

Round table discussion in HRA data workshop

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Dimensions to be defined for clear data comparison (1)

- Data source
 - event report
 - full scope simulator
 - partial scope simulator
 - small-scale experiment
- Data form to be exchanged
 - raw data including simulation records and event records
 - performance/reliability data using formalized templates
 - statistical estimates such as HEP, PSF multipliers, and recovery factors
- Human error/task level
 - (Abstraction hierarchy)

Dimensions to be defined for clear data comparison (2)

- Target HRA methods
 - general
 - specific to (method)
- Environments basically assumed
 - internal event? external event?
 - staffing/environmental issues
- PSFs evaluated (coverage)
 - meta PSF
 - PSF variable / contextual variable

Issue found in comparison of CBDTM and HuREX (1)

- CBDTM (Cause-Based Decision Tree Method)
 - Developed by Parry [1992] at EPRI
 - Implemented in EPRI HRA Calculator
 - Failure mechanisms

Type	Designator	Description
Failures in the Operator–Information Interface	$p_c a$	Data not available
	$p_c b$	Data not attended to
	$p_c c$	Data misread or miscommunicated
	$p_c d$	Information misleading
Failures in the Operator-Procedure Interface	$p_c e$	Relevant step in procedure missed
	$p_c f$	Misinterpret instruction
	$p_c g$	Error in interpreting logic
	$p_c h$	Deliberate violation

The screenshot displays the EPRI HRA Calculator software interface. The main window is titled "EPRI HRA Calculator" and features a menu bar with options like "Menu Options", "Import/Export", "Procedures", "Locations", "LER Screening", "Crew Composition", "New", "Recalculate all", "Create New DAF", "Report Options", "PRA DocAssist Report", and "Help". Below the menu bar, there are several tabs: "Summary", "HFE-LLOCARECIRC", and "CBDTM/THRP". The "CBDTM/THRP" tab is active, showing a "Basic Event" window. The "Basic Event" window has a "BE ID" field containing "HFE-LLOCARECIRC" and a "Description" field containing "Operators switch SI to ...LLOCA on low RWST low". Below these fields, there are several sections for defining failure mechanisms. The "Equipment Accessibility (Cognitive)" section includes a "Location" dropdown set to "MCR" and an "Accessibility" dropdown set to "Accessible". The "pc Failure Mechanism" section lists several mechanisms with associated probabilities and HEP values. The "Pcb: Failure of attention" mechanism has a probability of 0.0e+000 and an HEP of 1.5e-004. The "Pcc: Misread/miscommunicate data" mechanism has a probability of 0.0e+000 and an HEP of 0.0e+000. The "Pcd: Information misleading" mechanism has a probability of 0.0e+000 and an HEP of 0.0e+000. The "Pce: Skip a step in procedure" mechanism has a probability of 0.0e+000 and an HEP of 3.0e-003. The "Pcf: Misinterpret instruction" mechanism has a probability of 0.0e+000 and an HEP of 0.0e+000. The "Pcg: Misinterpret decision logic" mechanism has a probability of 0.0e+000 and an HEP of 0.0e+000. The "Pch: Deliberate violation" mechanism has a probability of 0.0e+000 and an HEP of 0.0e+000. The "Initial Pc =" field is set to 3.2e-003, and the "Effective Tw (Minutes)" field is set to 29.00. The "Procedure" section shows a step number of 13 and a revision number of 1. The "Notes" section is empty.

Issue found in comparison of CBDTM and HuREX (2)

Cognitive Activity	ID	Task type	EOO	EOC
Information gathering	1	Verifying alarm occurrence	* Pcb (Data not attended to) * Pca (Data not available) – special case	* Pcc (Data misread or miscomm.) * Pcd (Information misleading) – special case
	2	Verifying state of indicator		
	3	Synthetically verifying information		
	4	Reading simple value		
	5	Comparing parameter		
	6	Comparing in graph constraint		
	7	Comparing for abnormality		
	8	Evaluating trend		
Response Planning	9	Entering step in procedure	* Pce (Relevant step in procedure missed)	* Pcf (Misinterpret instruction) * Pcg (Error in interpreting logic)
	10	Transferring procedure		
	11	Transferring step in procedure		
	12	Directing information gathering		
	13	Directing manipulation		
	14	Directing notification/request		
Situation Interpreting	15	Diagnosing		
	16	Identifying overall status		
	17	Predicting		
Execution	18	Manipulating simple (discrete) control		
	19	Manipulating simple (continuous) control		
	20	Manipulating dynamically		
	21	Notifying/requesting to the outside of MCR		

Issue found in comparison of CBDTM and HuREX (3)

<HEP of Pcf Misinterpret instruction>

p_{cf}	Standard, unambiguous wording	All required information	Training on step	Nominal probability
Yes				(a) neg.
				(b) 3.0E-3
				(c) 3.0E-2
				(d) 3.0E-3
No				(e) 3.0E-2
				(f) 6.0E-3
				(g) 6.0E-2

Issue found in comparison of CBDTM and HuREX (4)

<HEP of Pcf Misinterpret instruction>

CBDTM node	Standard, unambiguous wording	All required information	Training on step	HEP in CBDTM	Success # in HuREX	Failure # in HuREX	HEP in HuREX
Similar HuREX variable	Clarity of decision-making criteria	Previous information not required	Scenario familiarity				
Branch1	Yes	Yes	-	neg.	14701	123	8.30E-03
Branch2	Yes	No	Yes	3.00E-03	1432	12	8.31E-03
Branch3	Yes	No	No	3.00E-02	898	9	9.92E-03
Branch4	No	Yes	Yes	3.00E-03	551	2	3.62E-03
Branch5	No	Yes	No	3.00E-02	279	1	3.57E-03
Branch6	No	No	Yes	6.00E-03	8	0	0.00E+00
Branch7	No	No	No	6.00E-02	6	0	0.00E+00

Issue found in comparison of CBDTM and HuREX (4)

<HEP of Pcf Misinterpret instruction>

This value reflects failures of all mechanisms and all relevant PSF effects

CBDTM node	Standard, unambiguous wording	All required information	Training on step	HEP in CBDTM	Success # in HuREX	Failure # in HuREX	HEP in HuREX
Similar HuREX variable	Clarity of decision-making criteria	Previous information not required	Scenario familiarity				
Branch1	Yes	Yes	-	neg.	14701	123	8.30E-03
Branch2	Yes	No	Yes	3.00E-03	1432	12	8.31E-03
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Branch4	No	Yes	Yes	3.00E-03	551	2	3.62E-03
Branch5	No	Yes	No	3.00E-02	279	1	3.57E-03
Branch6	No	No	Yes	3.00E-03	8	0	0.00E+00
Branch7	No	No	No	3.00E-02	6	0	0.00E+00

This value only deals with failures of misinterpreting instructions and the relevant PSF effects

>> How can we reasonably understand or employ the results for applications?