

IDHEAS dependency model and guidance (IDHEAS-DEP)

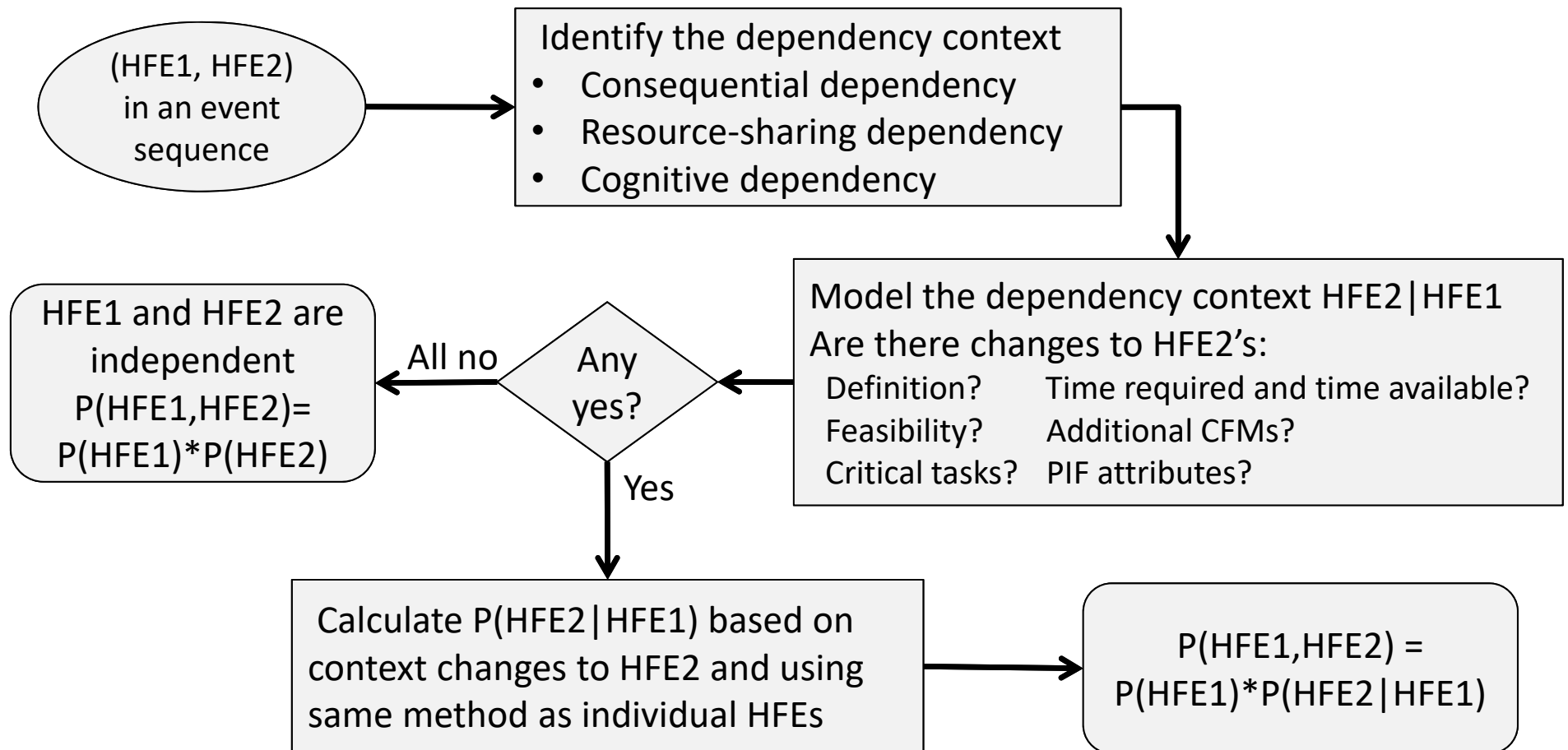
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Presented by Jing Xing to the public meeting on IDHEAS
April-08-2021

Overview

1. IDHEAS Dependency Model
2. NRC 2021 HRA Dependency Workgroup
3. Guidance for using IDHEAS Dependency Model in HRA
4. Path forward with IDHEAS dependency

IDHEAS-G Dependency Model



“HFE2|HFE1” means the occurrence of event HFE2 given the occurrence of event HFE1, where HFE1 is the first event and HFE2 is the second event.

NRC HRA Dependency Workgroup

(Nov. 2020 – March 2021)

- **Purpose:** Understand HRA dependency and develop guidance for using IDHEAS Dependency Model
- **Activities:**
 - Phase 1: Six analysts each performed dependency analysis of an example event (from SDP or PRA models) using IDHEAS-ECA and IDHEAS Dependency Model
 - Phase 2: The project team developed the draft guidance and the analysts piloted it with the examples
 - Phase 3: The workgroup will review and comment on the fully written guidance
- **Workgroup members:**
 - A. Brown, C. Hunter, J. DeJesus, M. Pohida, and K. Tetter, Reliability And Risk Analysts, NRR and RES
 - A. Rosebrook, Sr. Reactor Analyst, Region II
 - K. Gunter, Lead Engineer, Jensen Hughes Company
 - M. Presley, Principal Technical Leader, EPRI

IDHEAS dependency guidance framework

Pre-determination:

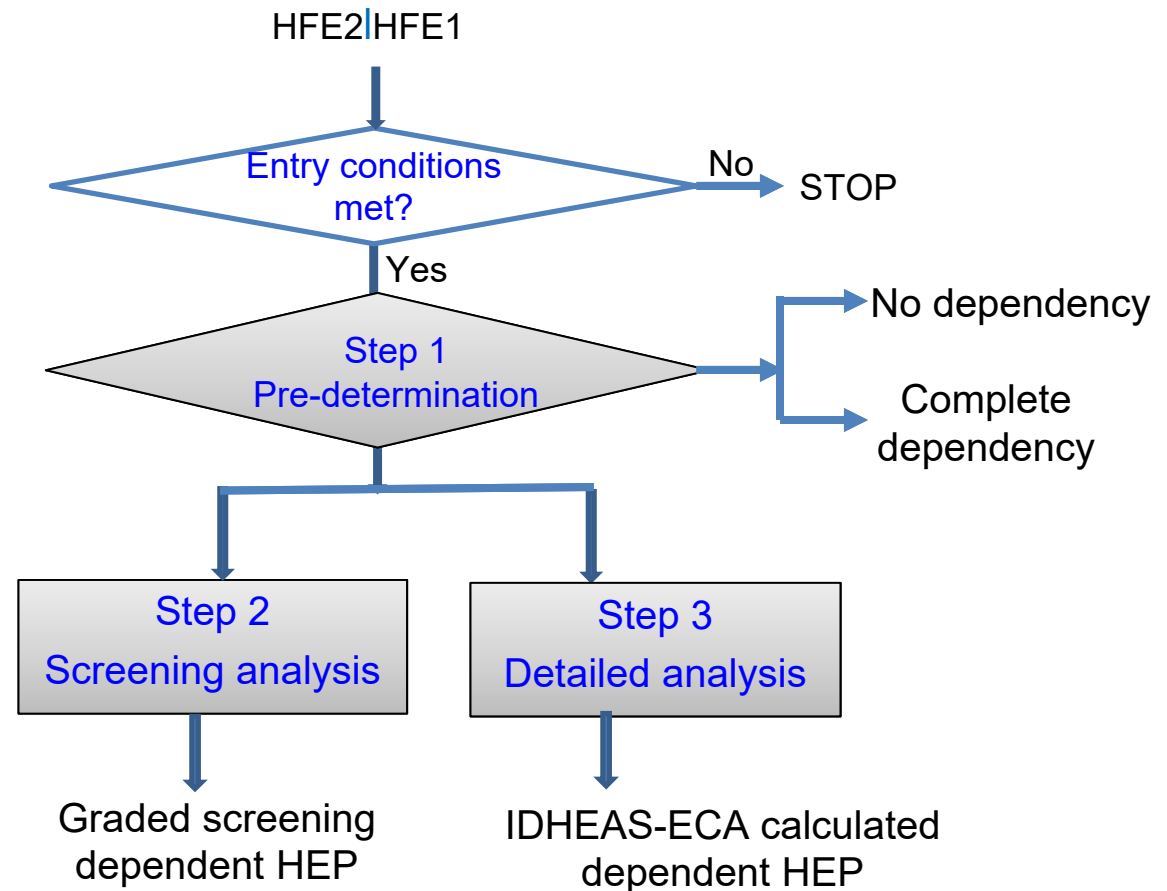
Assess the relationships between the HFEs for *no dependency*, *complete dependency*, or further analysis

Screening analysis:

Assessing screening dependent HEPs without using IDHEAS-ECA (for HRA applications where detailed information is not available or the individual HEPs of the HFEs were not from IDHEAS-ECA)

Detailed analysis:

Analyze dependency factors and their impact on HEPs using IDEHAS-ECA



Preliminary insights on IDHEAS dependency guidance

- IDHEAS dependency analysis is based on IDHEAS-G and IDHEAS-DATA
 - THERP dependency: Each relationship deems a multiplier
 - IDHEAS dependency: The context of each relationship is analyzed for its impact on the dependent HEP
- The assessed dependency is explainable on why the dependency occurs and how it impacts HEPs
 - Enhanced HRA traceability and documentation
 - Explicit identification of dependency mechanisms for reducing dependency
- Preliminary piloting of the draft dependency guidance dependency shows promise
 - that the dependent HEPs calculated from IDHEAS dependency model were more consistent with analysts' assessment, not overly conservative

Path forward with IDHEAS dependency

- IDHEAS Dependency Model in IDHEAS-G report (NUREG-2198) Appendix K, in publication, 2021
- Publish *The guidance for using IDHEAS Dependency Model (IDHEAS-DEP)* as a NRC Research Information Letter and collect public comments – summer 2021
- Document and publish the dependency analysis examples from the NRC Dependency Workgroup – summer 2021
- Update IDHEAS-ECA report and software tool by incorporating IDHEAS dependency guidance – winter 2021