



Standardized Plant Analysis Risk (SPAR) Model Philosophy

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Model Uses

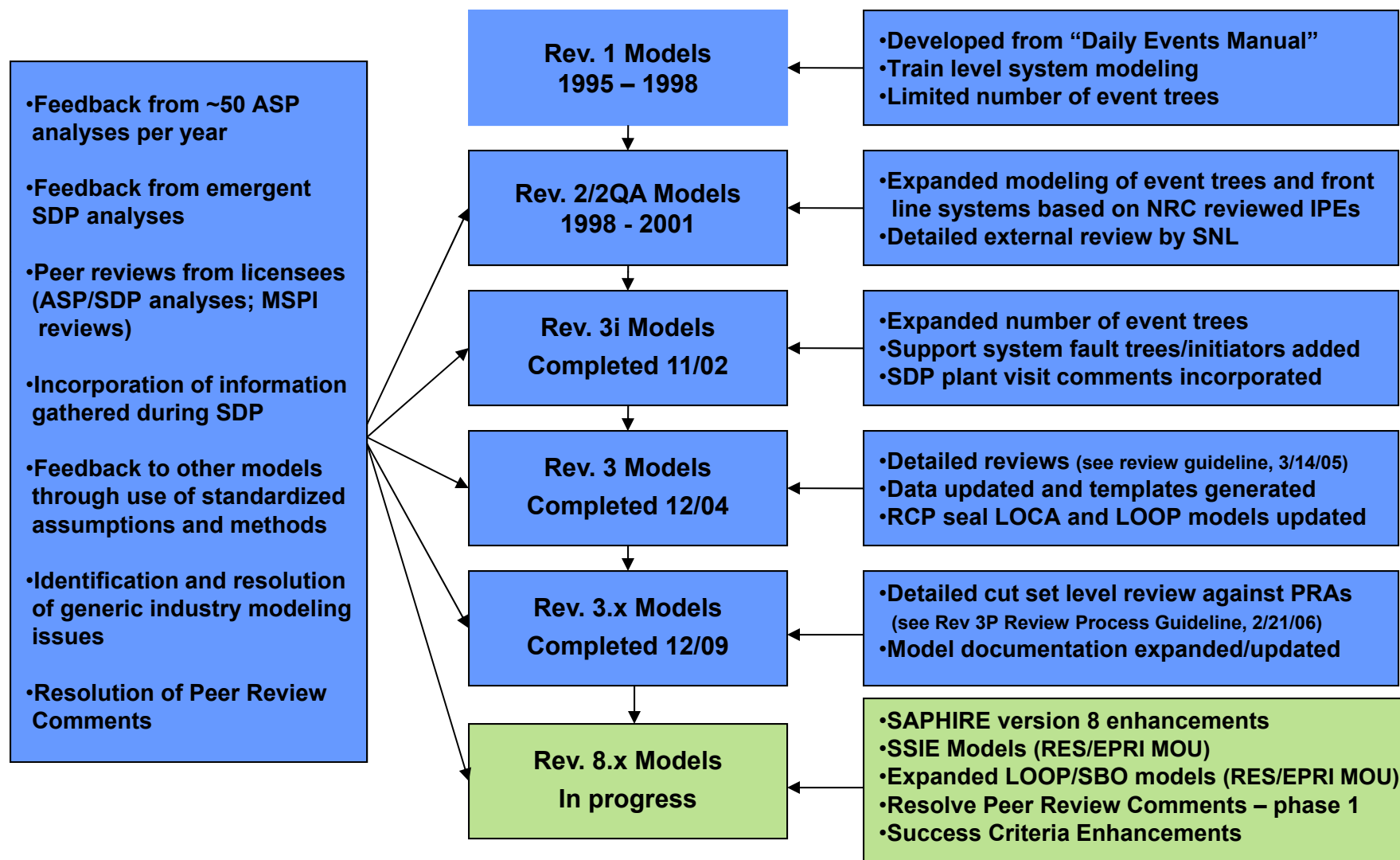
- Reactor Oversight
 - Significance Determination Process (SDP)
 - Notices of Enforcement Discretion (NOEDs)
 - Management Directive MD 8.3 Incident Investigation Assessments
 - Accident Sequence Precursor Program
- System & Component Studies
- Generic Issue Screening
- Special Studies



SPAR Technical Adequacy

- Unlike licensee PRA models that support risk-informed licensing actions, SPAR models are not required to minimum technical adequacy requirements (e.g., RG 1.200).
- SPAR QA program helps to ensure SPAR models reflect as-built, as-operated plant
- Process controls also help to ensure quality
 - Trained/certified analysts
 - Internal reviews
 - External reviews

SPAR Level 1 Model Development





Capabilities

- Operating Reactors
 - 75 full-power, internal events models representing all operating plants
 - 18 IPEEE-based external hazard models
 - 4 “All Hazard Models”
 - 8 Shutdown template models
 - 3 Level 2 feasibility models
 - 1 Integrated Capability Model
- New Reactors
 - ABWR – GE & Toshiba (SD)
 - APWR
 - AP1000 (seismic, flooding, fire, LPSD)
 - US EPR



Development Philosophy

- Provide independent, plant-specific PRA models for use by agency risk analysts
 - “[I]ndependent oversight of licensee performance is critical for effective NRC oversight and is an important aspect of upholding public confidence in the [SDP] process” (letter from EDO to NEI, October 2007, ML072490566)
- Use standardized modeling conventions
 - Standardization approach supports plant-specific modeling
 - Ease of use for agency analysts
 - Efficient model maintenance and updating



Development Philosophy

- Support event and condition assessment (ECA) activities
 - SAPHIRE user “workspaces” structured to support ROP
 - SPAR models designed to efficiently address typical ECA activities (e.g., CCF, LOOP modeling)
- Apply agency resources in a cost-effective manner
 - SPAR models generally not as detailed as licensee models (with some exceptions)
 - SPAR generally relies on licensee PRA modeling assumptions (supported with some independent analysis)



Quality Assurance

- SPAR Quality Assurance Plan
- SPAR Project Manager Handbook
- Risk Assessment of Operational Events (RASP) Handbook
 - Helps to ensure that the SPAR models are of adequate quality, reflect the as-built, as-operated plant for the problem being analyzed, and are used in a consistent manner.
- Model Maker Guidelines (MMGs)
 - All Hazard Models
 - Shutdown
 - Integrated Capability Modeling



Quality Assurance

- Onsite verification reviews
 - Onsite reviews conducted during MSPI benchmarking activities
 - Onsite reviews conducted for new modeling elements (e.g., shutdown, fire, external hazards)
- SPAR Configuration/Version Control
- SAPHIRE Quality Assurance Plan
 - Independent Verification and Validation for SAPHIRE 8
 - NUREG/BR-0167, “Software Quality Assurance Program and Guidelines” compliant QA program, including annual audits



Maintenance Program

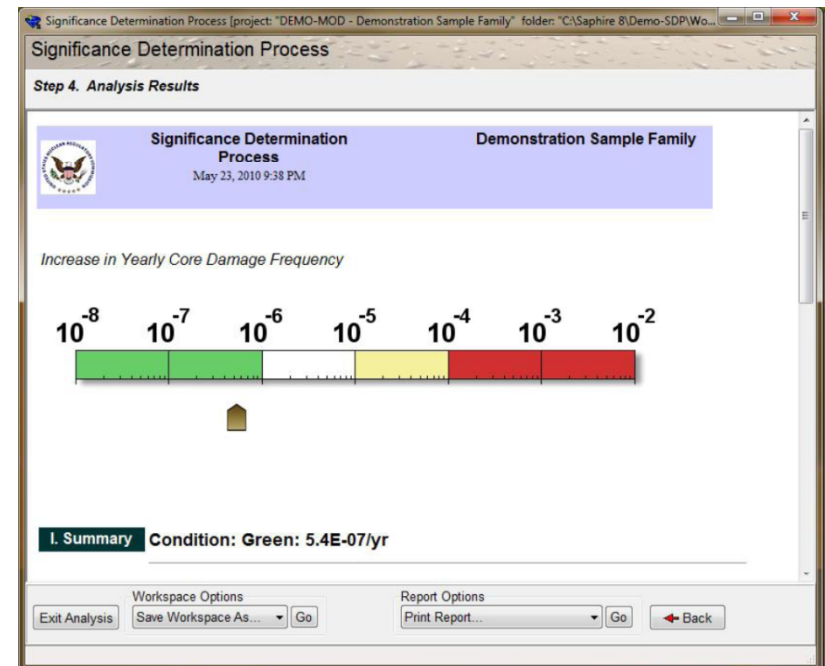
- Major updates are performed on approximately 8-12 SPAR models per year based on feedback from model users and licensees
 - Less significant model changes are performed on an additional 20-30 models per year to support risk assessments for specific regulatory applications
 - Approximately one half of the plant-specific SPAR models are typically updated in a given year



SAPHIRE

SAPHIRE (Systems Analysis Programs for Hands-on Integrated Reliability Evaluation)

- Performs logic solving and Boolean reduction to generate PRA cutsets from event tree/fault tree models
- NRC sponsored code developed at Idaho National Lab.
- Developed to Support Event and Condition Analysis
 - Workspaces (SDP, ECA, GA)
 - CCF Module
 - Cut set editor
 - Reporting Capabilities
- NUREG/BR-0167 Compliant QA Program





Questions?