北京全路通信信号研究设计院
Beijing National Railway Research & Design Institute of Signal & Communication

Research on Organization-level Safety Assurance System

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ACCIDENT←→ SAFETY

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Introduction on CRSC

- The Main Signalling System Supplier

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Introduction on CRSC

- The Top Signalling System Integrator




The key points of SAS

- The safety culture
- The project safety organization structure
- The project safety activities
- The monitor on project safety work, and
- The key safety control points (the safety milestones)

Safety culture

- Essential for an organization to deliver safety critical products and system integration services
- The headline of safety policy of CRSC

Safety is the Life and Commitment of CRSC

- Example of detailed safety policy

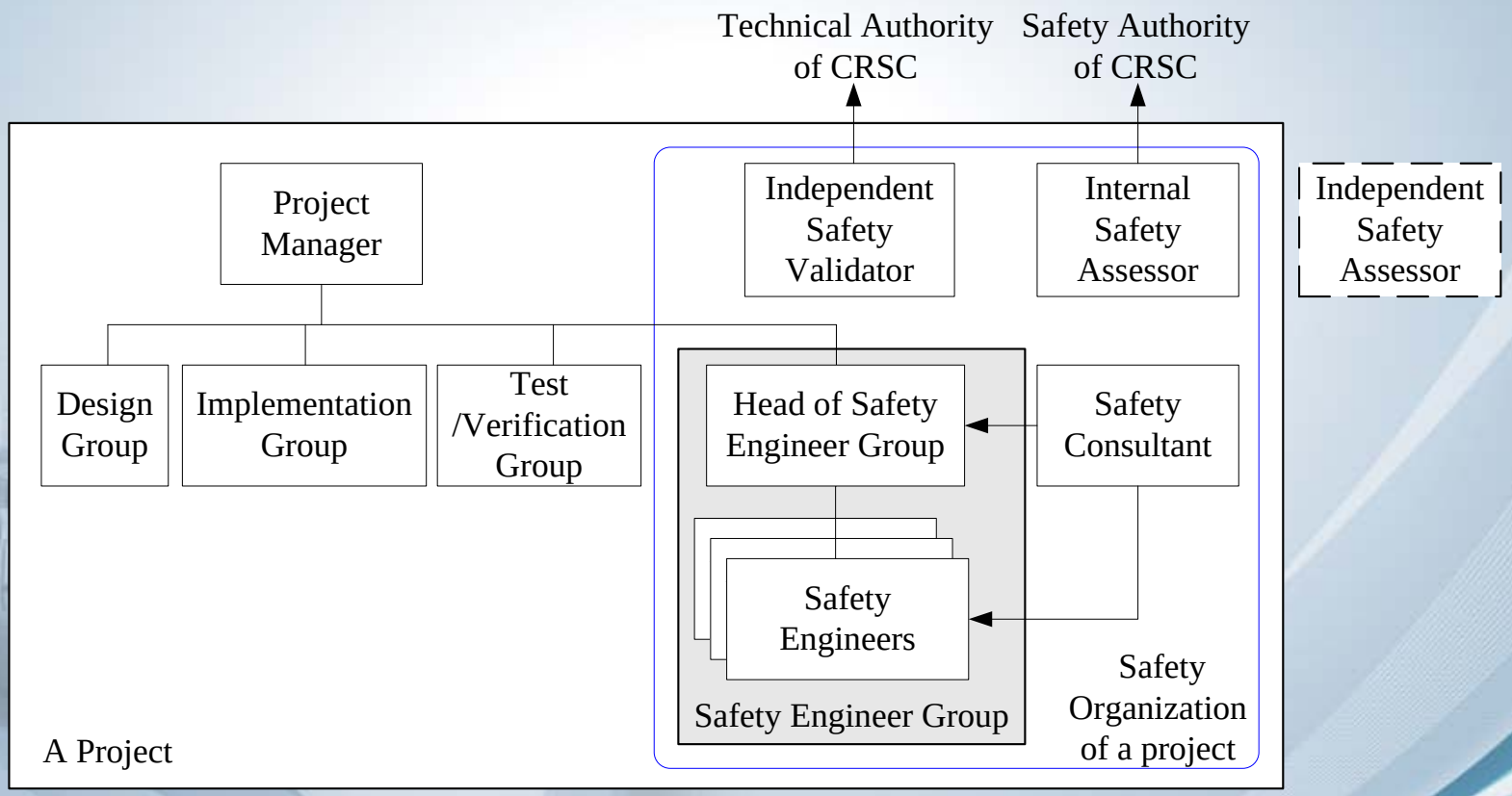
The dynamicity of the safety policy implies that any measure that may facilitate refining or improving the safety policy shall be welcomed and encouraged

Project safety organizations and independence(1 /2)

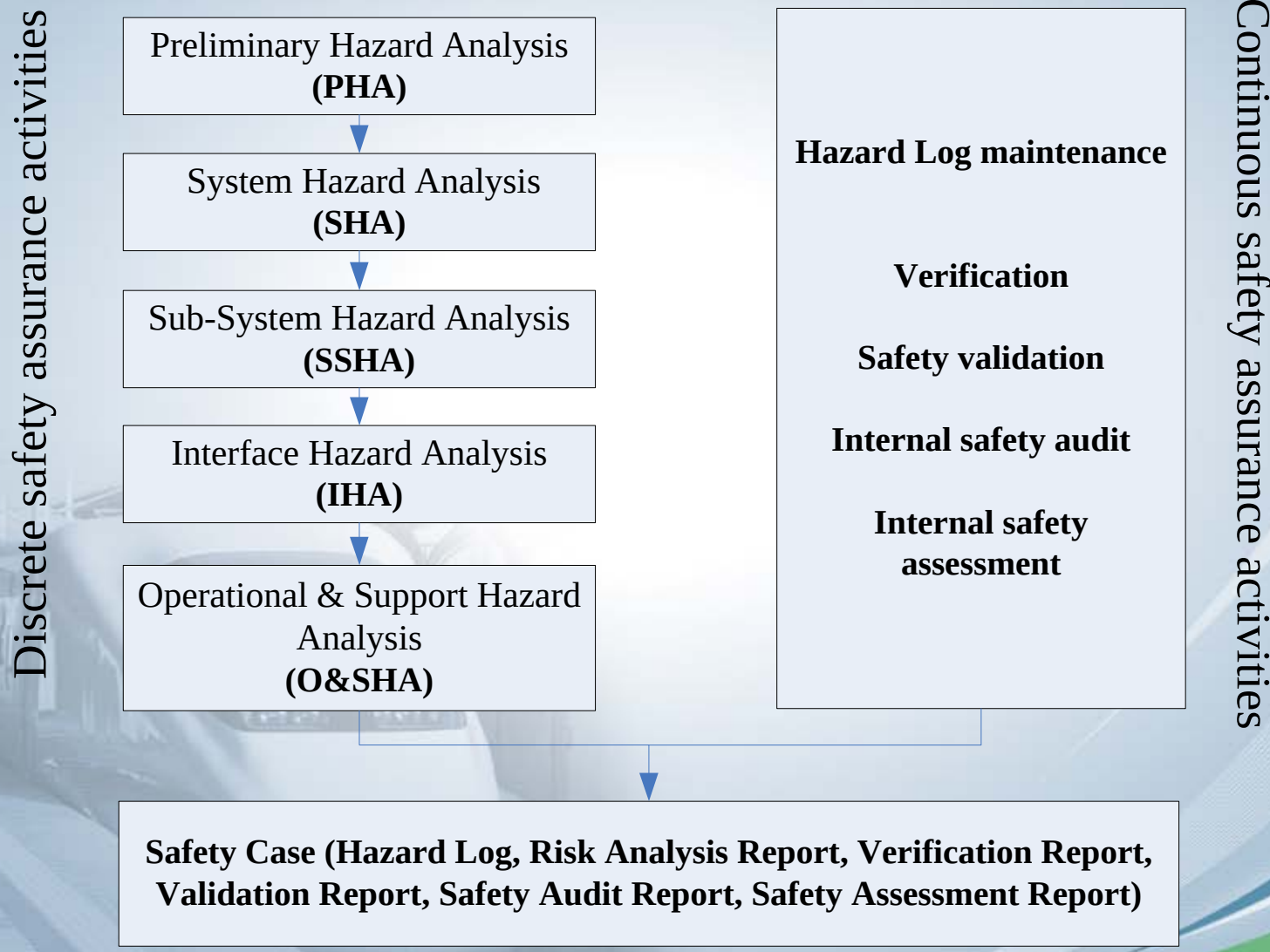
- Safety assurance for the project
- Project safety monitoring

Project safety organizations and independence(2/2)

- Safety organization of a project



The project major safety assurance activities(1/6)



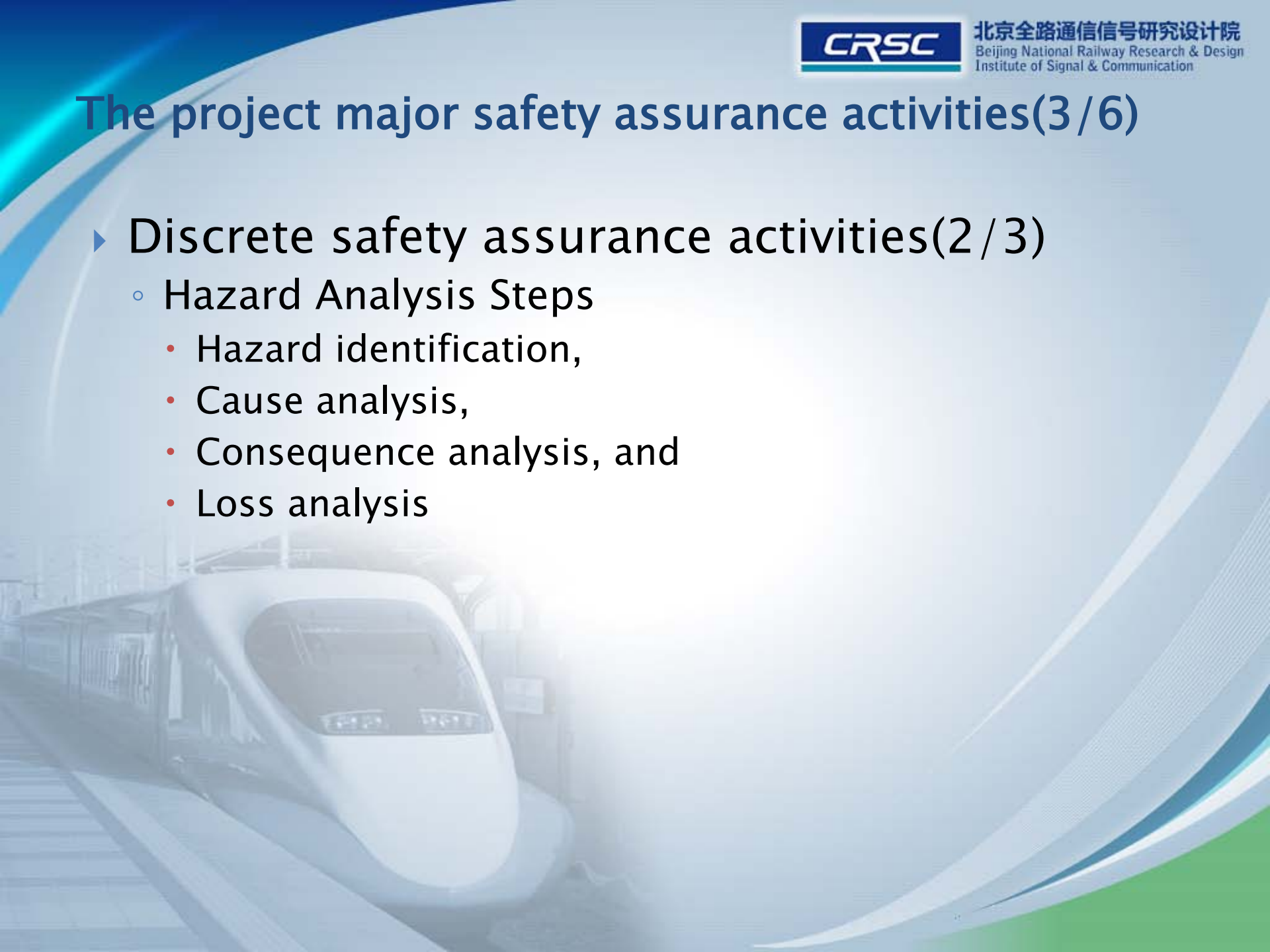
The project major safety assurance activities(2/6)

- Discrete safety assurance activities(1/3)
  - Illustration of hazard analysis types in a system integration project

Levels being analysed	PHA	SHA	SSHA	IHA	O&SHA
System levels	√	√		√	√
Subsystems/ subcontractors levels			√	√	√

The project major safety assurance activities(3/6)

- Discrete safety assurance activities(2/3)
  - Hazard Analysis Steps
    - Hazard identification,
    - Cause analysis,
    - Consequence analysis, and
    - Loss analysis



The project major safety assurance activities(4/6)

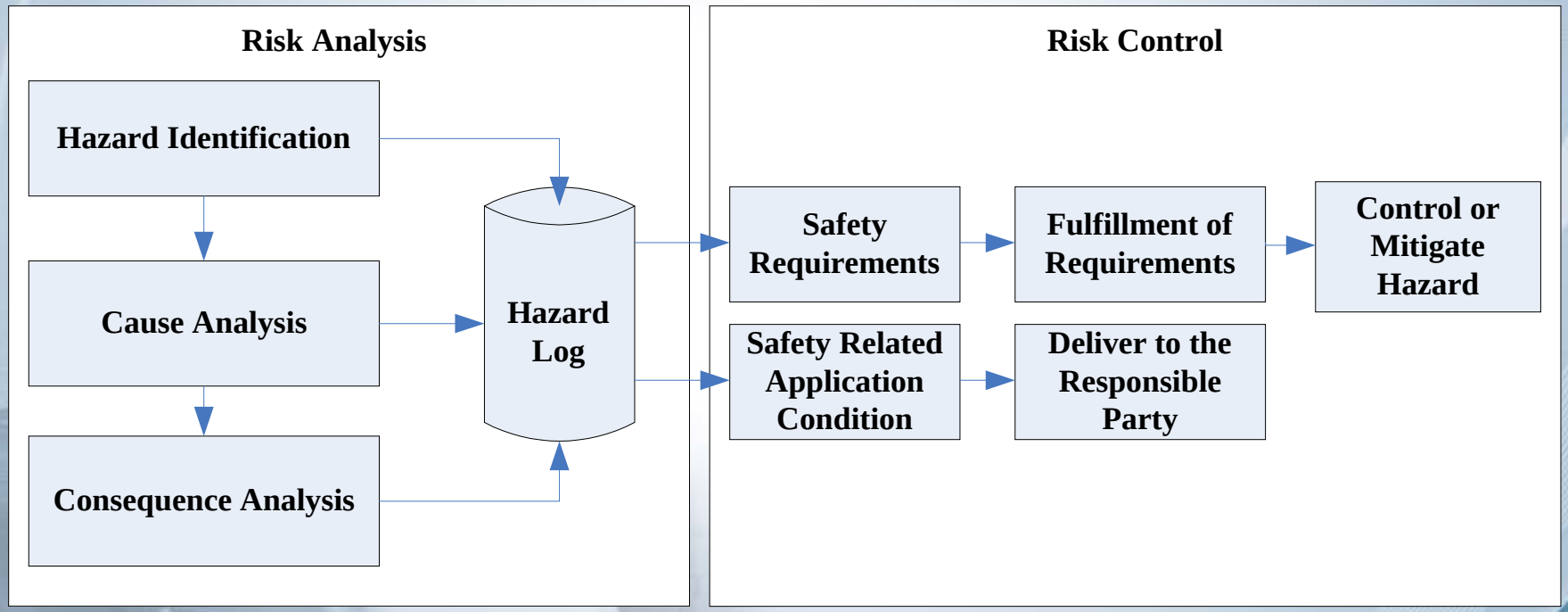
- Discrete safety assurance activities(3/3)
  - Hazard Analysis Techniques
    - HAZard and Operability Studies (HAZOP),
    - Brainstorming,
    - Fault Tree Analysis (FTA),
    - Event Tree Analysis (ETA),
    - Failure Mode and Effects Analysis (FMEA), and
    - Etc.

The project major safety assurance activities(5/6)

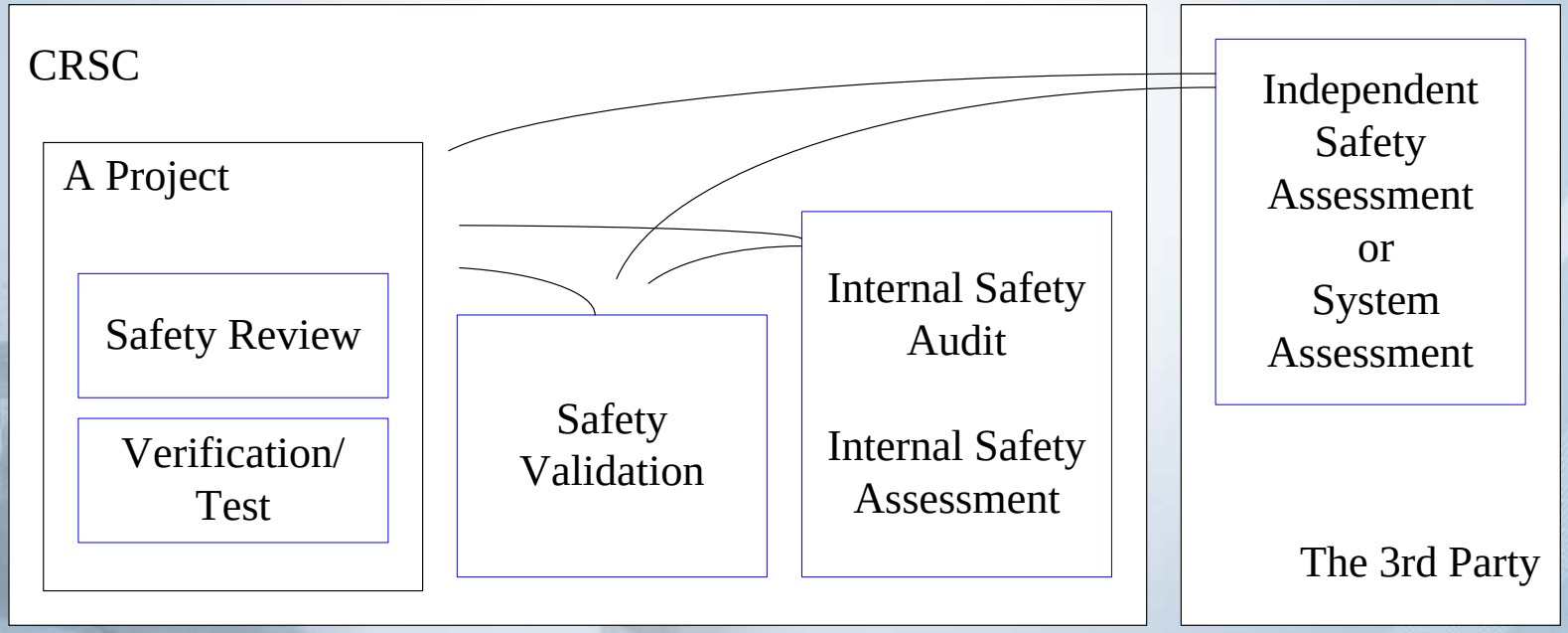
- Continuous safety assurance activities(1/2)
  - Hazard log maintenance,
  - Verification,
  - Safety validation,
  - Internal safety audit, and
  - Internal safety assessment

The project major safety assurance activities(6/6)

- Continuous safety assurance activities(2/2)



Monitoring on project safety activities



Safety milestones(1 /2)

- For signalling R&D projects
  - Generic products or generic applications
  - Safety milestone:

SM1	PERMISSION TO SYSTEM DELIVERY

Safety milestones(2/2)

- For signalling system integration projects
  - Specific applications
  - Safety milestones:

SM1	PERMISSION TO FIELD TEST
SM2	PERMISSION TO TRIAL OPERATION
SM3	PERMISSION TO COMMERCIAL OPERATION

Conclusion

- An organization-level SAS is essential for top Chinese signalling product supplier and system integrator like CRSC.
- The SAS of CRSC combines European safety assurance concepts and best practices.

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Thank you for your attention!

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