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リーダーシップとマネジメント

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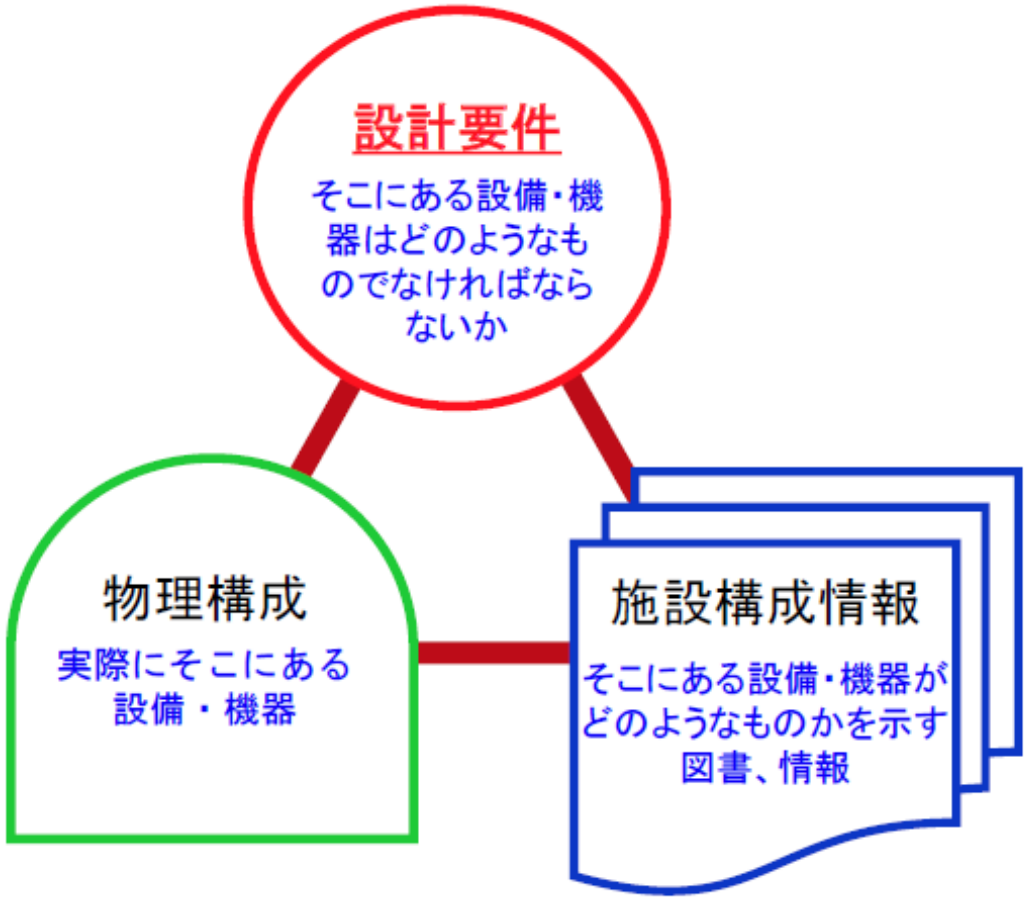
この講義は、北大・工・修士の集中講義「新型軽水炉安全工学」として実施しました

考えてみよう

- 運転経験が蓄積すると共に、システムの改善点が見つかることがあります。
- ある原発では、津波対策のために最終ヒートシンクを構成する海水ポンプをピット化していましたが、引き波対策を自動化するためにピット内に潮位計を設置することにしました。
- この改善には、どのような安全上の問題があるでしょうか？

コンフィギュレーション管理



- 施設を設計した通りの状態に維持し続けるには、実物と図面を比較するだけでは不十分
- 個々の機器の安全上の位置づけ性能検証の範囲、ケーブル壁などの配置がどのような役割を持っているかなど、言語化することが重要

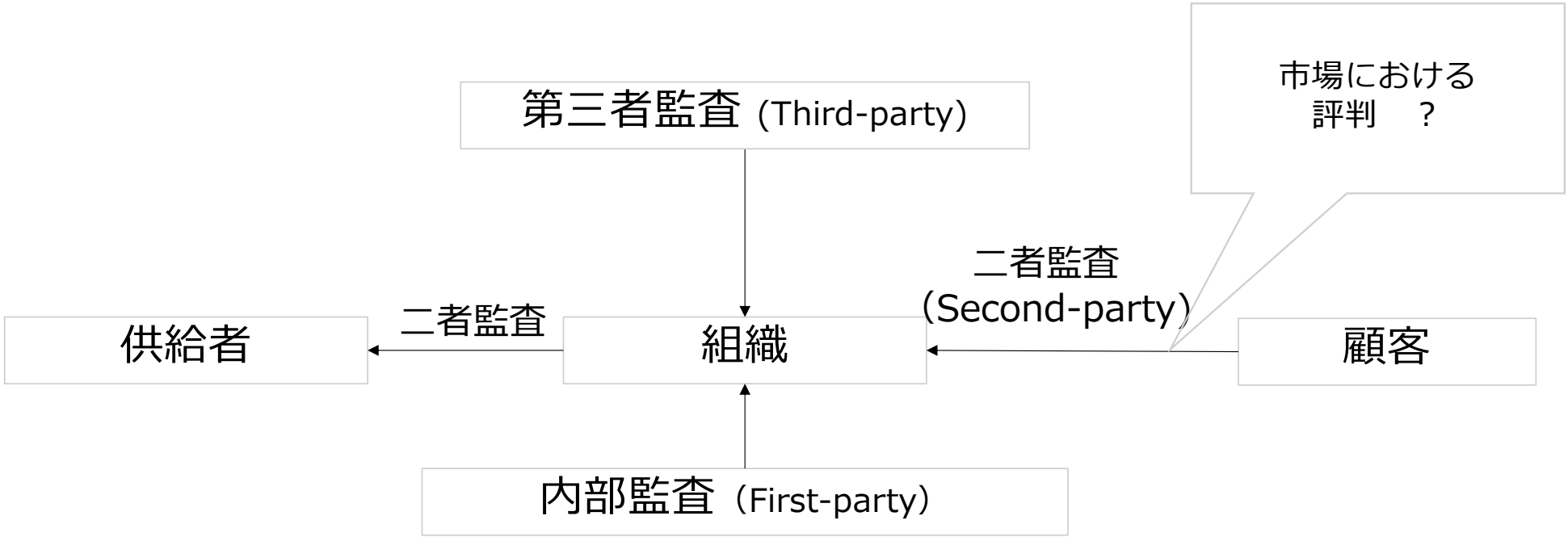
Browns Ferry 1号機　火災事故 (1975)

https://www.nrc.gov/docs/ML1321/ML13210A179.pdf

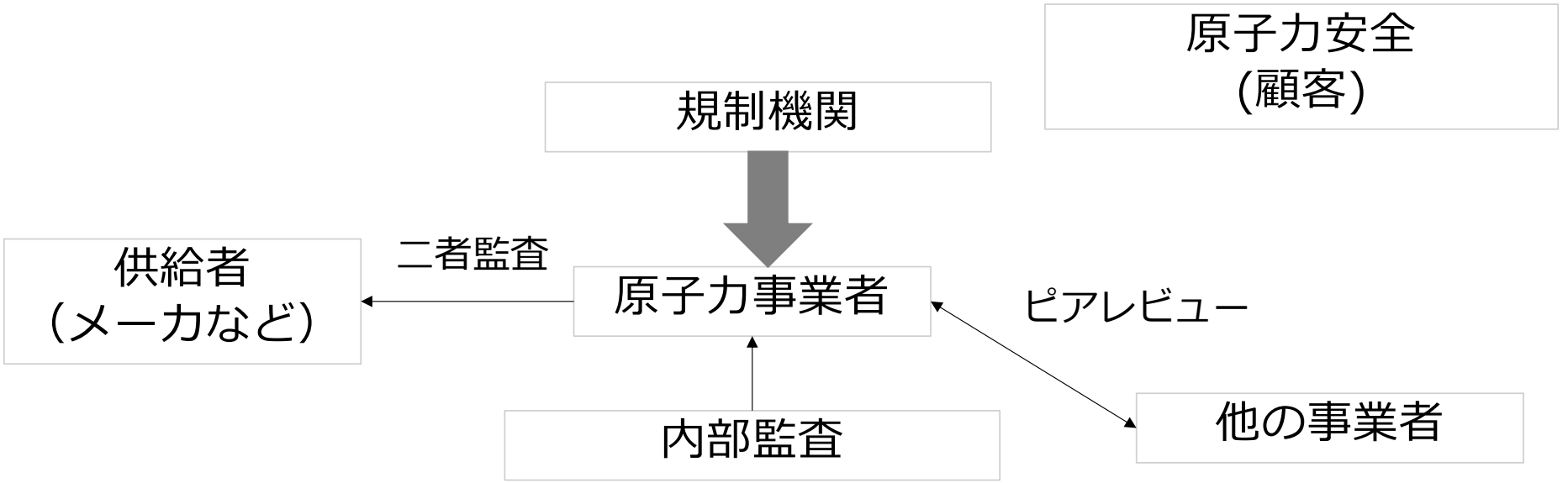
【1】出典：The Browns Ferry Nuclear Plant Fire of 1975 Knowledge Management Digest (NUREG/KM-0002, Revision 1), P2

監査の枠組み(Audit)

サプライチェーン



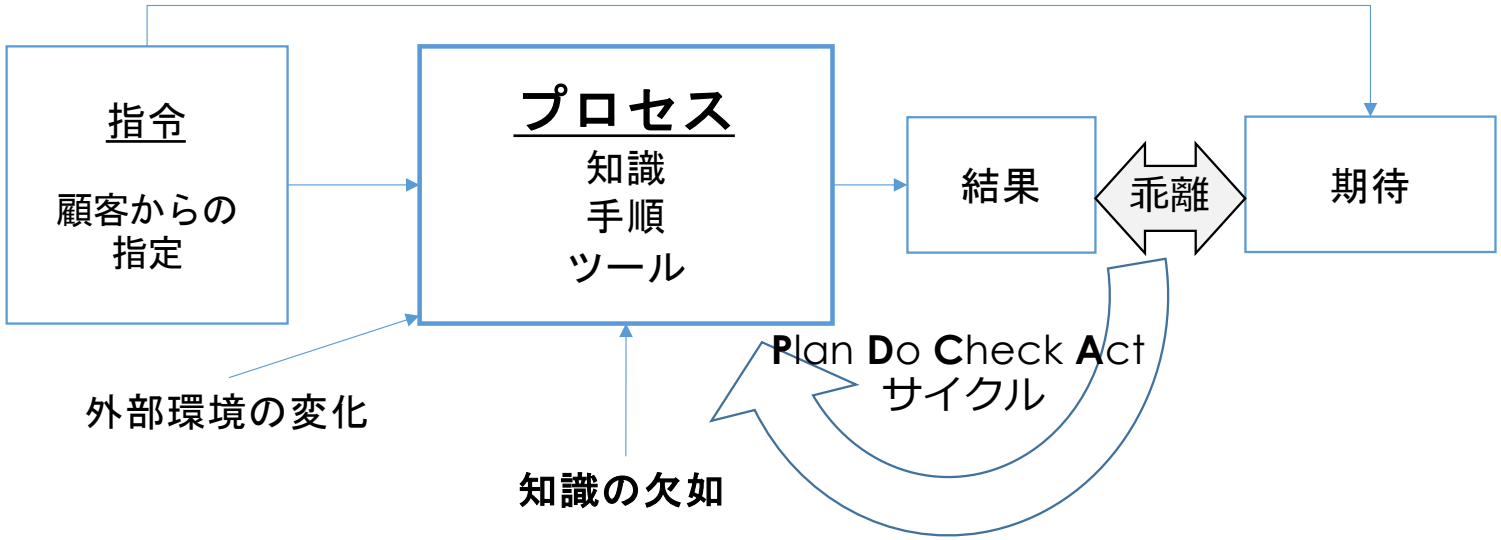
原子力安全マネジメントの枠組み



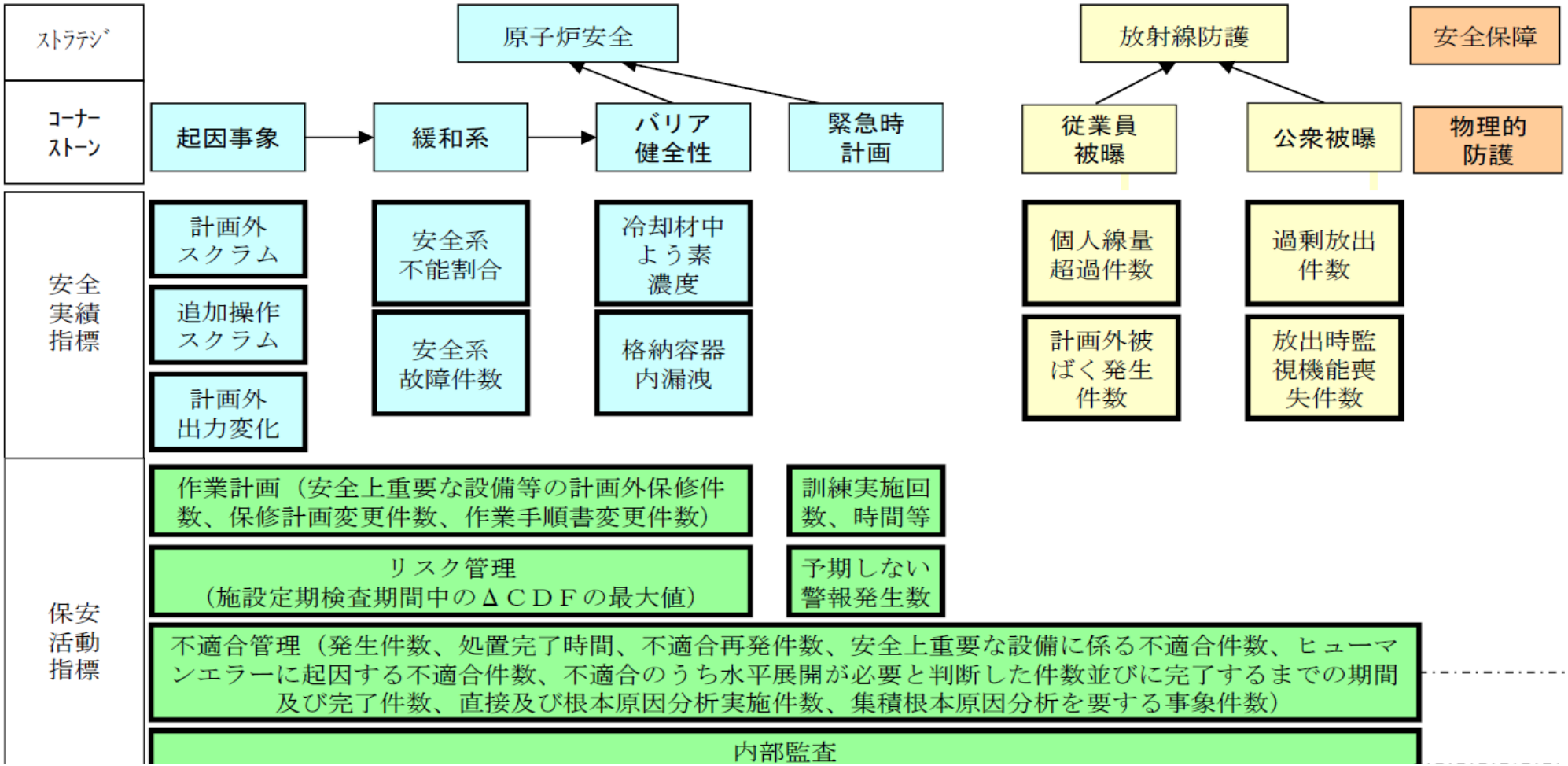
マネジメントシステム ISO-9001:2015

- Process Approach
- Risk-based thinking
- Continuous Improvement

リスク: 不確かさの影響



検査制度



【2】出典：検査制度見直しに関する事業者説明会 平成29年3月10日 検査制度見直しについての説明, 参考4, 原子力規制委員会アーカイブ検索システム（ベータ版）

考えてみよう

- ある原発では、タービンから原子炉へと冷却水を送り込む復水ポンプに故障が検出されたので、原子炉をタービンから隔離して、緊急炉心冷却系を使って炉心を冷やすことにしました。
- 別の原発では、毎月実施しているサーベランス試験において、緊急炉心冷却系の高圧注水ポンプが起動しないことが発覚したので、運転を停止することにしました。

- どちらの事象のほうが危険度が高いでしょうか？

国際原子力事象評価尺度

TABLE 1. GENERAL CRITERIA FOR RATING EVENTS IN INES

IAEA INES User's Manual 2008

Description and INES Level	People and the environment	Radiological barriers and controls at facilities	Defence in depth
Major accident Level 7	- Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures.		
Serious accident Level 6	- Significant release of radioactive material likely to require implementation of planned countermeasures.		
Accident with wider consequences Level 5	- Limited release of radioactive material likely to require implementation of some planned countermeasures. - Several deaths from radiation.	- Severe damage to reactor core. - Release of large quantities of radioactive material within an installation with a high probability of significant public exposure. This could arise from a major criticality accident or fire.	
Accident with local consequences Level 4	- Minor release of radioactive material unlikely to result in implementation of planned countermeasures other than local food controls. - At least one death from radiation.	- Fuel melt or damage to fuel resulting in more than 0.1% release of core inventory. - Release of significant quantities of radioactive material within an installation with a high probability of significant public exposure.	
Serious incident Level 3	- Exposure in excess of ten times the statutory annual limit for workers. - Non-lethal deterministic health effect (e.g. burns) from radiation.	- Exposure rates of more than 1 Sv/hr in an operating area. - Severe contamination in an area not expected by design, with a low probability of significant public exposure.	- Near accident at a nuclear power plant with no safety provisions remaining. - Lost or stolen highly radioactive sealed source. - Misdelivered highly radioactive sealed source without adequate radiation procedures in place to handle it.
Incident Level 2	- Exposure of a member of the public in excess of 10mSv. - Exposure of a worker in excess of the statutory annual limits.	- Radiation levels in an operating area of more than 50 mSv/h. - Significant contamination within the facility into an area not expected by design.	- Significant failures in safety provisions but with no actual consequences. - Found highly radioactive sealed orphan source, device or transport package with safety provisions intact. - Inadequate packaging of a highly radioactive sealed source.
Anomaly Level 1			- Overexposure of a member of the public in excess of statutory limits. - Minor problems with safety components with significant defence in depth remaining. - Low activity lost or stolen radioactive source, device or transport package.
No safety significance (Below scale/Level 0)			

【3】出典：INES: The International Nuclear and Radiological Event Scale User's Manual, IAEA, 2013, P3

リーダーシップとマネジメントの関係

	Leadership Coping with change	Management Coping with complexity
What are we setting out to do?	1. Set Direction Develop a vision and strategies to achieve that vision; setting high but reasonable standard	1. Plan and Budget Develop a detailed steps and timetables and allocate resources
How do we deliver results?	2. Align People Communicating direction to influence creation of teams and coalitions that understand vision and strategy	2. Organize and Staffing Establish a structure to achieve the plan; delegate authority and provide policies and procedures
What do we make it happen?	3. Motivate, Mentor, Inspire Energizing people to develop and overcome barriers to change	3. Control and Problem Solving Monitor and organize
What are the outcomes?	4. Produce Change Often to a dramatic degree, such as cultivating new services and new approaches	4. Produce Predictability and Order Consistently achieve budgets and targets

Kotter (1990) and (1999) https://hbr.org/2001/12/what-leaders-really-do

【4】出典：Kotter J. P. (1990). What leaders really do. Harvard business review, 68(3), 103–111 を元に作図

リーダーシップの成熟度

5 (Highest)	Proactive, Focused on learning, Appropriate transfer of authority to people at all levels
4	Proactive, People in the organization are deeply involved in decision making
3	Proactive, Transferred authority
2	Still reactive, But decisions by various levels of management are noted
1 (Lowest)	Reactive, Top-down approach

ISO-9001-2009 Appendix B

【5】出典：ISO 9001:2009 Appendix Bを元に作図

参考文献

- International Atomic Energy Agency, “Leadership and management for safety” GSR-part 2、2016

- 三代義雄、ISOマネジメントシステム強化書 ISO9001:2015: -規格の歴史探訪からAnnex SLまで、オーム社、2016

- 近藤寛子、改革の過程から規制の進化を探る (原子力検査制度の変化と一貫性を両立させるコーナーストーンとは) 、ERC出版、2019年

出典一覧

No.	ライセンス	出典情報
【1】	‡	The Browns Ferry Nuclear Plant Fire of 1975 Knowledge Management Digest (NUREG/KM-0002, Revision 1), P2, https://www.nrc.gov/reading-rm/doc-collections/nuregs/knowledge/km0002/index.html
【2】	‡	検査制度見直しに関する事業者説明会 平成29年3月10日 検査制度見直しについての説明, 参考4, 原子力規制委員会アーカイブ検索システム（ベータ版）, https://www.da.nra.go.jp/view/NR100021518
【3】	‡	INES: The International Nuclear and Radiological Event Scale User's Manual, IAEA, 2013, P3, https://www.iaea.org/publications/10508/ines-the-international-nuclear-and-radiological-event-scale-users-manual
【4】	‡	Kotter J. P. (1990). What leaders really do. Harvard business review, 68(3), 103–111 を元に作図
【5】	‡	ISO 9001:2009 Appendix Bを元に作図