Development of Early Warning Indicators Based on Incident Investigation

PSAM 9

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Overview of presentation

- Introduction
- Approach and results
  - Description of incident
  - Analysis of incident
  - Identification of barriers
  - Development of checkpoints and early warning indicators
  - Adaptation of frequency of data collection
- Conclusions
- Further work

Introduction
Challenge & solution

- Challenge:

  Political acceptance for exploration of oil and gas in the Northern Regions (Barents Sea and Lofoten) depends on public confidence in the ability to produce oil and gas without any harmful spills

- One solution:

  Use early warning indicators to improve the ability to produce oil and gas without any harmful spills

- Objective of work/paper:

  To explore the possibility of developing early warning indicators based on incident investigation

Approach and results

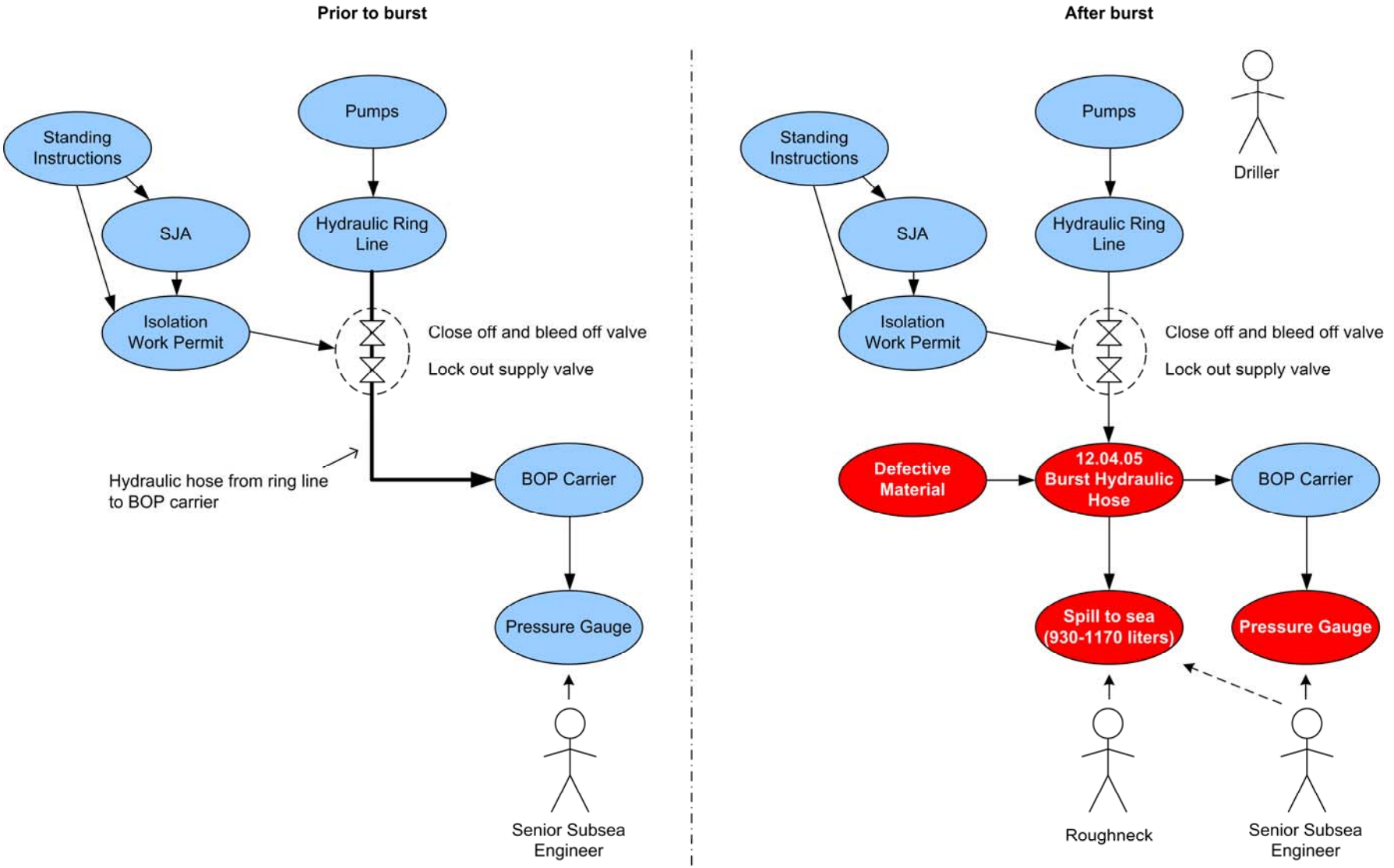
1. Describe incident
2. Analyze incident using influence diagrams
3. Identify barriers
4. Develop checkpoints and early warning indicators
5. Adapt the frequency of data collection to each indicator

1. Description of incident (I)

- April 12, 2005
- 1000 liters oil
- 18 days delay
- Media attention

Eirik Raude

1. Description of incident (II)



2. Analysis of incident

“Minor but complex”

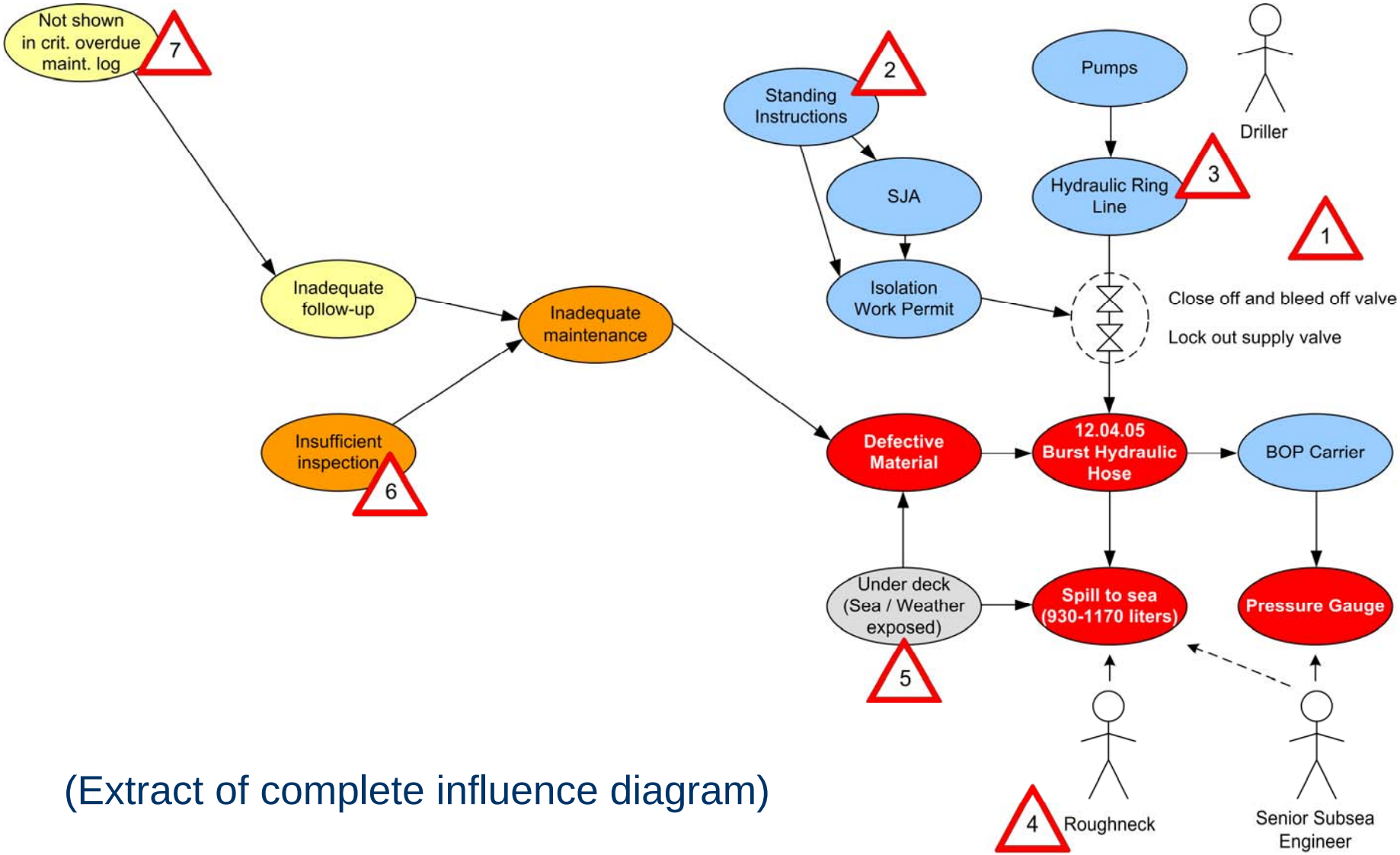
Direct cause

- Mechanical wear and tear

Contributing cause

- Inappropriate design/construction
- Failure to warn/notify about difficult access for inspection
- Inadequate maintenance and maintenance routines
- Vague organization of responsibilities – management of change
- Lack of knowledge/training

3. Identification of barriers



(Extract of complete influence diagram)

4. & 5. Development of checkpoints and early warning indicators (results)

Barrier		Checkpoint
1	Close off/lock off valves for system isolation	Check depressurization of isolated systems
2	Use of standing instructions for system de-isolation	Check use of WP/SJA when de-isolating system
3	Visual inspection of system prior to use	Check that visual inspection is carried out
4	Monitoring of valve operation	Spot check presence of watchman
5	Use of system under controlled weather condition	Check/verify that restrictions are followed
6	Inspection of hoses according to PM program	Check/follow-up PM-program
7	Review of critical overdue maintenance log	Check the critical overdue maintenance log

Early warning indicators		Data collection frequency
1	Rate of inadequate depressurization of isolated systems	Daily
2	Rate of inadequate use of WP and SJA	Daily/Weekly
3	Rate of inadequate visual inspection of system prior to use	Daily/Weekly
4	Rate of inadequate use of a watchman	Daily
5	Rate of failure to comply with weather restrictions	Daily/Weekly
6	Number of PM work orders for hydraulic hoses in backlog	Weekly/Monthly/Quarterly
7	Number of critical CM work orders in backlog	Weekly/Monthly/Quarterly

Conclusions

- The preliminary work has shown that it is possible to develop early warning indicators based on incident investigation (but this is of course strongly influenced by the quality and depth of the incident investigation)
- The set of early warning indicators, when finalized, can be further developed into a practical tool to be used by e.g. the oil company representative (or environmental advisor)
- Several of the proposed checkpoints/indicators may have prevented the oil leak at Eirik Raude, if they had been in use prior to the incident

Further work

- The indicators need to be made operational and to be validated (at least obtain necessary face validity)
- Need to develop early warning indicators or other control measures to avoid harmful spills from major accidents (e.g. blowouts) and discharge of “regular” spills

The end

Time to wake up …

Thank you for your attention!