

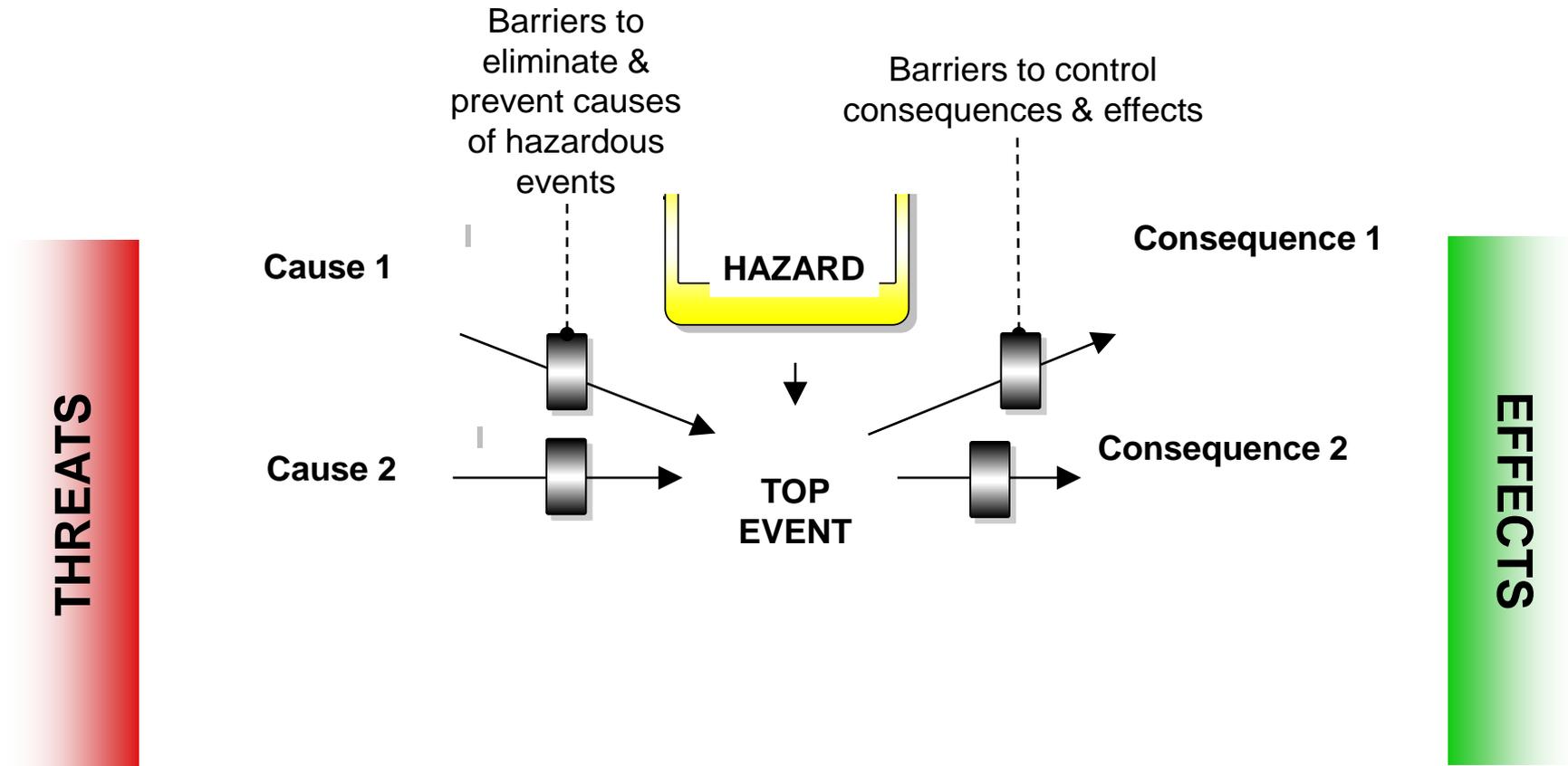


What new design requirements are needed to provide assurance that BOPs will cut and seal effectively under foreseeable operating conditions?

Forum on Next-Generation BOP and Control Systems Technology, Management, and Regulations
May 22, 2012

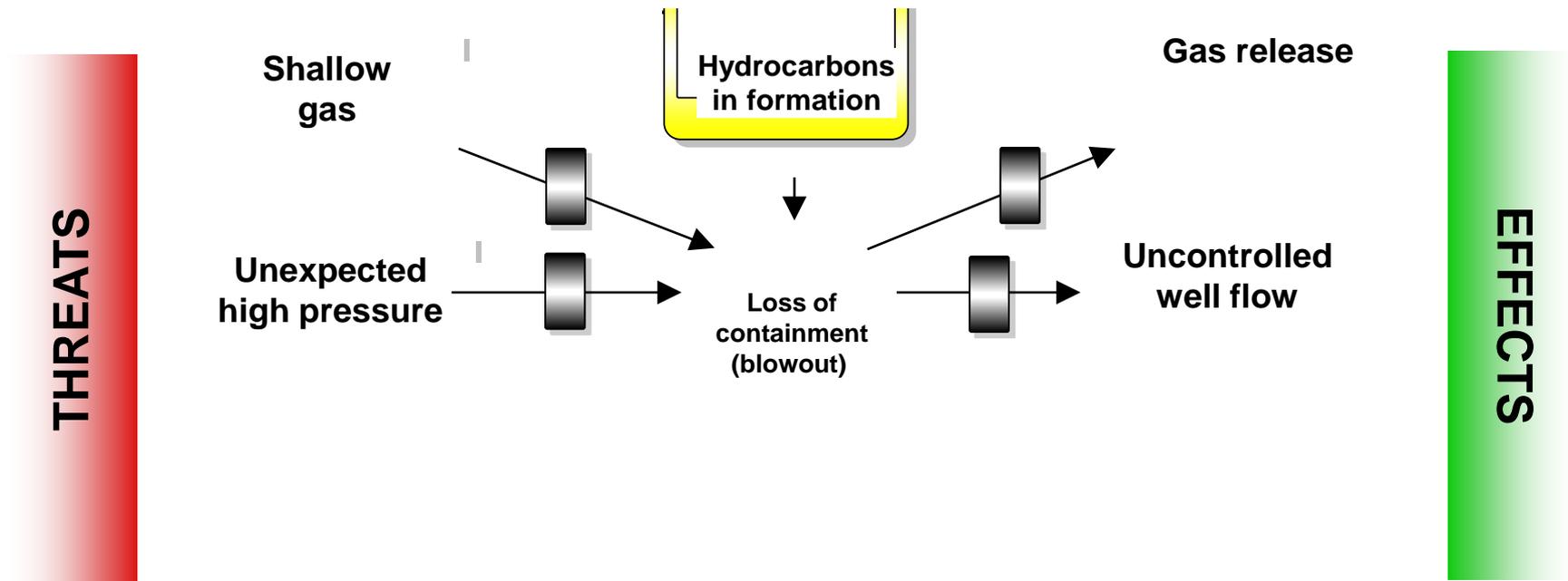
Bryce Levett, Director Risk Management Solutions, DNV North America

The role of a BOP



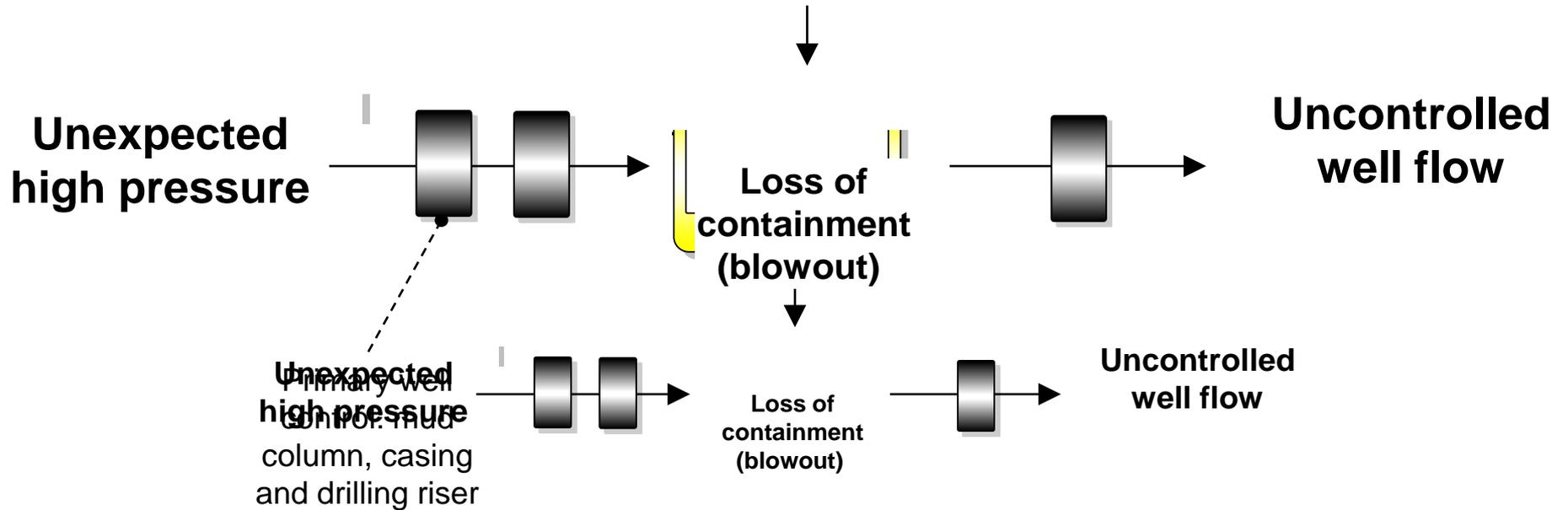
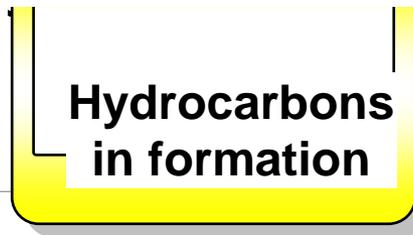
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The role of a BOP



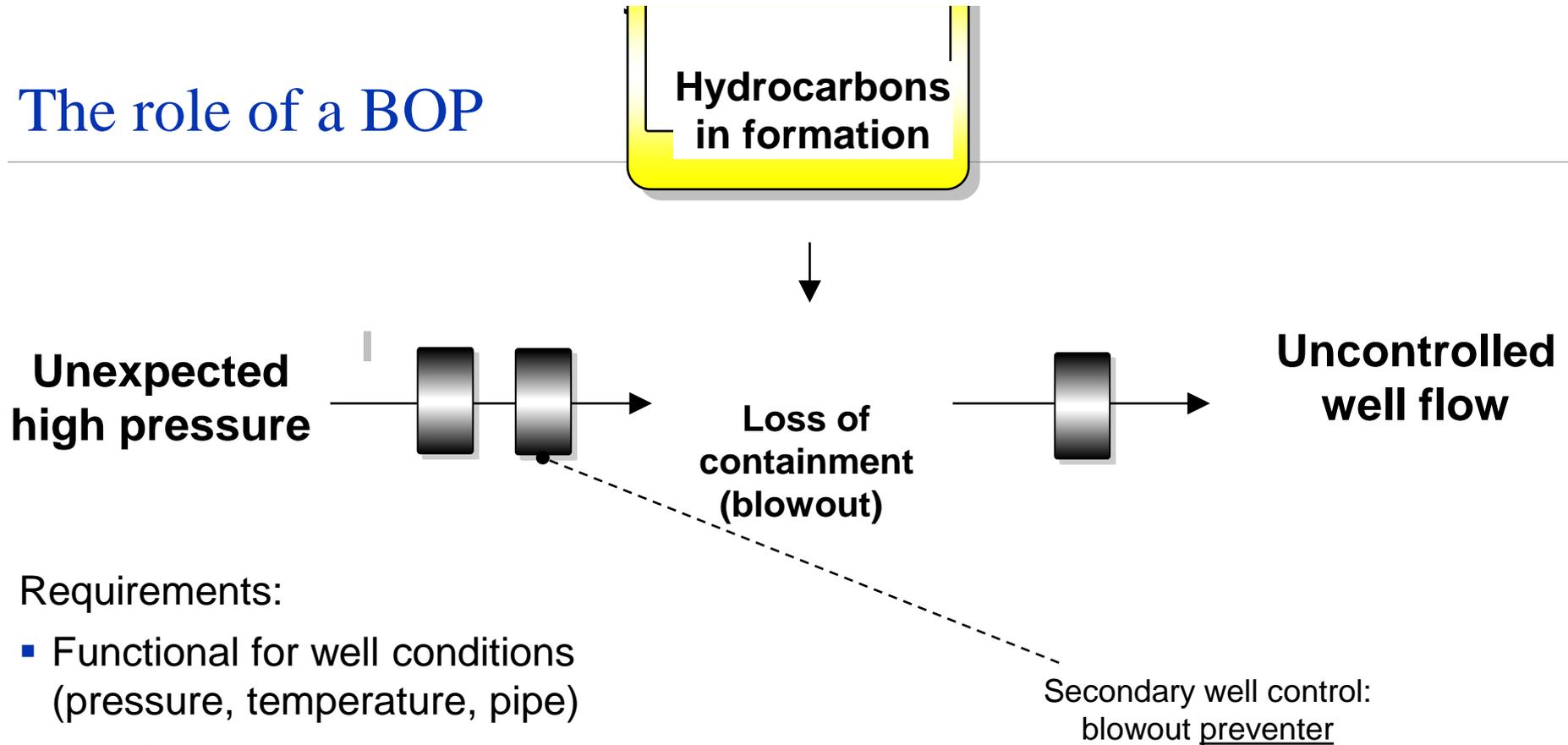
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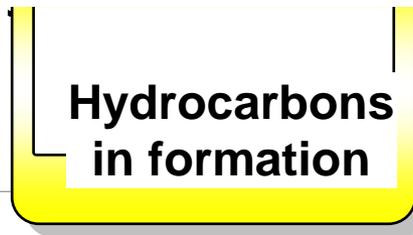


Requirements:

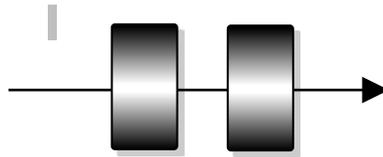
- Functional for well conditions (pressure, temperature, pipe)
 - Verification and testing
- Work on demand
 - Monitoring
 - Verification of state
- Activated when needed
 - Human elements
 - Monitoring of well
- Continuous learning
 - Registration of successes, near misses and failures

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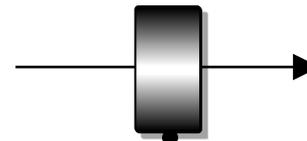
The role of a BOP



Unexpected high pressure



Loss of containment (blowout)



Uncontrolled well flow

Secondary well control:
Blowout arrester
blowout preventer

Requirements:

- Functional for well conditions (pressure, temperature, pipe, **and flow**)
 - Verification and testing
- Work on demand
 - Monitoring
 - Verification of state
- Activated when needed
 - **Human elements?**
 - **Automatic function**
- **After action** learning
 - **Black box recording**

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What new requirements are needed?

- Blowout preventer and arrestor. The role needs to be clearly defined (where it sits in the bowtie) in order to define requirements.
- Novel designs require functional specification rather than prescriptive
 - Should be based upon holistic risk assessment (foreseeable operating conditions)
 - Should establish required performance and not restrict solution
- Design requirements for control systems have to consider human decision making.
 - Establish potential human limitations then incorporate automatic functions
 - Address current conditions (well, equipment and inventories)
 - Black box to record all important parameters (like aviation)
- Design requirements set functional minimums
 - Designs can achieve better than minimum (allow continuous improvement)
 - What is best available / safest technology, when should it be adopted (grandfathering)?
- Should address relationship to other barriers

Safeguarding life, property and the environment

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