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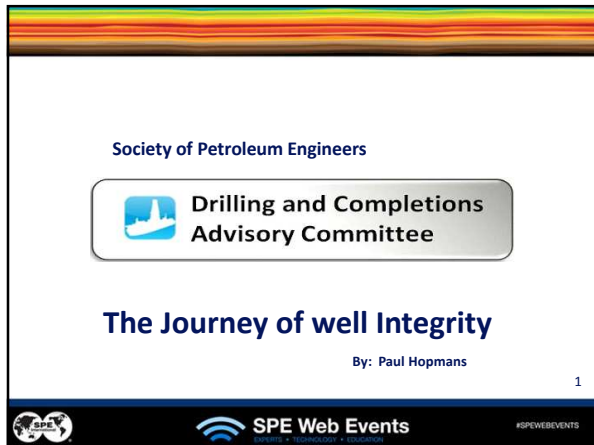
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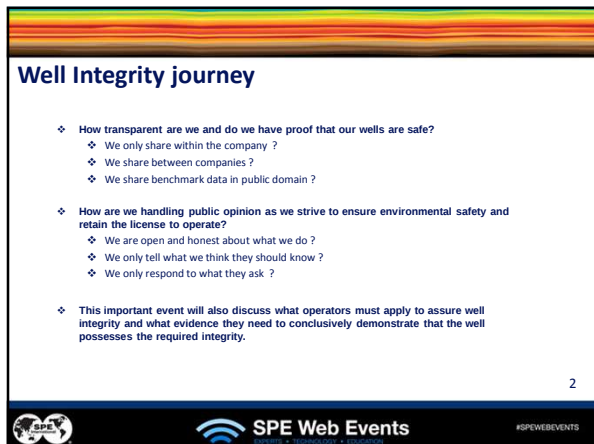
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# Q&A

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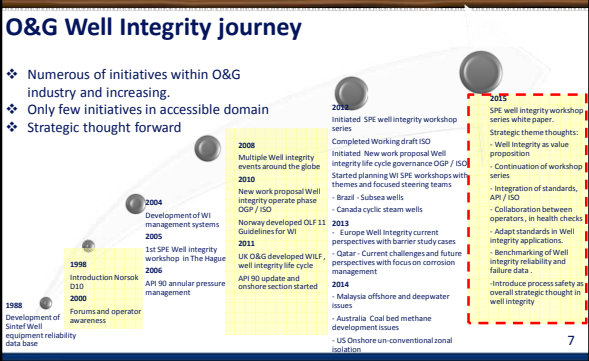
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## O&G Well Integrity journey

- Numerous of initiatives within O&G industry and increasing.
- Only few initiatives in accessible domain
- Strategic thought forward



**1988** Development of Sinter Well equipment reliability data base

**2000** Forums and operator awareness

**2004** Development of WI management systems

**2005** 1st SPE Well Integrity workshop in The Hague

**2006** API 90 annular pressure management

**2008** Multiple Well Integrity events around the globe

**2010** New work proposal Well integrity operate phase OGP / ISO

**2011** UK O&G developed WILF well integrity life cycle

**2012** API 90 update and onshore section started

**2013** Europe Well Integrity current perspectives with barrier study cases

**2014** Malaysia offshore and deepwater issues

**2015** SPE well integrity workshop series white paper.

**2015** Strategic theme thoughts:

- Well integrity as value proposition
- Continuation of workshop series
- Integration of standards, API / ISO
- Collaboration between operators, in health checks
- Adapt standards in Well integrity applications
- Benchmarking of Well integrity reliability and failure data
- Introduce process safety as overall strategic thought in well integrity

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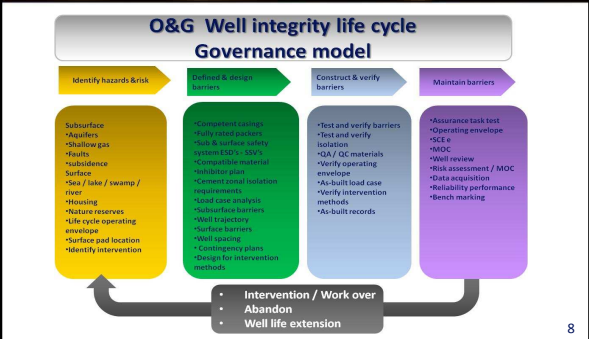
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## O&G Well integrity life cycle Governance model



**Identify hazards & risk**

- Subsurface
  - Aquifers
  - Shallow gas
  - Faults
  - Unstable
- Surface
  - Sea / lake / swamp / river
  - Housing
  - Nature reserves
  - Life cycle operating envelope
  - Surface geol location
  - Identify intervention

**Define & design barriers**

- Consistent catalog
- Fully rated pattern
- Sub & surface safety system (ESD, SIS)
- Compatible material
- Inhibitor plan
- Current control isolation requirements
- Cost care analysis
- Subsurface barriers
- Well trajectory
- Barrier barriers
- Well spacing
- Contingency plans
- Design for intervention methods

**Construct & verify barriers**

- Test and verify barriers
- Test and verify isolation
- QA / QC materials
- Verify operating envelope
- As-built load case
- Verify intervention methods
- As-built records

**Maintain barriers**

- Assurance task test
- Operating envelope (SCE)
- MOC
- Well review
- Risk assessment / MOC
- Data acquisition
- Reliability performance
- Bench marking

**Intervention / Work over**

- Abandon
- Well life extension

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## Industry well integrity outlook

- ❖ Industry will drill more wells in next decade than have been drilled in last 100 years
- ❖ Global well population is +/- 1.8 million, of which +/- 35 % has sustained casing pressure
- ❖ Public awareness and concern of zonal isolation requirements is increasing ( USA / Australia / Europe )
- ❖ Geothermal wells and CO2 sequestration wells are on the increase
- ❖ Subsidence is a risk in some depleting reservoirs
- ❖ Life cycle extension of aging assets is becoming a pre-requisite of legislators
- ❖ Zonal isolation challenges and assurance does need push in technology
- ❖ Abandonment of legacy wells is becoming more of a focus
- ❖ Industry collaboration is an inevitable pre-requisite on all topics

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## O&G Industry well integrity strategy

**Strategic theme thoughts:**

- ❖ Well Integrity as value proposition , demonstrate barriers are in place and transparent & accessible.
- ❖ Turn White papers of workshop series into industry standards, as appropriate.
- ❖ Integration of standards, API / ISO
- ❖ Collaboration between operators, in standards & health checks.
- ❖ Adapt standards in commercial Well integrity applications.
- ❖ Publish benchmarking of Well integrity reliability and failure data in accessible domain.
- ❖ Introduce process safety as overall strategic thought in well integrity.

❖ **How do we move forward as an industry**



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## Q&A

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Thank you for your time

For further information you can contact me at

[Paul.p.hopmans@shell.com](mailto:Paul.p.hopmans@shell.com)



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