OWL: An Integration & Analysis Hub for O&G IT

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"If I owned Hell and Texas, I'd live in Hell and rent out Texas."
Early industrial adopters include

- **HCLS**
  - heavy users of ontologies, including OWL
  - at least one novel scientific discovery with OWL already
- **Financials**: we think future is *very bright*, ironically:
  - OWL loves policy & regulatory apps
  - automated compliance checking, forensics
- **Defense**
  - OWL for integration across product lifecycle
  - Decision support & analysis apps (UAV planning)
- **Enterprise IT**
  - a laggard, but coming around slowly
What is the view globally?

- The EU is ahead and pulling away:
  - EU is ahead of the world and investing *heavily* in semantics
    - Defense is a special case
    - small startups (!!) -- a historic reversal
  - Far ahead in "heavy industry"
  - EU centralized funding ([FP7](https://en.wikipedia.org/wiki/FP7), currently) matters
- US is uncertain, though there are some signs of life:
  - HCLS is probably world leader; but really LS dominated
  - [Oracle's OWL](https://en.wikipedia.org/wiki/Oracle.owl) product *is crucial*
- China and Japan are mixed
  - China doing cutting-edge CS (including OWL) now
  - Japan leading in "digital cities", ubiquitous & small device apps

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What about "heavy" industry?

- Lags behind other front-line industries w/r/t SW adoption
- Signs of change:
  - ISO 15926 & POSC Caesar
  - Product Modeling Ontology (PMO) from SWOP (FP6)
  - this workshop
- Analogues in associated industries:
  - BIM (Building Information Modeling); see, e.g., NBIMS
  - Model-based Systems Engineering in manufacturing; see http://mbse.sysmod.de/
- These are precursor technologies: they will lead to SW adoption because of technical needs & "network effect"
Answering two questions...

What are we all doing here? I assume we're trying to see:
1. if there's enough "fit" between O&G and SW to make a match, and
2. if so, is there anything W3C can do to help

So:
1. What sorts of IT problems is Semantic Web technology especially well-suited to solve?
2. What sorts of IT problems do O&G companies have?
What is SW tech good for?

1. Information Integration
   - abstract, declarative, high-level knowledge formalisms
   - to enable, in a standardized & web-friendly way, integration of data models rather than data sources
   - with computational & logical guarantees & properties:
     - logical consistency, automated alignment & fusion
     - automated explanations, biz rules, high-level query

2. Decision Support & Analysis
   - represent complex problem domains in machine-readable form via ontology modeling
   - use existing tools & custom code to build analysis apps

3. Integrating (1) and (2)...The "hub" idea...
Integration & Analysis

- Simply put, the more integration you do, the more analysis you *can* do.
- The more analysis you do, the more integration you *must* do.
- The NASA workforce analytics example:
  - Analysis needs (locate experts) fueled integration
  - which makes possible additional analysis (career planning)
  - requiring additional integration
  - etc etc etc
- We've seen this pattern repeated in HCLS, defense, financial, enterprise IT, etc.
Does O&G IT do any of this?

- Looking at ISO 15926, talking to people in O&G IT, and looking at the papers in this workshop...
- O&G IT face integration, analysis, configuration management, optimization problems at large scales, both of data and conceptual complexity, of the sort that other industries increasingly turn to SW tech to address
- In short: yes!
Next Steps

- Many possibilities, some of which require W3C help
- C&P focuses on **OWL infrastructure tools** particularly delivering value using automated reasoning & inference
- Requires serious commitment to standards
- **OWL 2** contains some "new stuff" that is O&G relevant:
  - improved expressivity, limited datatype reasoning
  - **profiles**, especially OWL 2 RL, OWL 2 QL
  - annotations as an extension mechanism
  - OMG/UML interop & cooperation
- Till the next round of standardization:
  - **integrity constraints**, fine-grained closed world reasoning
  - more equational reasoning, datatype reasoning:
    - temporal, spatial, units & quantities
  - description graphs for part-whole relations
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- License OWL and other Semantic Web components for use in commercial products & in-house apps
- Build in-house apps for Fortune 500 customers & govt
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