



# SIG MMT



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Modelling, Methods, and Technology

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1. What is the purpose of SIG MMT?
  2. The POSC Caesar Trac as a tool for collaboration in SIG's
  3. Using templates to create rich and reliable semantic structures
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# POSC Caesar Special Interest Groups

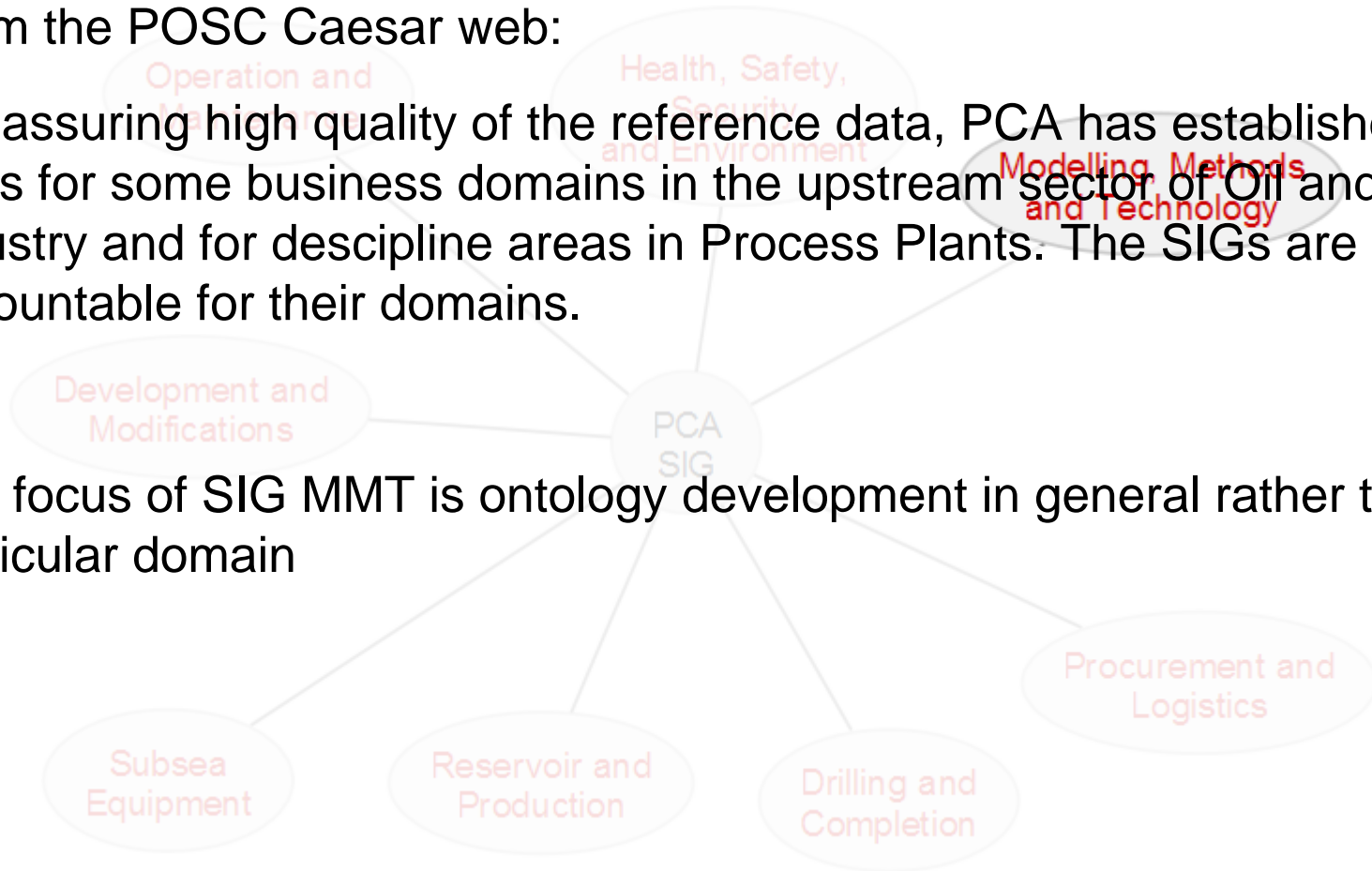
MANAGING RISK



- From the POSC Caesar web:

For assuring high quality of the reference data, PCA has established SIGs for some business domains in the upstream sector of Oil and Gas industry and for discipline areas in Process Plants. The SIGs are accountable for their domains.

- The focus of SIG MMT is ontology development in general rather than a particular domain



# Purpose of SIG MMT

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MANAGING RISK



- Investigate ISO 15926 Part 2 and propose changes
  - Identify best practises in modelling
  - Give advice on technologies for the implementation and practical application of ISO 15926
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## *Investigate ISO 15926 Part 2 and propose changes*

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- ISO 15926 Part 2 is a data model and an upper ontology
    - Generic categories such as *Class*, *Event*, *Parthood*
    - Canonical version in Express (ISO 10303)
    - Current implementations tend to prefer RDF and OWL
  - The POSC Caesar Reference Data Library (RDL) conforms to this model
  - Criticism has been directed at the upper ontology
    - Some ontological categories could be added to it
    - More constraints would be beneficial
  - Recent work has shown that we can get a lot done with what we have
  
  - Improving the standard is not crucial in the short term
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# *Identify best practises in modelling*

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- Widespread adoption of semantic modelling is something new
  - Basic ontology concepts need to be understood by contributors
    - Class versus individual
    - Comparison to OO approaches: Relations versus attributes
    - Open World
    - Expressive limitations versus programming languages
    - (Description) Logic
    - etc.
  - Complexity is unavoidable
    - Semantic models require more structure to be made explicit
  
  - Standardization of representation patterns is highly desirable
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- Tools specific to the POSC Caesar Reference Data Library
    - Reference Data Editor
    - Browsers
  - Generic ontology tools
    - A wide array of tools for working with ontologies
    - Formats are standardized (W3C), but maturity varies widely
    - A mix of commercial and open-source/free software
  - Ontologies
    - ISO 15926-2 is available in OWL, close to Express version
    - Translations into formats for specific use is required, e.g.
    - Visualization, taxonomy checks
  - A core set of tools is clearly desired
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# The POSC Caesar Trac: [trac.posccaesar.org](http://trac.posccaesar.org)

MANAGING RISK



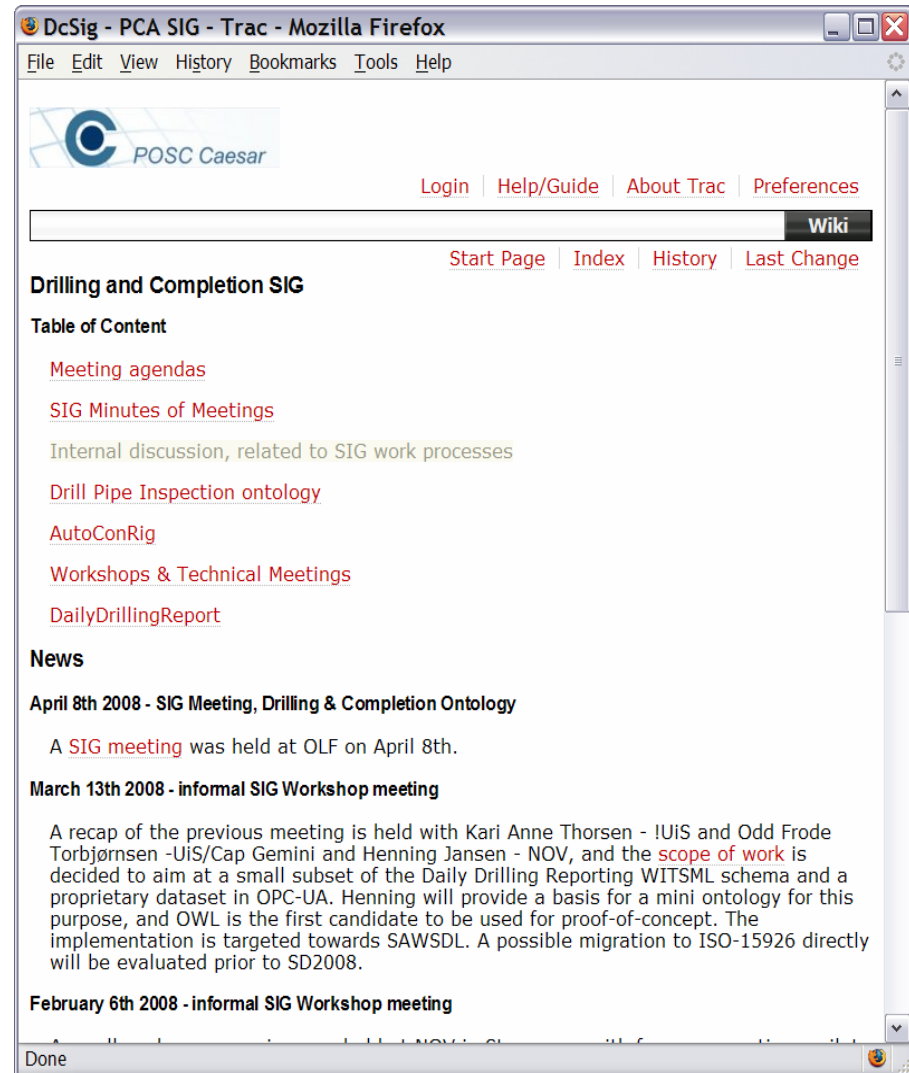
- Trac is a tool for software development
- Wiki for creating shared documents
- Document repository
- Supports the aim of making the ontology accessible

- Administered by SIG MMT

The screenshot shows a web browser window titled "PCA SIG - Trac - Mozilla Firefox". The page features the POSC Caesar logo and navigation links: "Login", "Help/Guide", "About Trac", and "Preferences". A search bar is present with a "Wiki" button. Below the search bar are links for "Start Page", "Index", "History", and "Last Change". The main content area is titled "The POSC Caesar Special Interest Group (SIG) Trac" and contains an introductory paragraph about the Trac system and a link to a "mandate". A yellow box highlights a list of links: "The POSC Caesar Special Interest Group (SIG) Trac", "Wiki pages", "Document storage", "Contact points", "Welcome to Trac", and "Starting Points". Below this is a section titled "Wiki pages" with a paragraph explaining that each SIG has a "homepage" in Trac. At the bottom, a diagram shows a central "PCA SIG" node connected to eight surrounding nodes: "Health, Safety, Security and Environment", "Operation and Maintenance", "Modelling, Methods and Technology", "Development and Modifications", "Reservoir and Production", "Subsea Equipment", "Drilling and Completion", and "Procurement and Logistics". The browser status bar at the bottom shows "Done".




- Each SIG has a home page and a storage domain
- Everything is version controlled
  - Web pages
  - Stored documents
- Registered users can create and edit pages, store documents
- Guests can browse the Wiki pages
- Restricted areas may be set up for “internal affairs”
- The Trac is suitable for collaboration as well as publication of results



DcSig - PCA SIG - Trac - Mozilla Firefox

File Edit View History Bookmarks Tools Help

 POSC Caesar

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[Start Page](#) | [Index](#) | [History](#) | [Last Change](#)

## Drilling and Completion SIG

### Table of Content

- [Meeting agendas](#)
- [SIG Minutes of Meetings](#)
- Internal discussion, related to SIG work processes
- [Drill Pipe Inspection ontology](#)
- [AutoConRig](#)
- [Workshops & Technical Meetings](#)
- [DailyDrillingReport](#)

### News

**April 8th 2008 - SIG Meeting, Drilling & Completion Ontology**

A [SIG meeting](#) was held at OLF on April 8th.

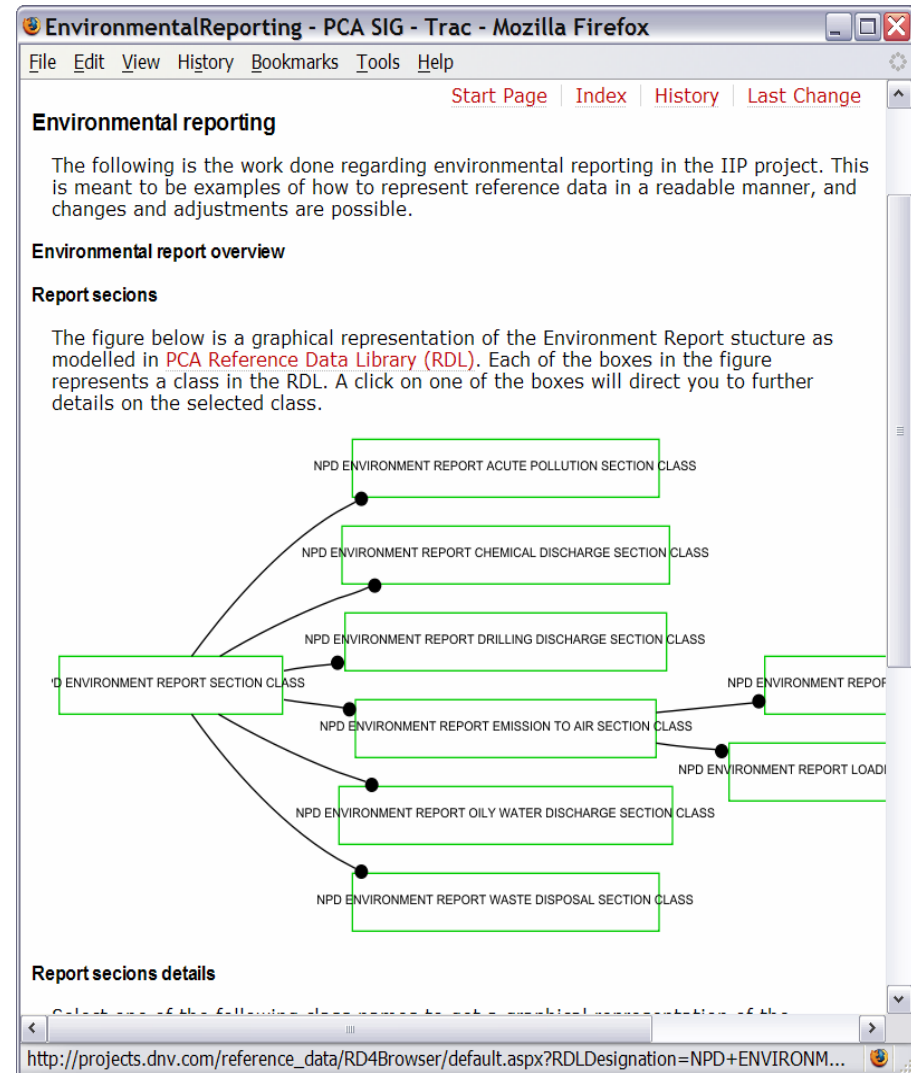
**March 13th 2008 - informal SIG Workshop meeting**

A recap of the previous meeting is held with Kari Anne Thorsen - !UIS and Odd Frode Torbjørnsen - !UIS/Cap Gemini and Henning Jansen - NOV, and the [scope of work](#) is decided to aim at a small subset of the Daily Drilling Reporting WITSML schema and a proprietary dataset in OPC-UA. Henning will provide a basis for a mini ontology for this purpose, and OWL is the first candidate to be used for proof-of-concept. The implementation is targeted towards SAWSDL. A possible migration to ISO-15926 directly will be evaluated prior to SD2008.

**February 6th 2008 - informal SIG Workshop meeting**

Done

- Documenting modelling decisions
  - Links to standards organizations
  - Visualization of RDL structures
  - Making ontology files available
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- Publication with minimal effort



The screenshot shows a web browser window titled "EnvironmentalReporting - PCA SIG - Trac - Mozilla Firefox". The page content includes:

- Environmental reporting**: A paragraph stating that the following is the work done regarding environmental reporting in the IIP project, intended as examples of how to represent reference data in a readable manner.
- Environmental report overview**: A section header.
- Report sections**: A section header followed by a paragraph explaining that the figure below is a graphical representation of the Environment Report structure as modelled in PCA Reference Data Library (RDL). Each box represents a class in the RDL, and clicking on one will direct to further details.
- Diagram**: A hierarchical diagram showing the structure of the Environment Report. The root class is "NPD ENVIRONMENT REPORT SECTION CLASS". It branches into six sub-classes: "NPD ENVIRONMENT REPORT ACUTE POLLUTION SECTION CLASS", "NPD ENVIRONMENT REPORT CHEMICAL DISCHARGE SECTION CLASS", "NPD ENVIRONMENT REPORT DRILLING DISCHARGE SECTION CLASS", "NPD ENVIRONMENT REPORT EMISSION TO AIR SECTION CLASS", "NPD ENVIRONMENT REPORT OILY WATER DISCHARGE SECTION CLASS", and "NPD ENVIRONMENT REPORT WASTE DISPOSAL SECTION CLASS". The "NPD ENVIRONMENT REPORT EMISSION TO AIR SECTION CLASS" further branches into "NPD ENVIRONMENT REPORT LOAD" and "NPD ENVIRONMENT REPORT".
- Report sections details**: A section header with a partially visible paragraph below it.

The browser's address bar shows the URL: [http://projects.dnv.com/reference\\_data/RD4Browser/default.aspx?RDLDesignation=NPD+ENVIRONM...](http://projects.dnv.com/reference_data/RD4Browser/default.aspx?RDLDesignation=NPD+ENVIRONM...)



- The domain-specific SIG's will be working to extend the POSC Caesar Reference Data Library
  
- Typical tools used include
  - Reference Data Editor
  - Spreadsheets

# Current practice and tools I: *RDE*

- Reference Data Editor
- Compliant with ISO 15926-2
- Available at [rds.posccaesar.com](http://rds.posccaesar.com)

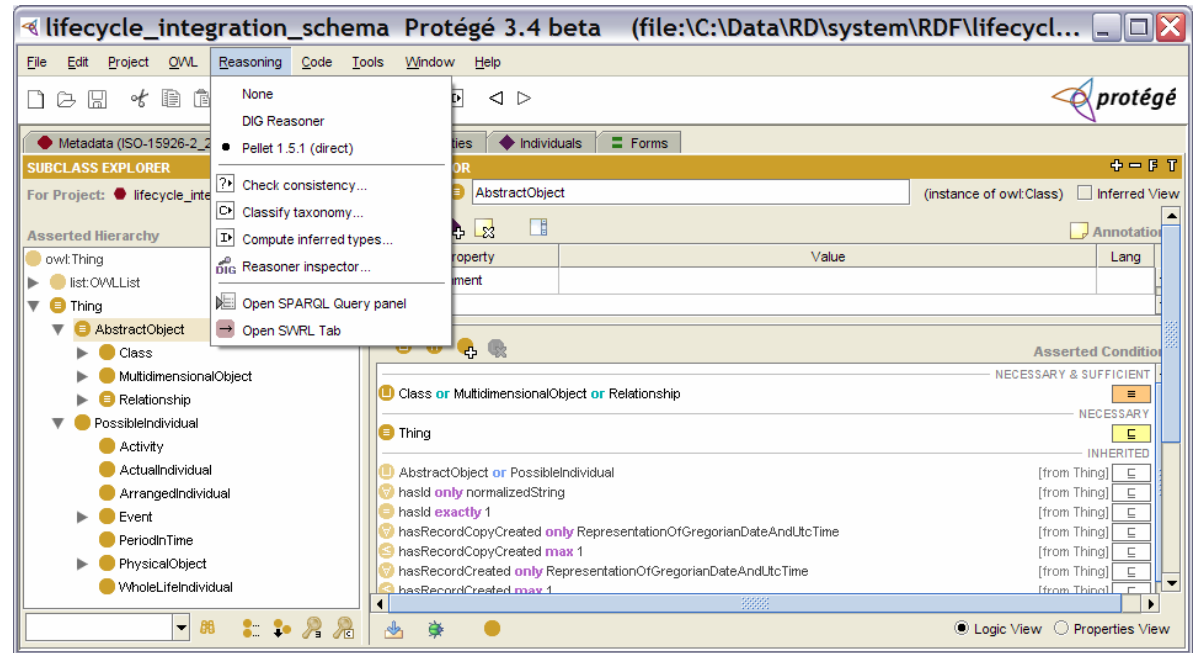


- A tool for ISO 15926 experts, not so much for O & G domain experts



# Current practice and tools III: *Protégé*

- A generic ontology editor
- Supports loading ISO 15926 Part 2 in OWL format
- Supports loading RDL in OWL format



- Like the RDE, mainly an expert tool

# Simple, intelligent tools wanted

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- Standardized modelling practice
  - Tools that are familiar to domain experts
    - Protégé, RDE are out
  - Tools that support the user and check correctness
    - Excel is out
  - Tools that provide for working at a suitable level of abstraction
    - Most ontology editors expose the user to too much "assembly code"
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# Building domain ontologies with *templates*

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- An ontology is used to record *statements*. That's semantics.
  - To build the RDL, we need to represent facts about a given domain using the language of ISO 15926
  - Ideally, a domain expert states the facts, and the machine interprets the facts automatically
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# A template is a pattern for stating facts

- A Template for ISO 15926 is a *statement form*, a *pattern for facts*
  - A template has a *signature* defining the form of a statement
    - What arguments need to be given
    - What are their types
  - Each template has an *interpretation rule* that interprets facts that fit the pattern
    - Reducing a complex statement into simpler ones
    - Eventually, to atomic statements in ISO 15926
    - Yielding an expression of the fact in the ontology language
  
  - Current prototype developed in the Intelligent Data Sets (IDS) project
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# Template example I

- Assume that any car has 3 or more wheels
- Expressed with a suitable template *Parts*  
*Parts ( Car, Wheel, 3 ) !*
- Rules generate a set of ISO 15926 statements

“ The statement

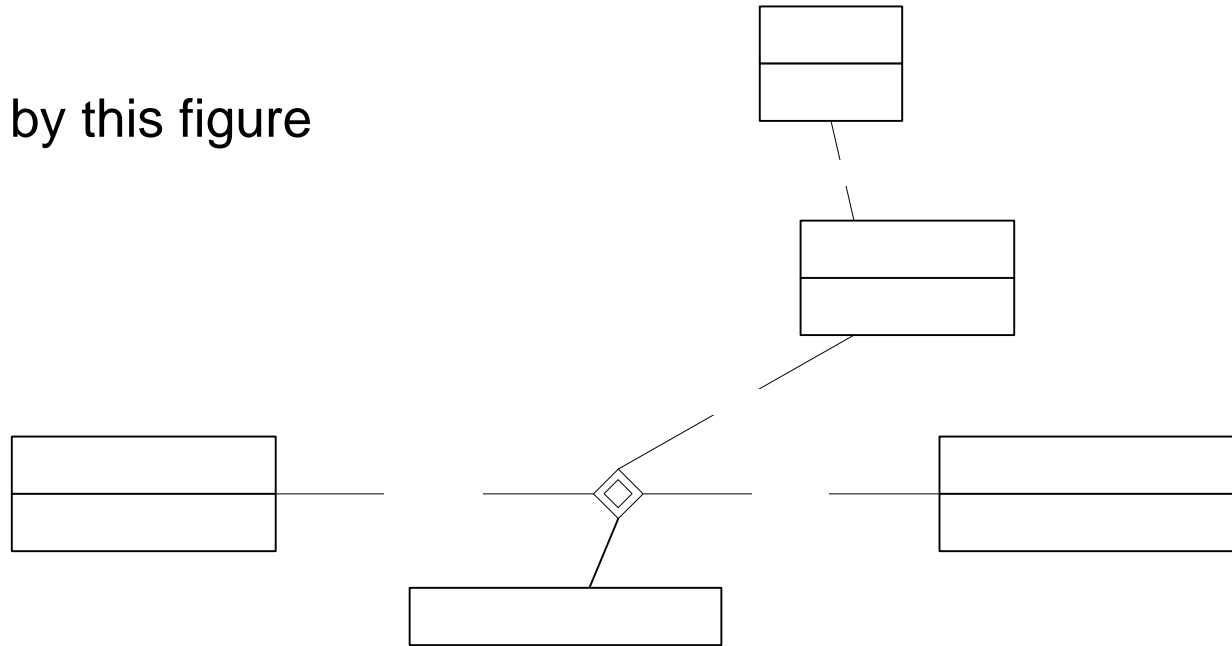
*Parts ( C, D, i, j )*

means that

Any C has between *i* and *j* D's as parts”

# Template example I

- Assume that any car has 3 or more wheels
- Expressed with a suitable template *Parts*  
*Parts ( Car, Wheel, 3 ) !*
- Rules generate a set of ISO 15926 statements
- ... as illustrated by this figure



- Making the statement

*Parts ( Car, Wheel, 3 )*

requires no detailed knowledge about modelling

- A list of arguments can easily be stored in a table (Excel!)
- Correctness of the generated ontology structure can be checked using generic ontology tools

# Template example II



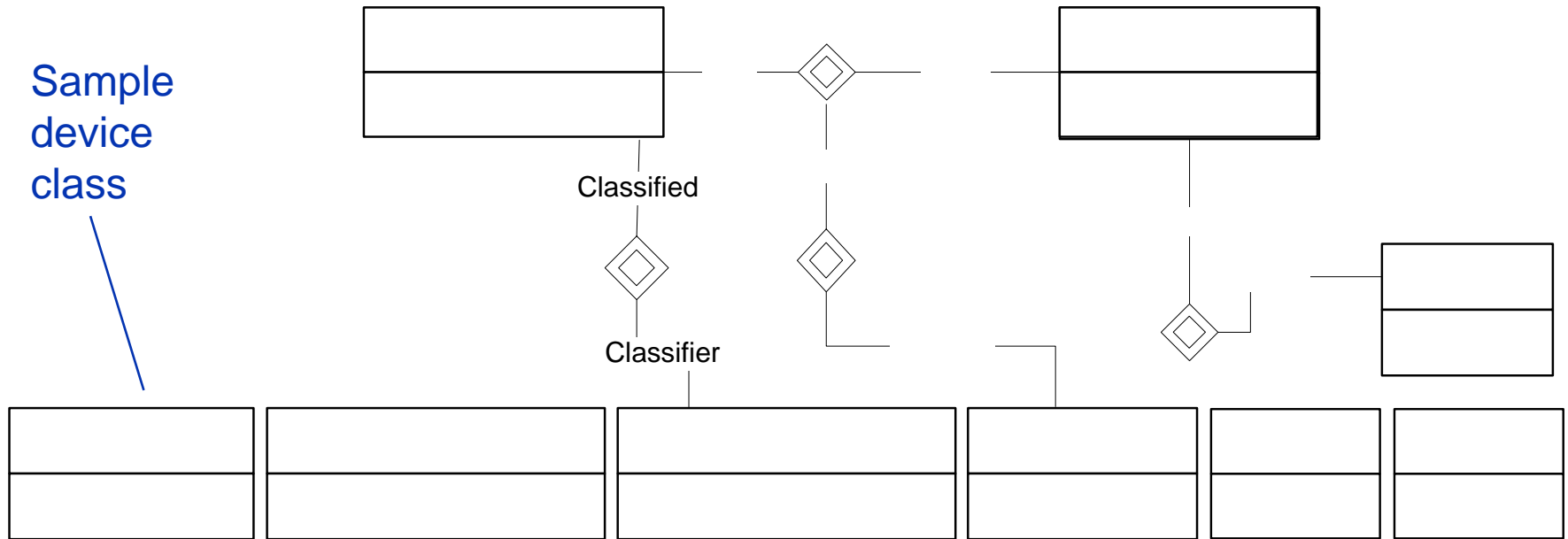
- A fairly complex claim (from IDS prototype)

“The ambient temperature during operation of a 3051CG pressure transmitter should be within -40 and 85 degrees Celsius.”

- Six arguments are required for a precise statement

“The body height of a human is a length property which varies from 50 to 250 cm”

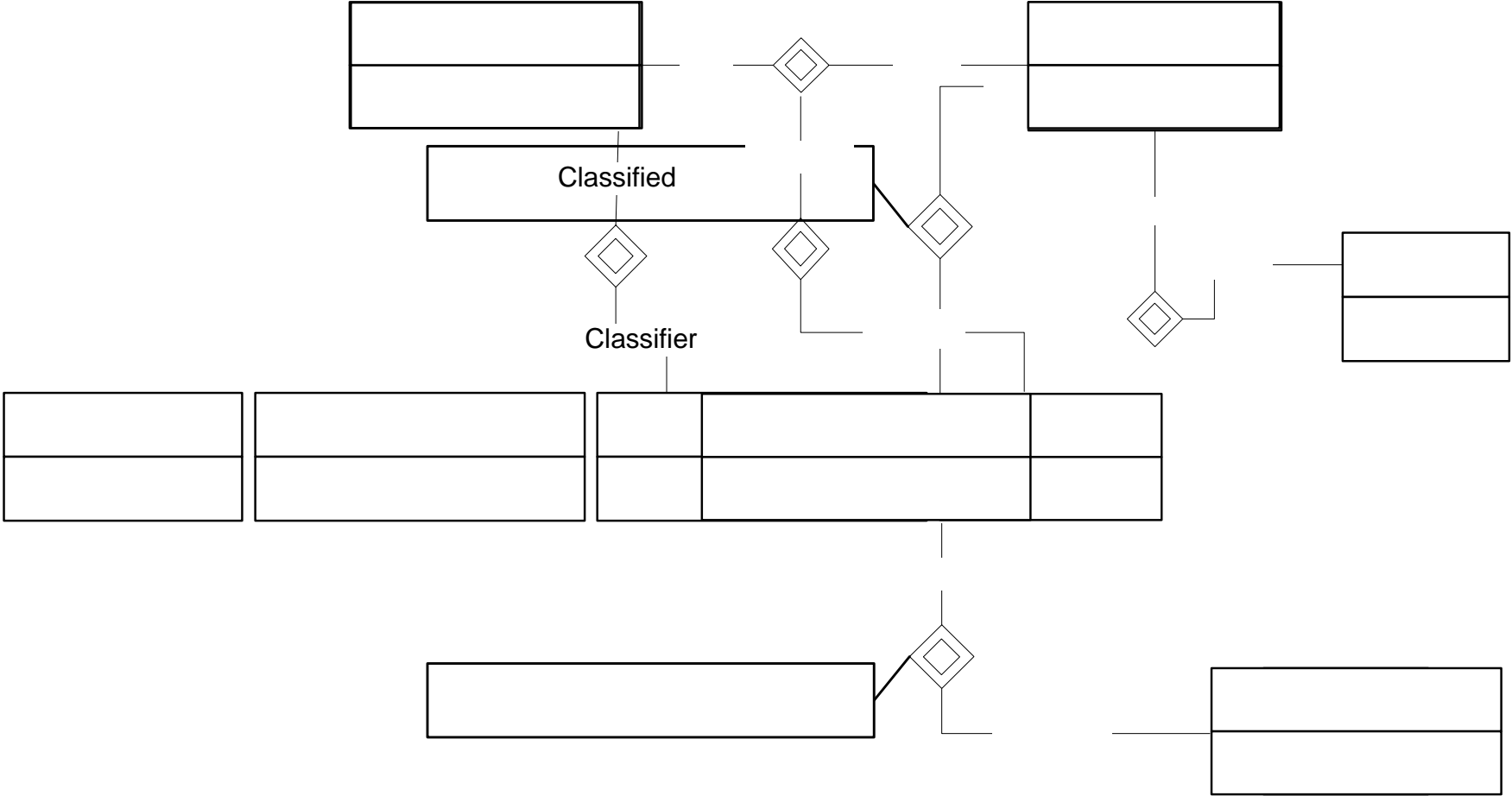
# Property with Scale and Quantification



“The ambient temperature during operation of a 3051CG pressure transmitter should be within -40 and 85 degrees Celsius.”

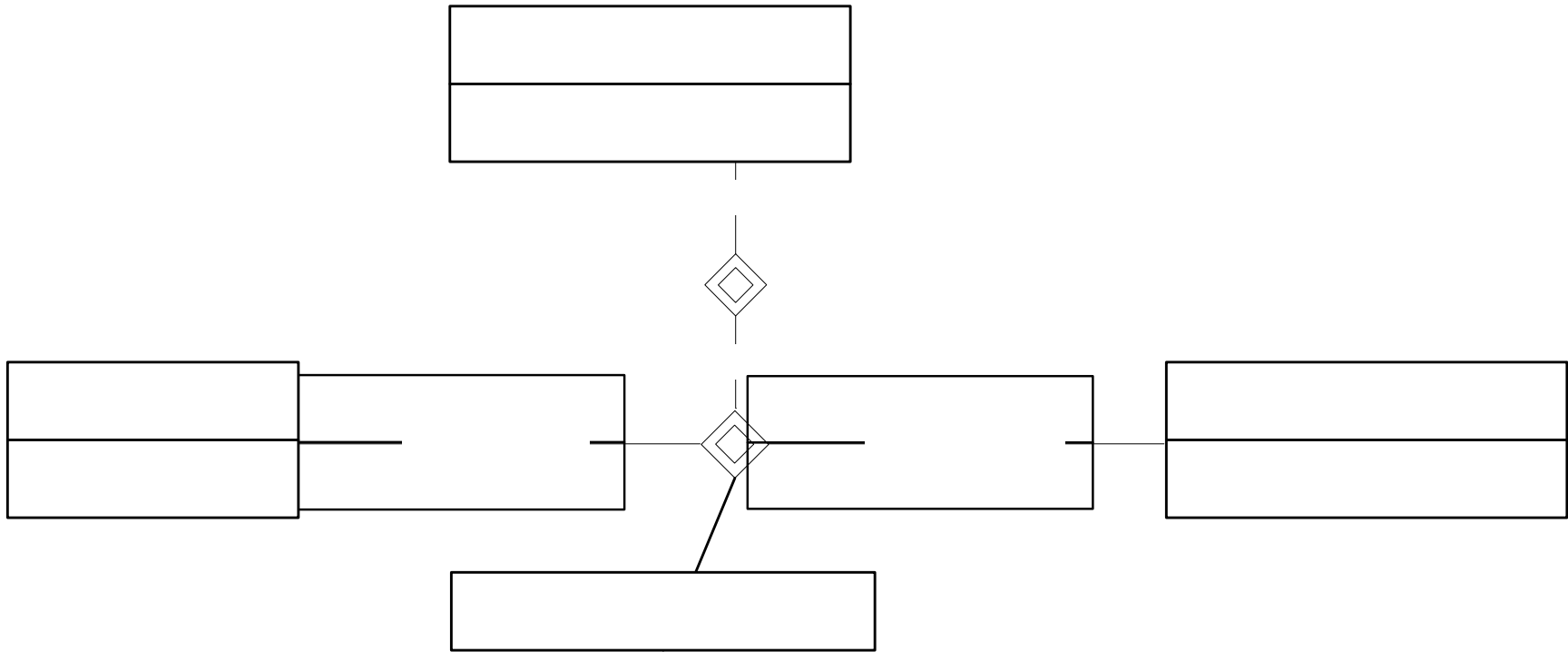
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# Property Range

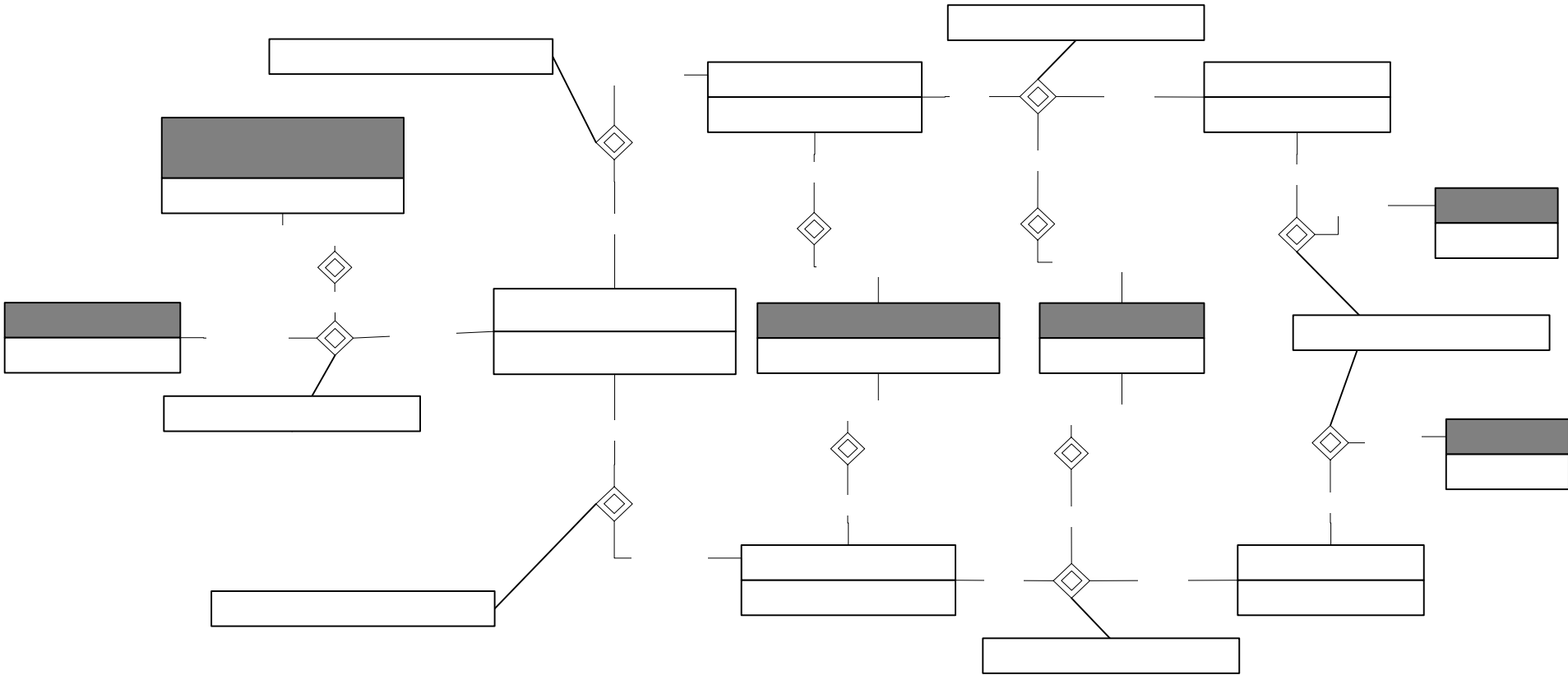




# Property Range Restriction



# Model: Ambient Temperature Range



*3051CG ambient temperature: -40°C – 85°C*

Upper Bound Of Pro

- Templates can provide a flexible and precise tool for ontology building
  - Creating rich semantic structure becomes practical
  - Standardization of modelling is standardizing on templates
  - Let the compiler handle the assembly language
  - Results can be consistency checked using automated reasoning
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- Need to work with SIG's to find the statement forms that are needed
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