

# Gellish Modeling Method Part 3B

## ***From multiple standards documents to a single requirements model***

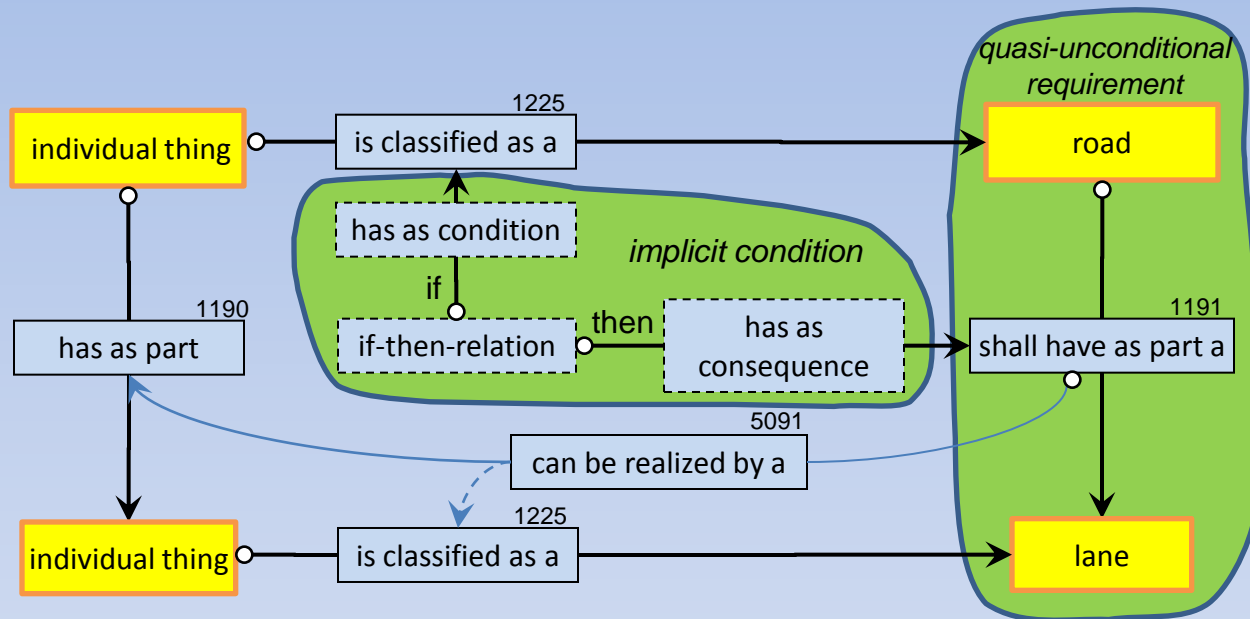
An ISO/Gellish based approach  
to facilitate  
Information Quality Assurance and Usability

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# Quasi unconditional requirements

- Requirements are valid only within a validity context (an authority)
- Textual requirements can be modeled into computer interpretable Requirements Models
- Quasi unconditional requirements are modeled by
  - shall have... relations
  - shall be.... relations
- Conditional requirements are modeled by
  - qualitative if-then-else relations

# Realization of quasi-unconditional requirements



# Example textual requirements source material

1. **Centrifugal pumps for petroleum, petrochemical and natural gas industries (ISO 13709:2003)**
2. **Technical specification – centrifugal pumps (Shell DEP 31.29.02.30-Gen)**
3. **Gellish English Dictionary-Taxonomy**

# Problems of Textual Requirements

## **Low Information Quality:**

- Information is redundant
- Information is ambiguous
- Information is not rich enough (context, function, etc.)

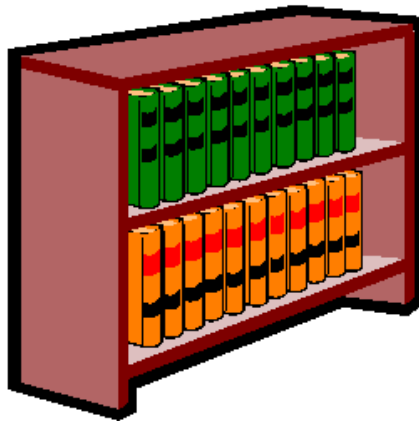
## **Low Information Accessibility**

- Information is dispersed
- Information objects (product & process) are not related to each other

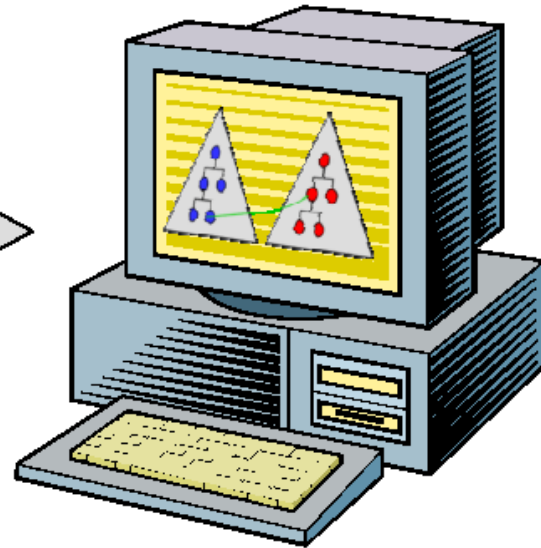
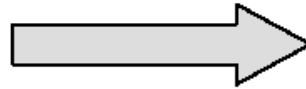
## **Information interpretability**

- Information is meaningless for computers

# The solution

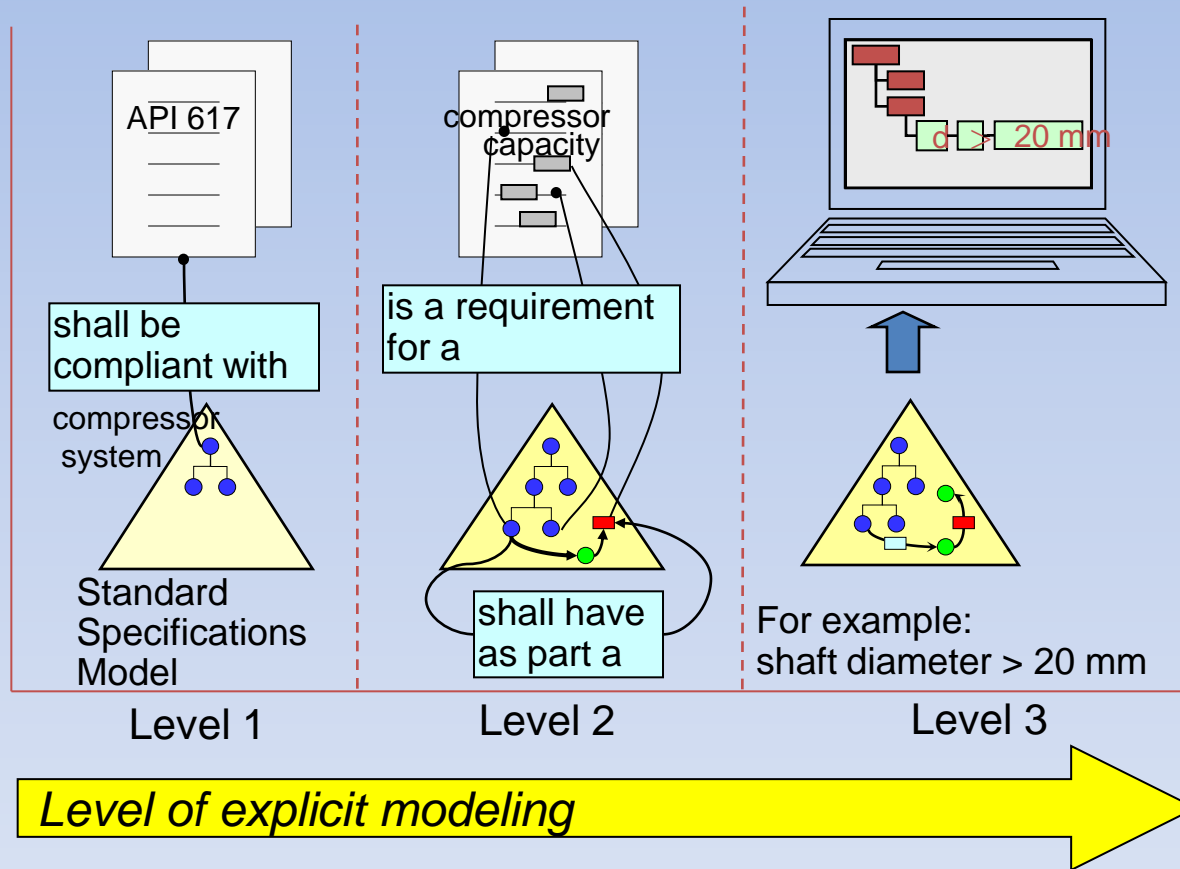


**Natural language information**



**Modelled information**

# Explicit Modelling of Document Content

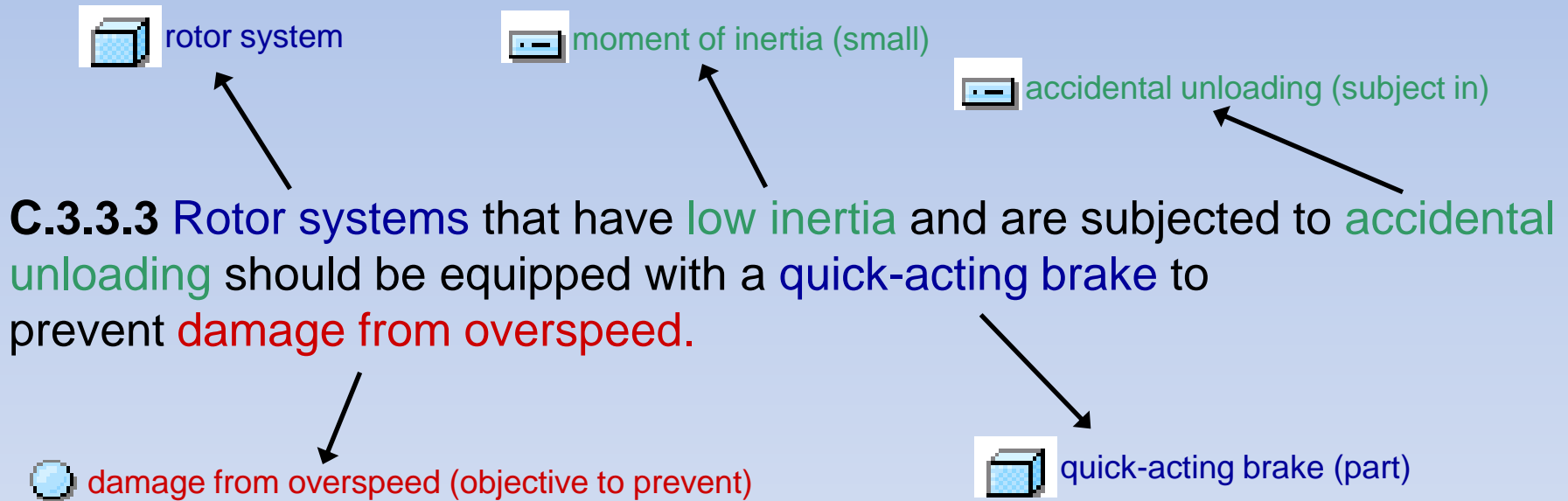


## Example Requirement C.3.3.3

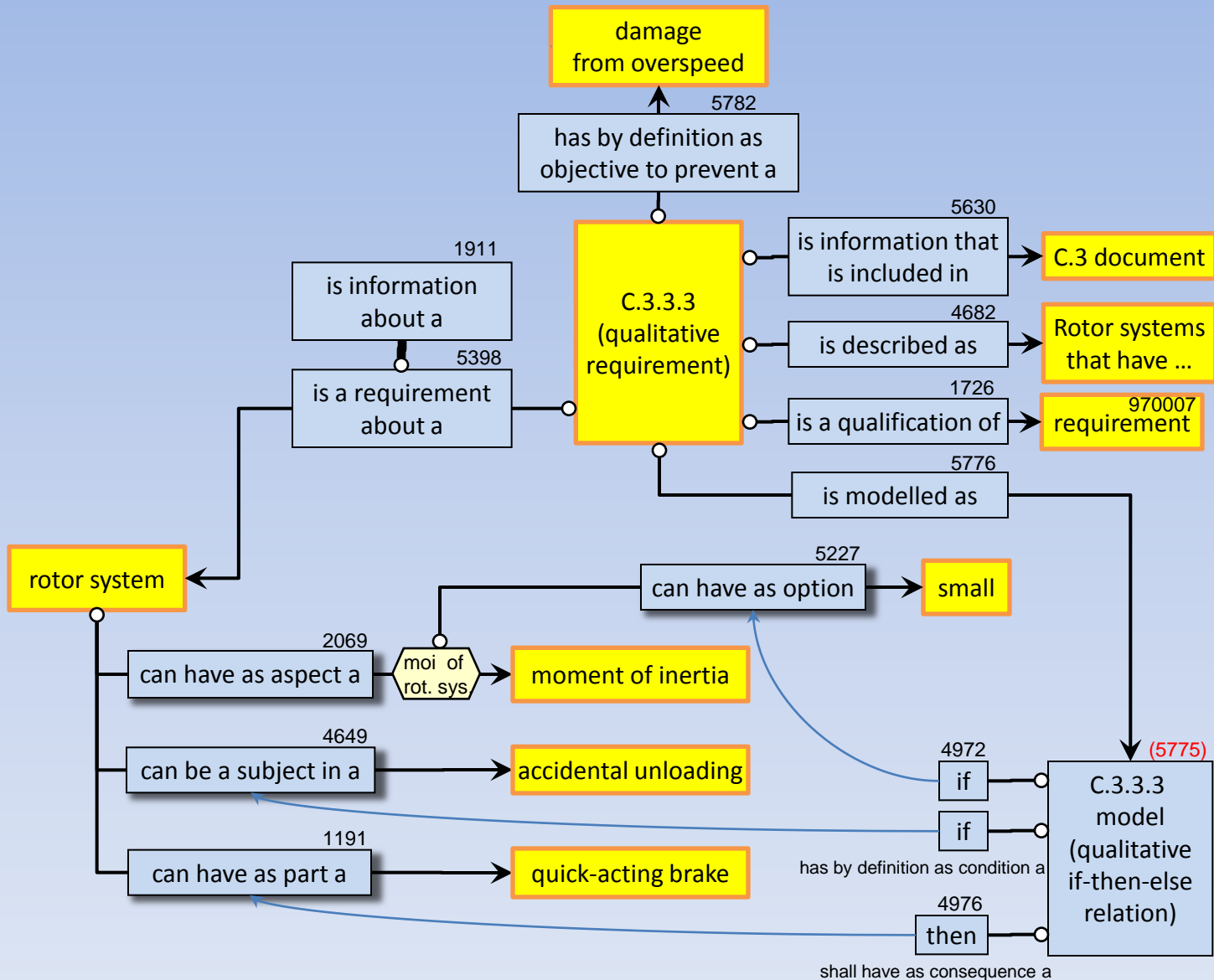
**C.3.3.3** Rotor systems that have low inertia and are subject to accidental unloading should be equipped with a quick-acting brake to prevent damage from overspeed.



# Semantic analysis of Requirement C.3.3.3 (2)



# Requirements model of C.3.3.3



# Gellish facts about Requirement C.3.3.3

	Requirement Model of C.3.3.3								
2	101	1	60	3	74	75	15	201	65
UID of left hand object	Name of left hand object	UID of fact	UID of relation type	Name of relation type	UID of role of right hand object	Name of role of right hand object	UID of right hand object	Name of right hand object	Partial definition
301	rotor system	201	2.069	can have as aspect a	302	moment of inertia of a rotor system	550.024	moment of inertia	
302	moment of inertia of a rotor system	204	5.227	can have as option			303	small	
301	rotor system	205	4.649	can be a subject in a			304	accidental unloading	
301	rotor system	206	1.191	can have as part a			305	quick-acting brake	
101	C.3.3.3	207	1.726	is a qualification of			970.007	requirement	Rotor systems that have low inertia and are subject to accidental unloading should be equipped with a quick-acting brake to prevent damage from overspeed.
101	C.3.3.3	208	5.630	is information that is included in			102	Document C	
101	C.3.3.3	209	5398	is a requirement about a			301	rotor system	
101	C.3.3.3	210	5.782	has by definition as objective to prevent a			306	damage from overspeed	
101	C.3.3.3	211	5.776	is modelled as			103	C.3.3.3 model	
103	C.3.3.3 model	212	4.972	has by definition as condition a			204	Model of condition-1	
103	C.3.3.3 model	213	4.972	has by definition as condition a			205	Model of condition-2	
103	C.3.3.3 model	214	4.976	shall have as consequence a			206	Model of consequence-1	

# Integration of requirements from ISO 13709 and DEP 31.29.02.30-Gen.

## 8.2.5.2.2

Thrust collars shall be positively locked to the shaft to prevent fretting.



thrust bearing collar (part)  
(synonyms)



positively locked  
(connection)



shaft (part)



fretting  
(objective to prevent)

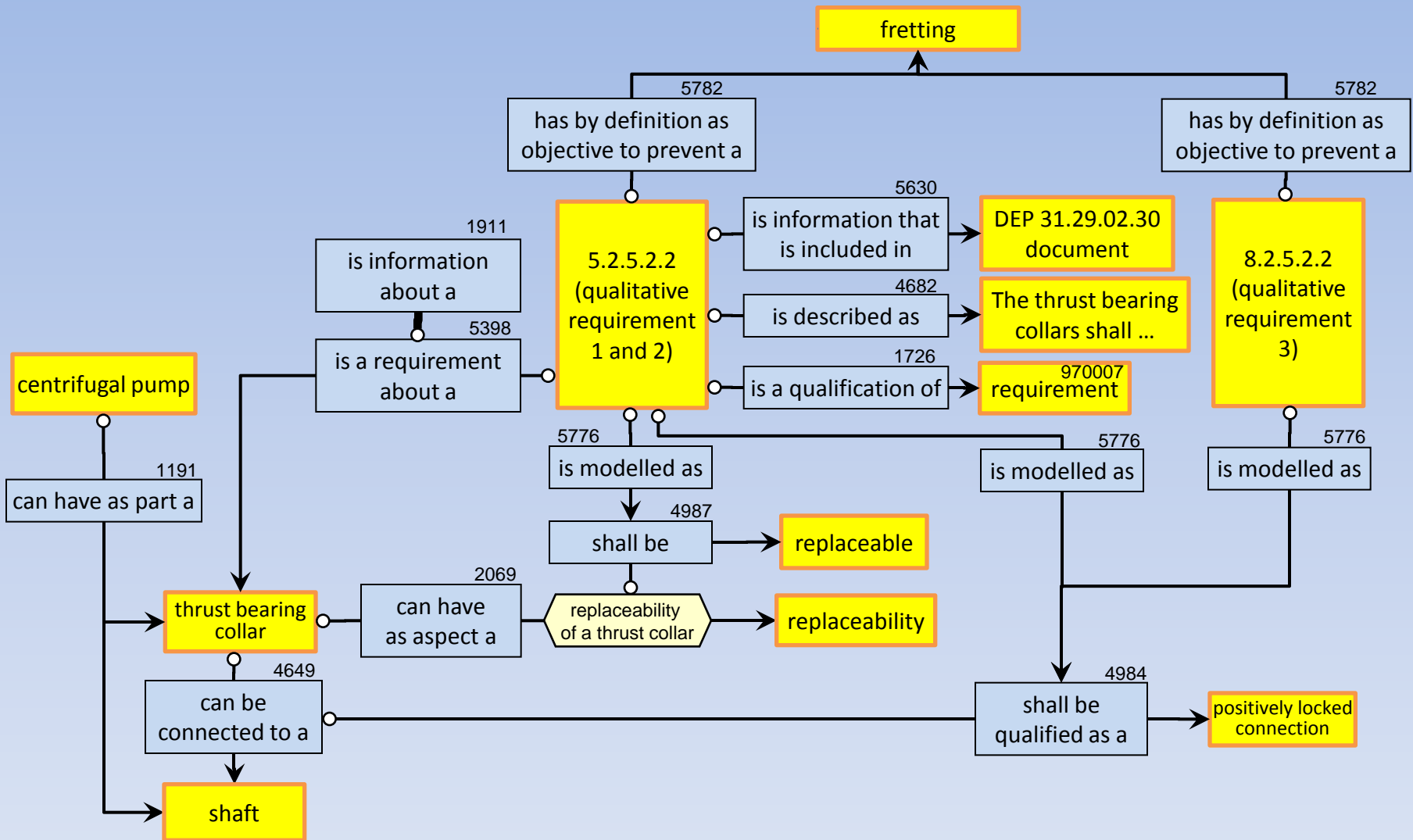
## 5.2.5.2.2

The thrust bearing collars shall be replaceable and shall be positively locked to the shaft to prevent fretting.



replaceable (quality)  
(2<sup>nd</sup> requirement)

# Example of the Integrated requirements model



# General Model of a Textual Qualitative Requirement

