



Virtual Assistant for Electricity Operating Instructions

Semantics Conference – Karlsruhe
2019



Hi, My name is
Anderson Cunha

Greetings from Rio de Janeiro - BRAZIL

Agenda

1. Brazilian Electricity Model
2. ONS and its responsibilities
3. What a Virtual Assistant can do for us
4. Edison Semantic Architecture
5. The Ontology – Usage of IEC CIM 61970 and W3C
6. Demo
7. Challenges
8. Next Steps

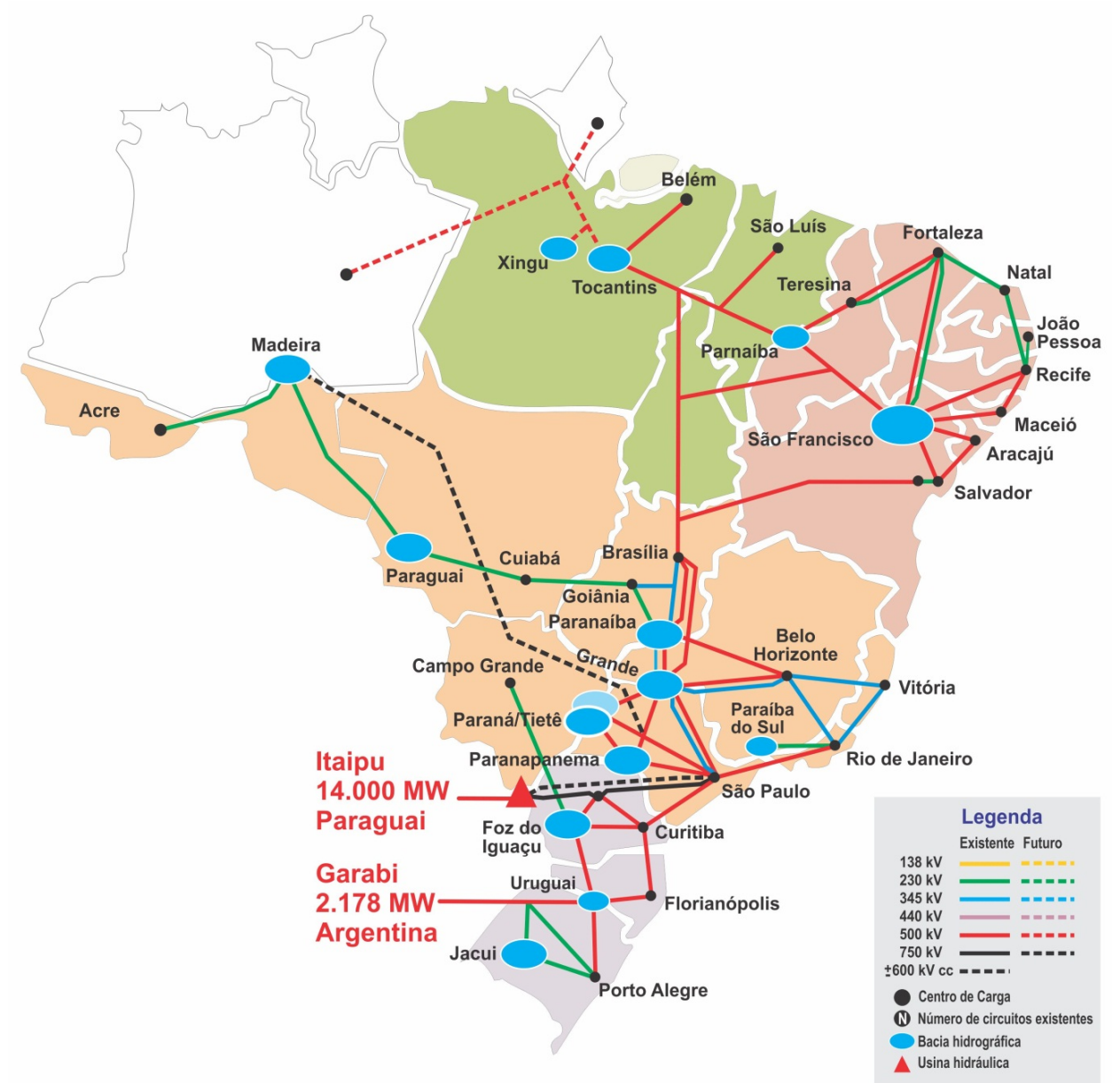
ONS is a private company, who takes care of the *Brazilian Interconnected Power System*, coordinating the planning and real-time operating of the grid using:

- Hydro (67.6%),
- Thermal (12.3%)
- Renewable (20%)

Our team:

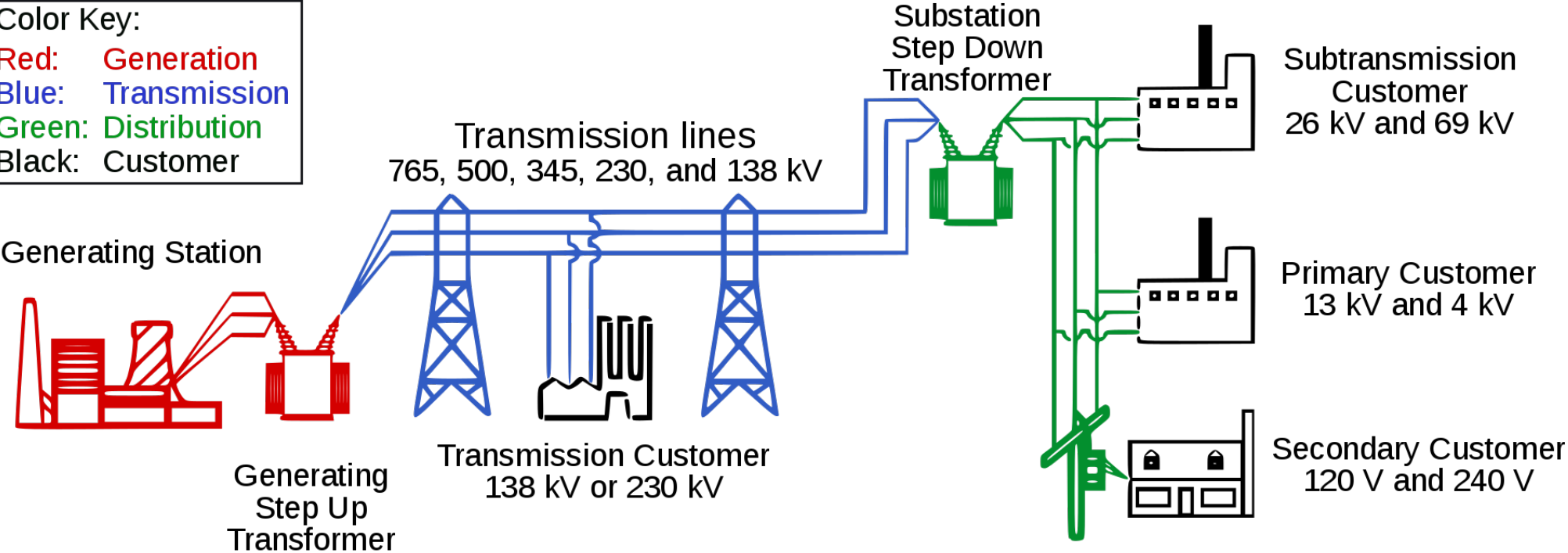
- ~ 900 employees
- 4 Control centers

Source pmo ago/2019 <http://www.ons.org.br/paginas/sobre-o-sin/o-sistema-em-numeros>



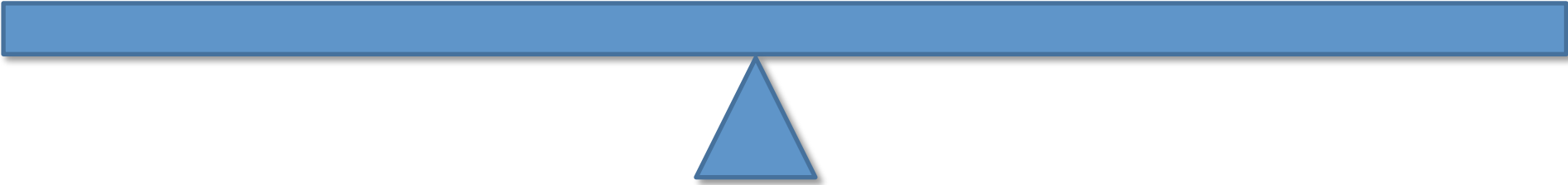
Generation x Load

Color Key:
Red: Generation
Blue: Transmission
Green: Distribution
Black: Customer



Generation

Load

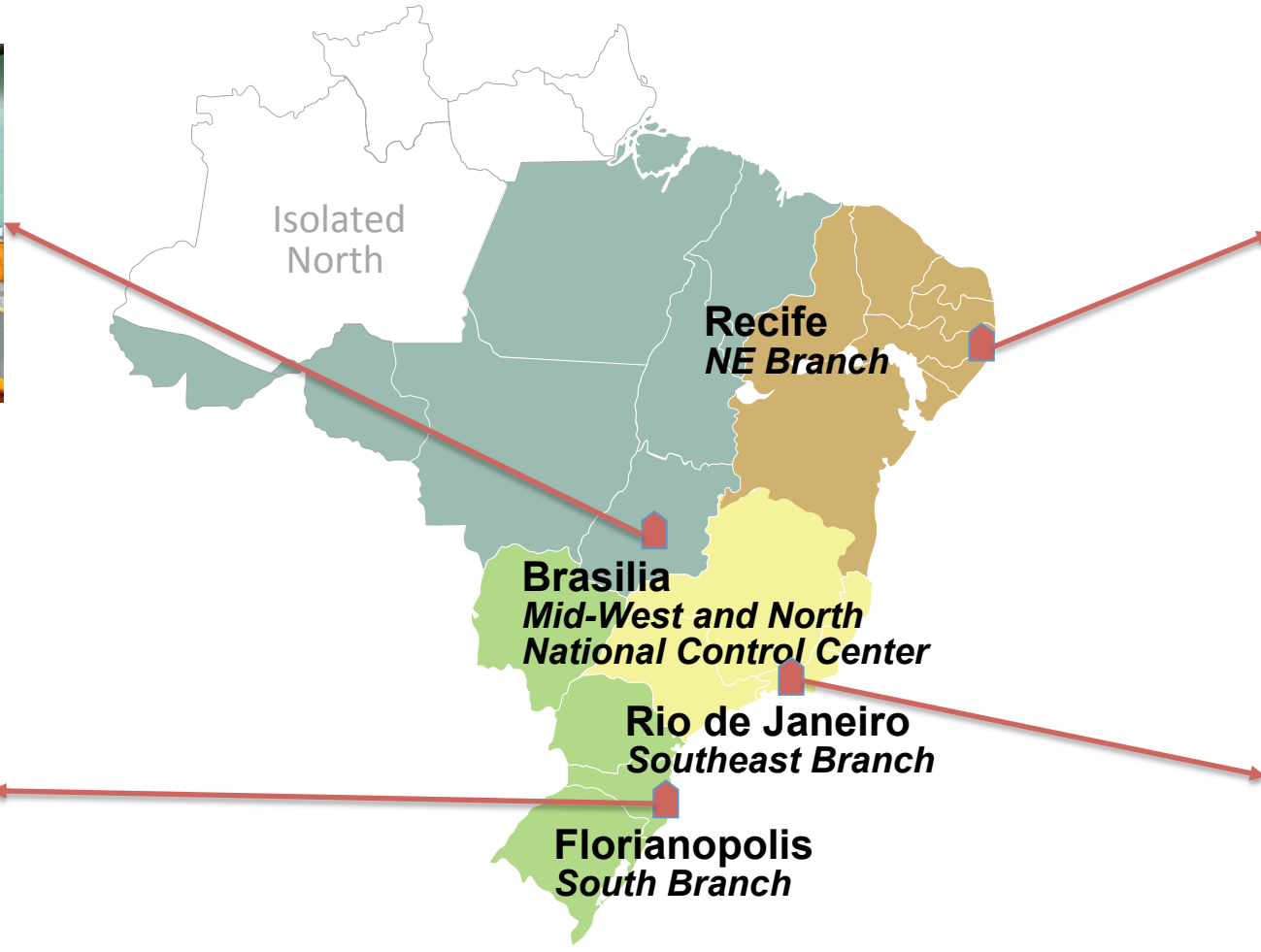


https://en.wikipedia.org/wiki/Electricity_generation

Your business is energy



So we manage the energy to be delivered as electricity



Geographic location of control centers

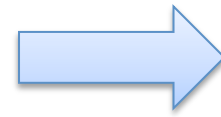
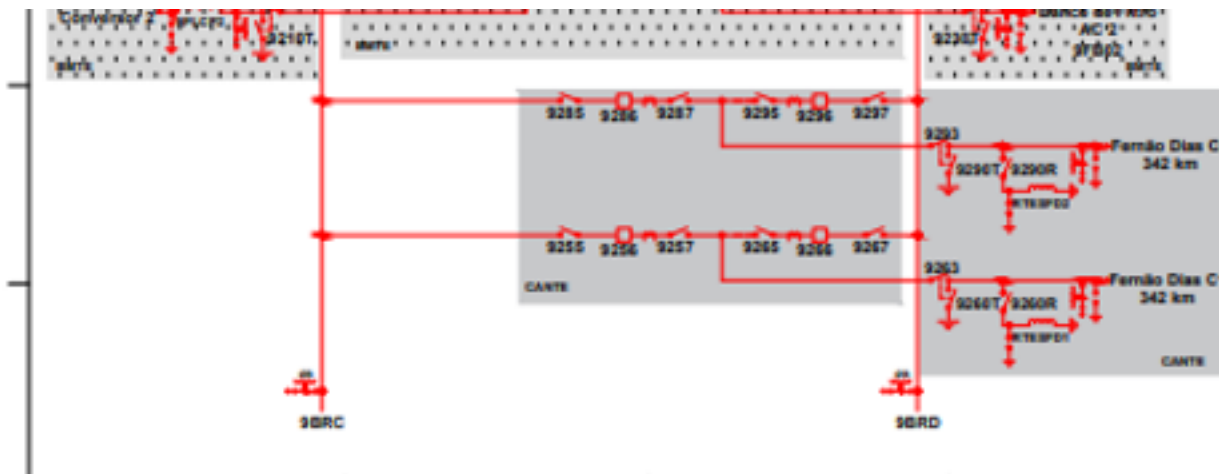
Operating procedures



standardization



Substation one line diagram



publish



Operating Instructions



used by grid operators



Legenda:



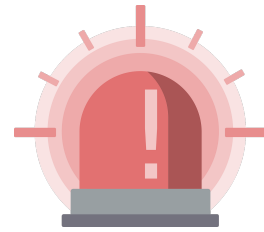
Equipamentos pertencentes a outras empresas



Equipamentos pertencentes a outras empresas e manobrados pela CRB

		SUBESTAÇÃO ESTREITO - SE ES DIAGRAMA UNIFILAR OPERATIVO PÁTIO DE MANOBRAS 500/345KV		Data: 03/02/2018	
09 Revisão		Entrada em operação da Cantamira Descrição		Folha: 1/1	
				Rev: 09	

Crisis situation



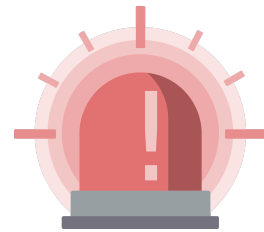
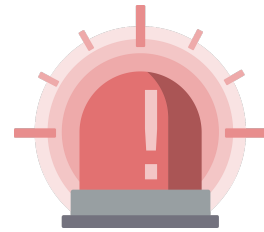
Alarms: Não Reconhecidos: 500 Advertência: 32 Urgência:

Timestamp	Objeto	Narrativa
05/08/2019 18:42:12	HGEST_345_M_VALOR_KV	Ultrapassou Se...
05/08/2019 18:42:09	HGEST_345_BA1_KV	Ultrapassou Se...
05/08/2019 18:42:05	HGEST_345_BA2_KV	Ultrapassou Se...
05/08/2019 18:41:53	HGEST_345_BA3_KV	Ultrapassou Se...
05/08/2019 18:41:56	HGEST_345_BA4_KV	Ultrapassou Se...
05/08/2019 18:41:46	HGEST_345_BA5_KV	Ultrapassou Se...
05/08/2019 18:41:45	SPSTIM_345_BA0_KV	U...
05/08/2019 18:41:32	HGPR2_130_BA11_KV	U...
05/08/2019 18:41:35	HGPR2_230_BA11_KV	U...
05/08/2019 18:41:22	HGSGPA_130_BA22_KV	U...
05/08/2019 18:41:22	HGSGPA_130_BA21_KV	U...
05/08/2019 18:41:19	HGARR1_130_BA11_KV	Ultrapas...

Lots of procedures



eg: blackout



Lots of alarms

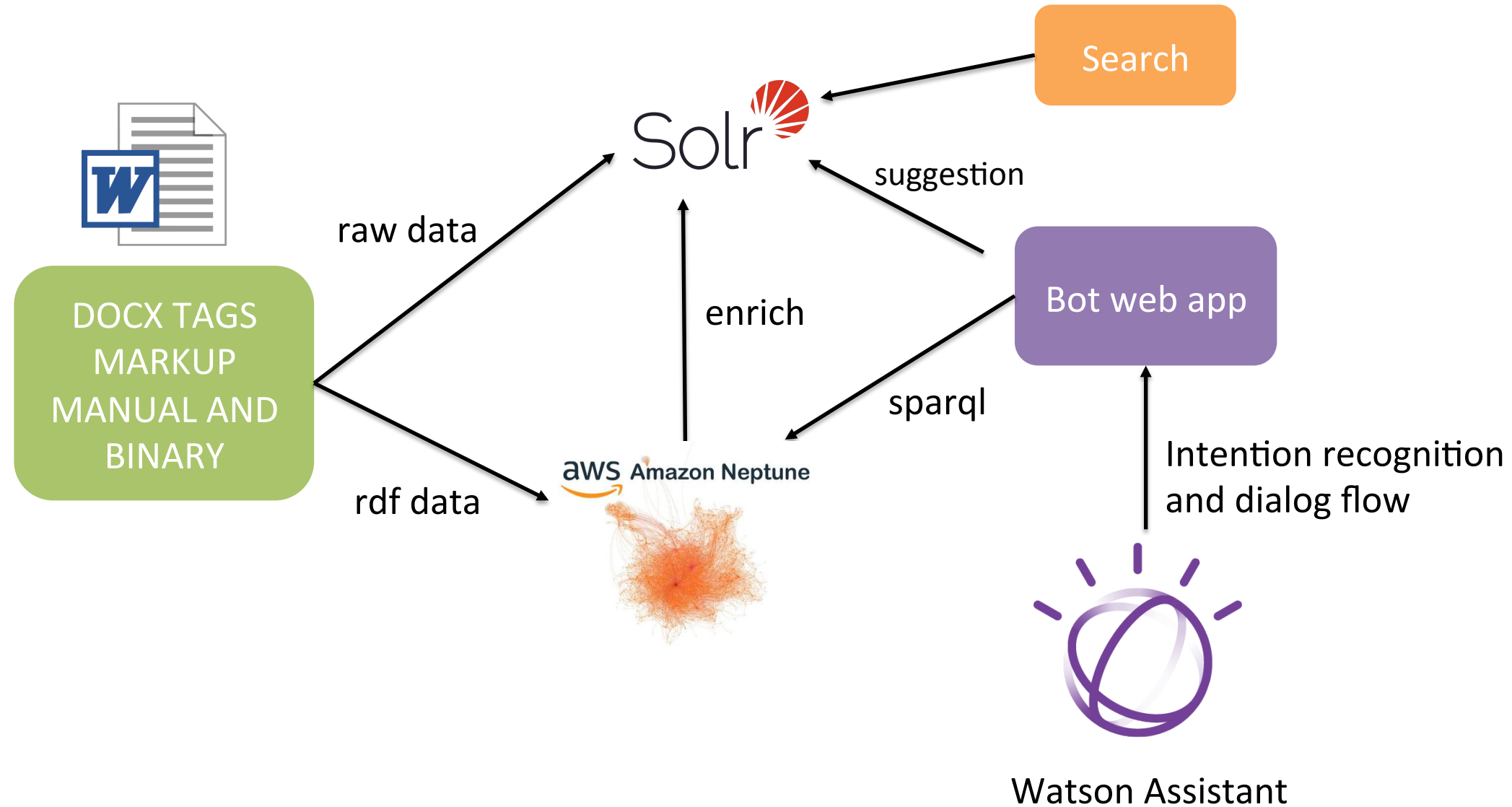
Complex substations / electric areas requires lots of procedures to restore the system

Challenges

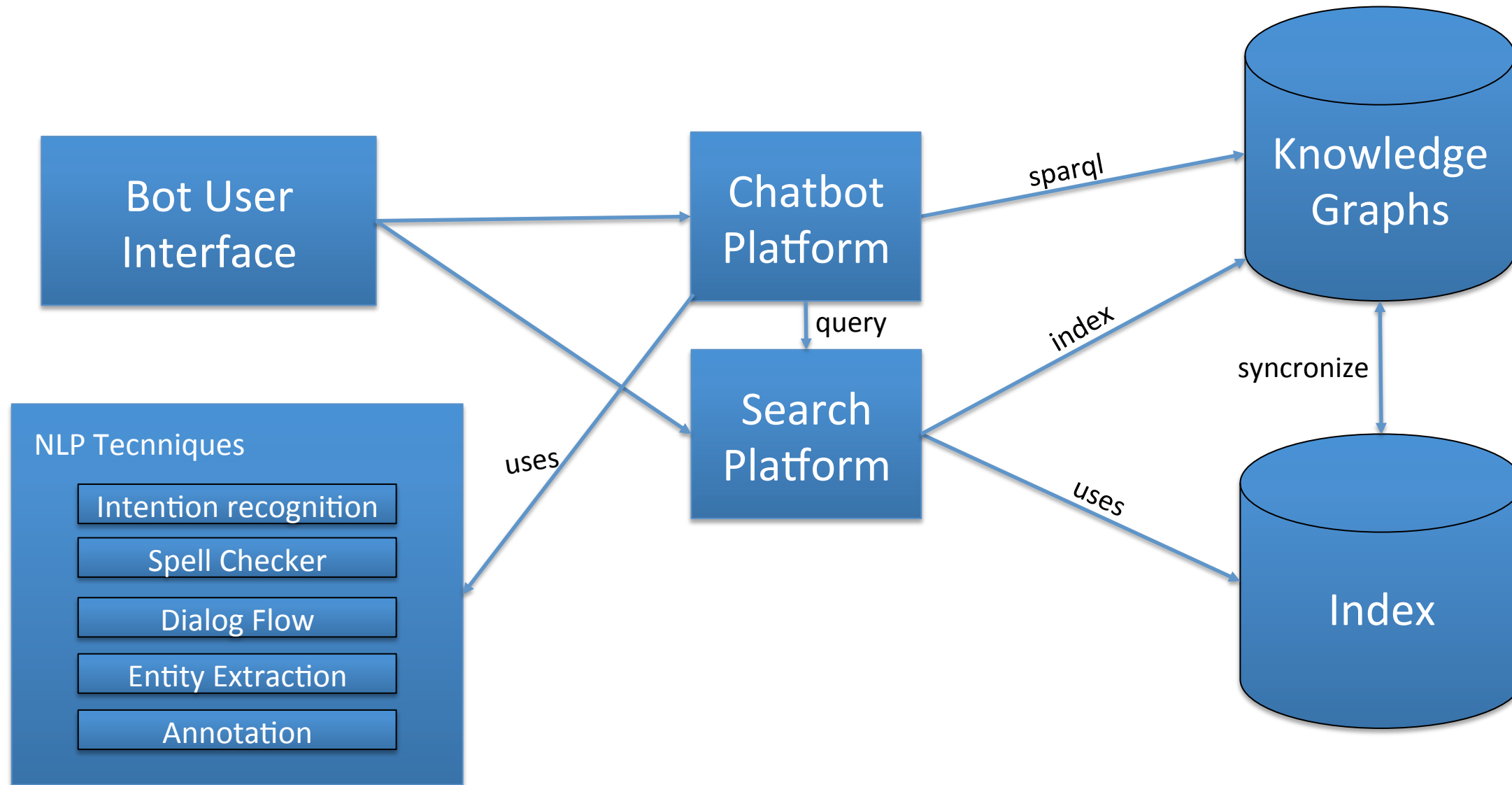
In crisis situation:

1. How to give fast and reliable responses to restore the system?
2. How to help operators with systems that solve complex tasks without depending **only** of the knowledge of power grid specialists?

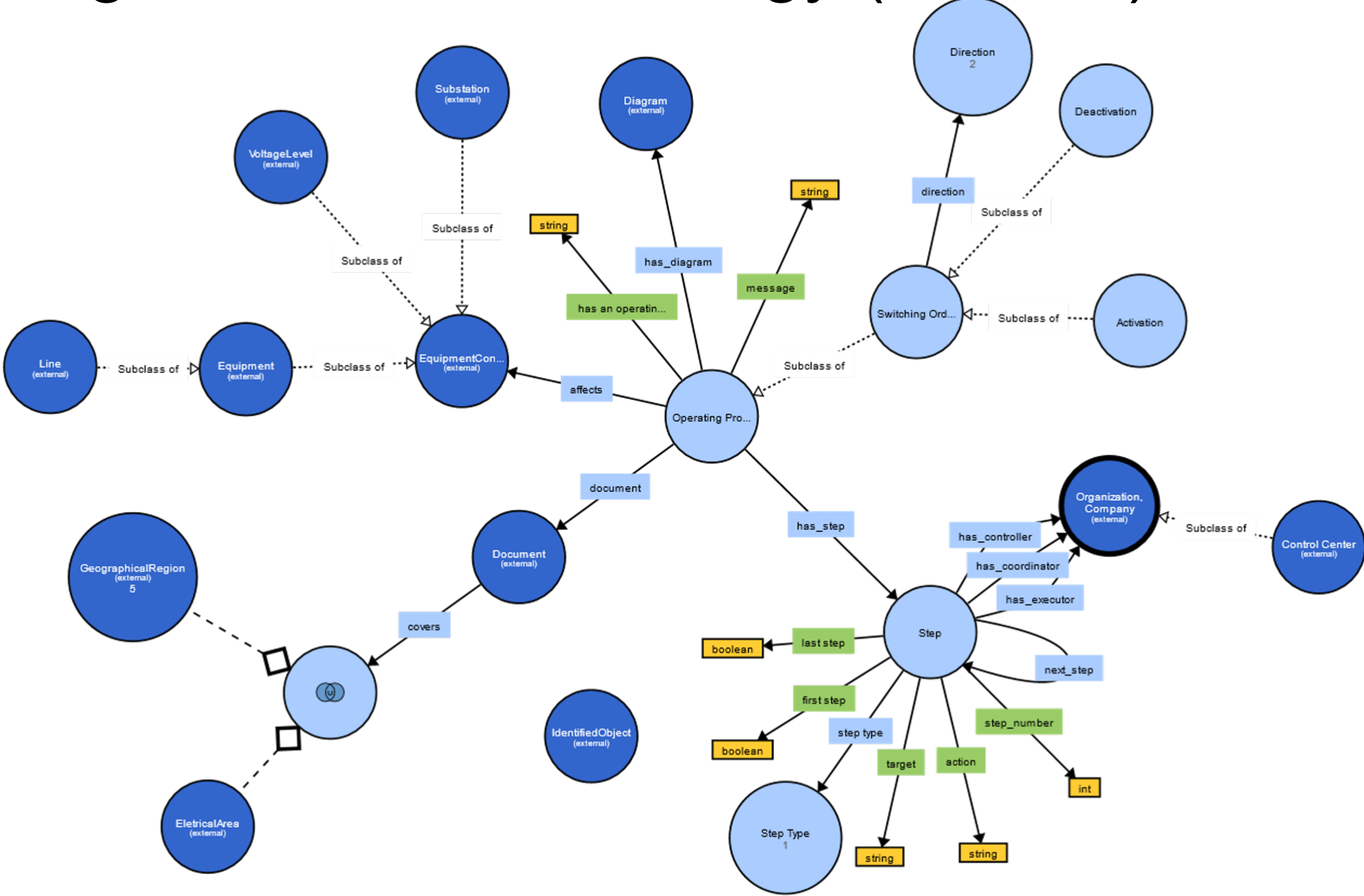
Switching order procedures data flow



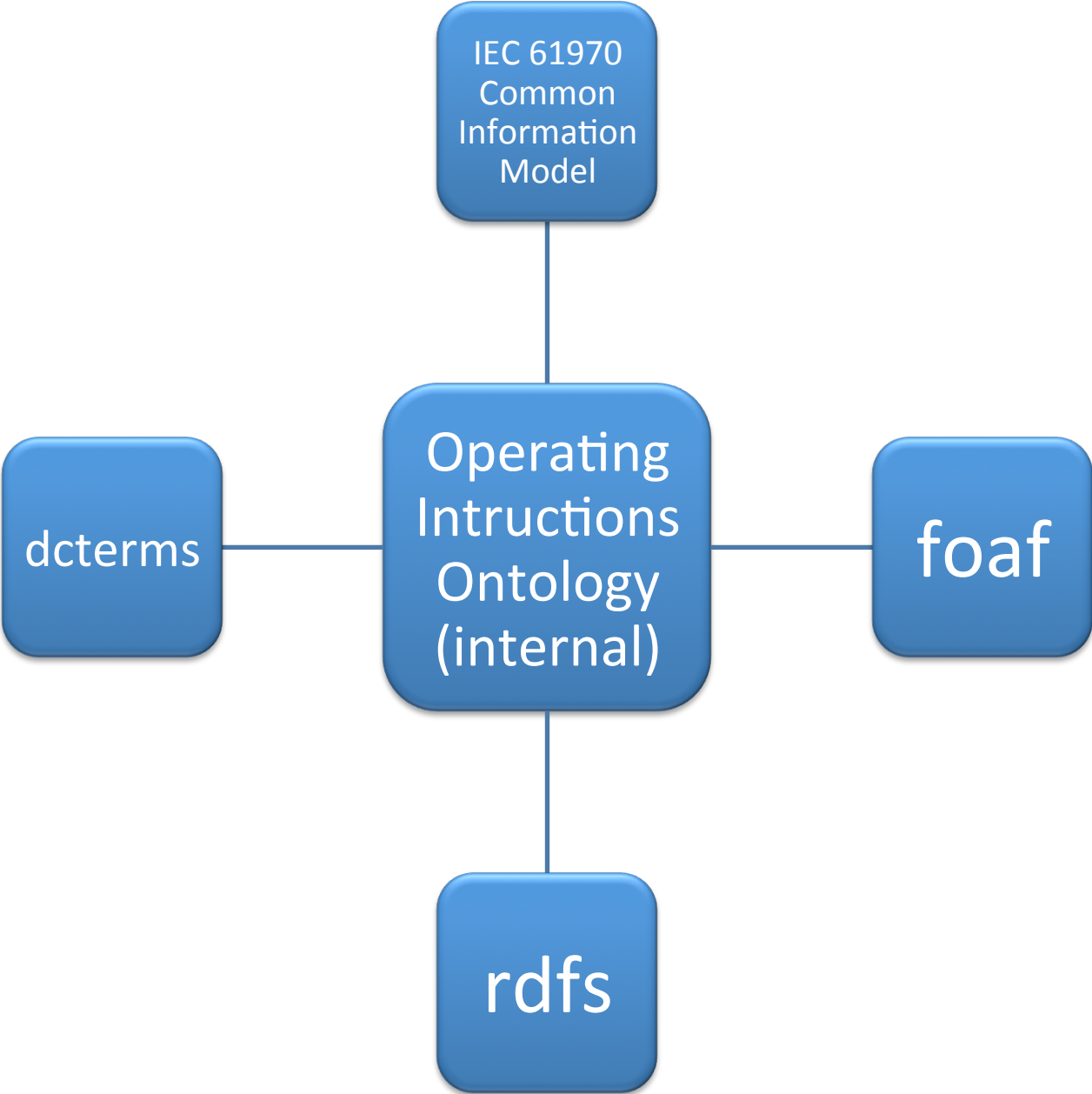
Reference Architecture



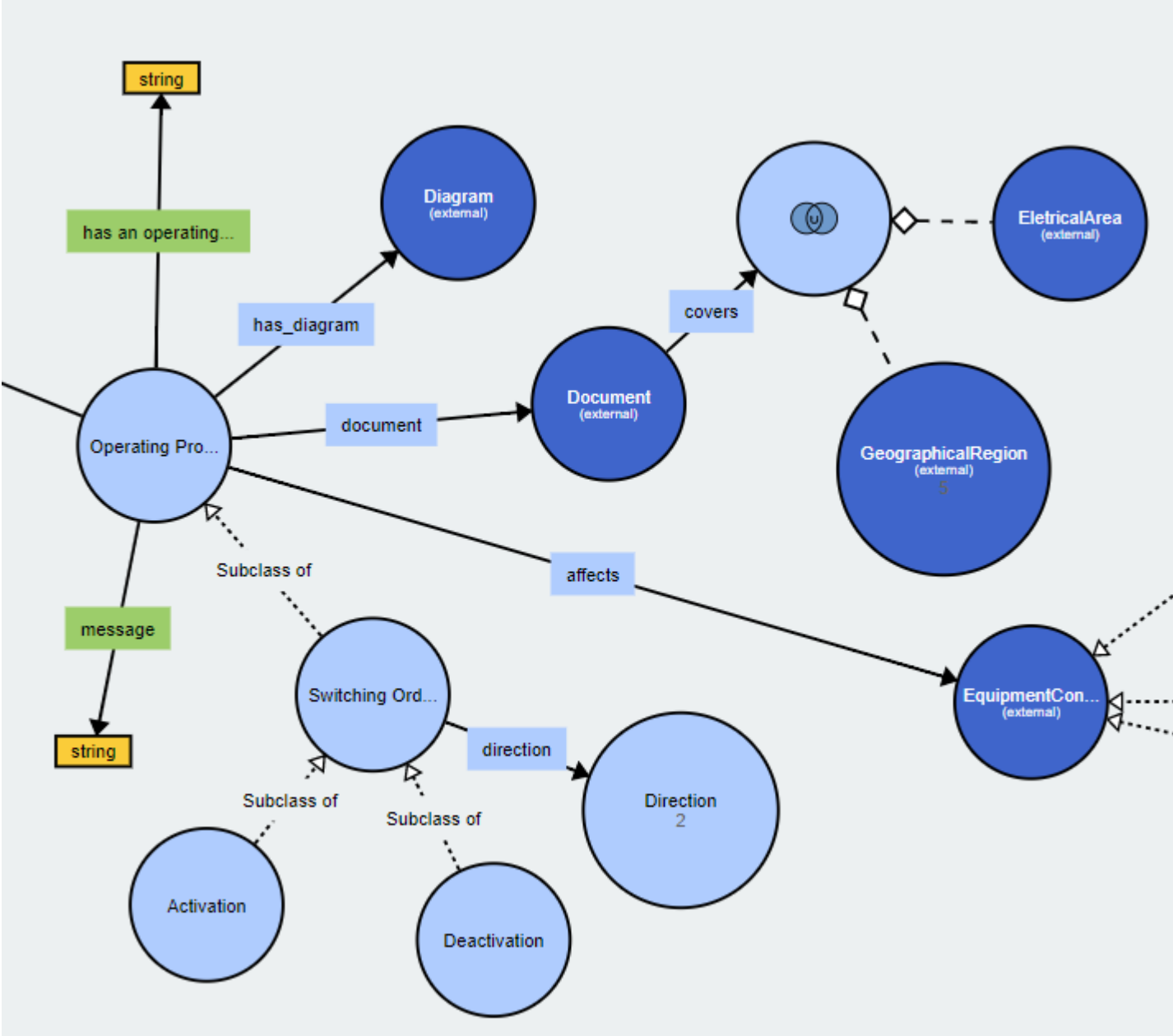
Operating Procedures Ontology (internal)



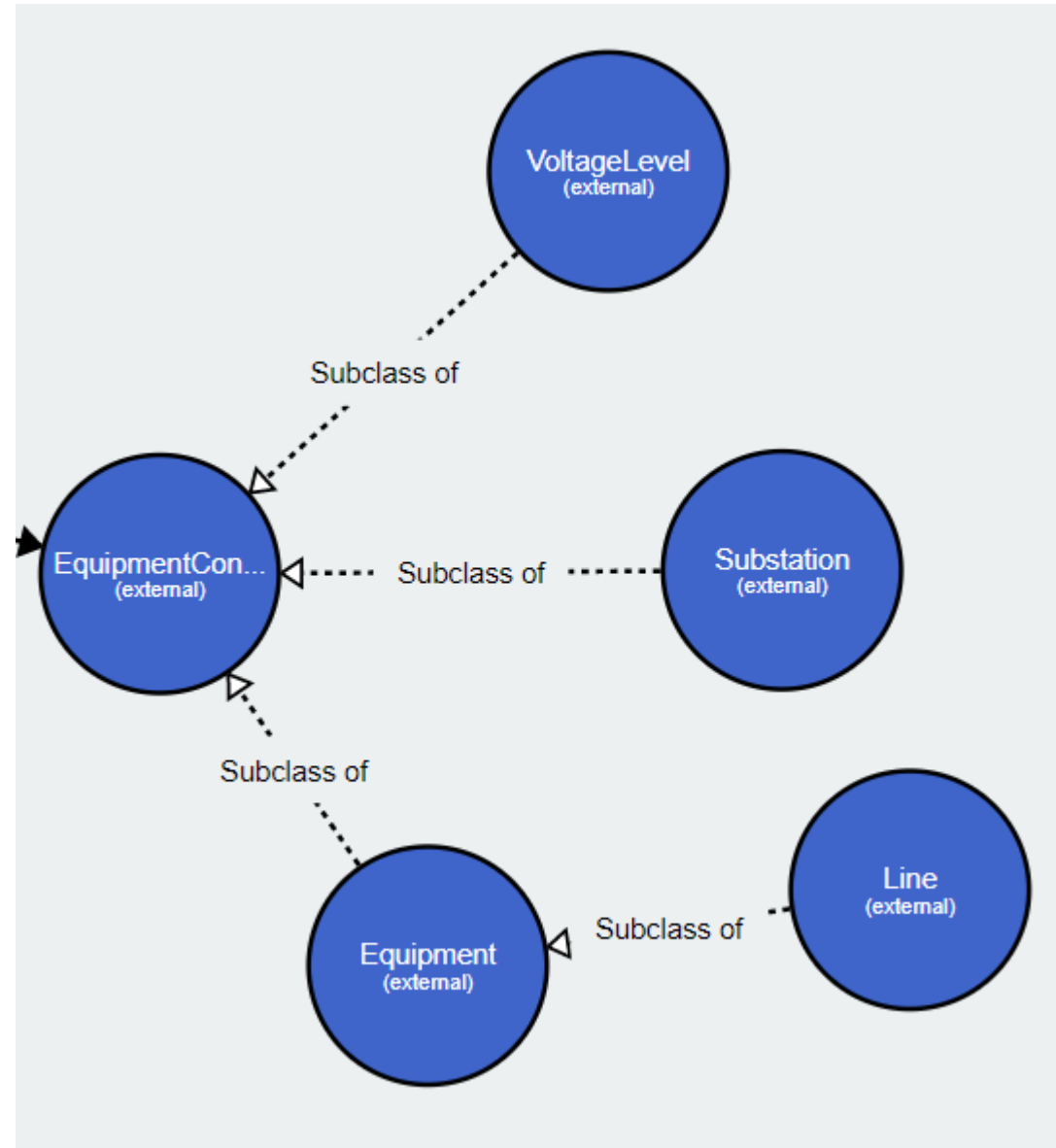
Ontology dependencies



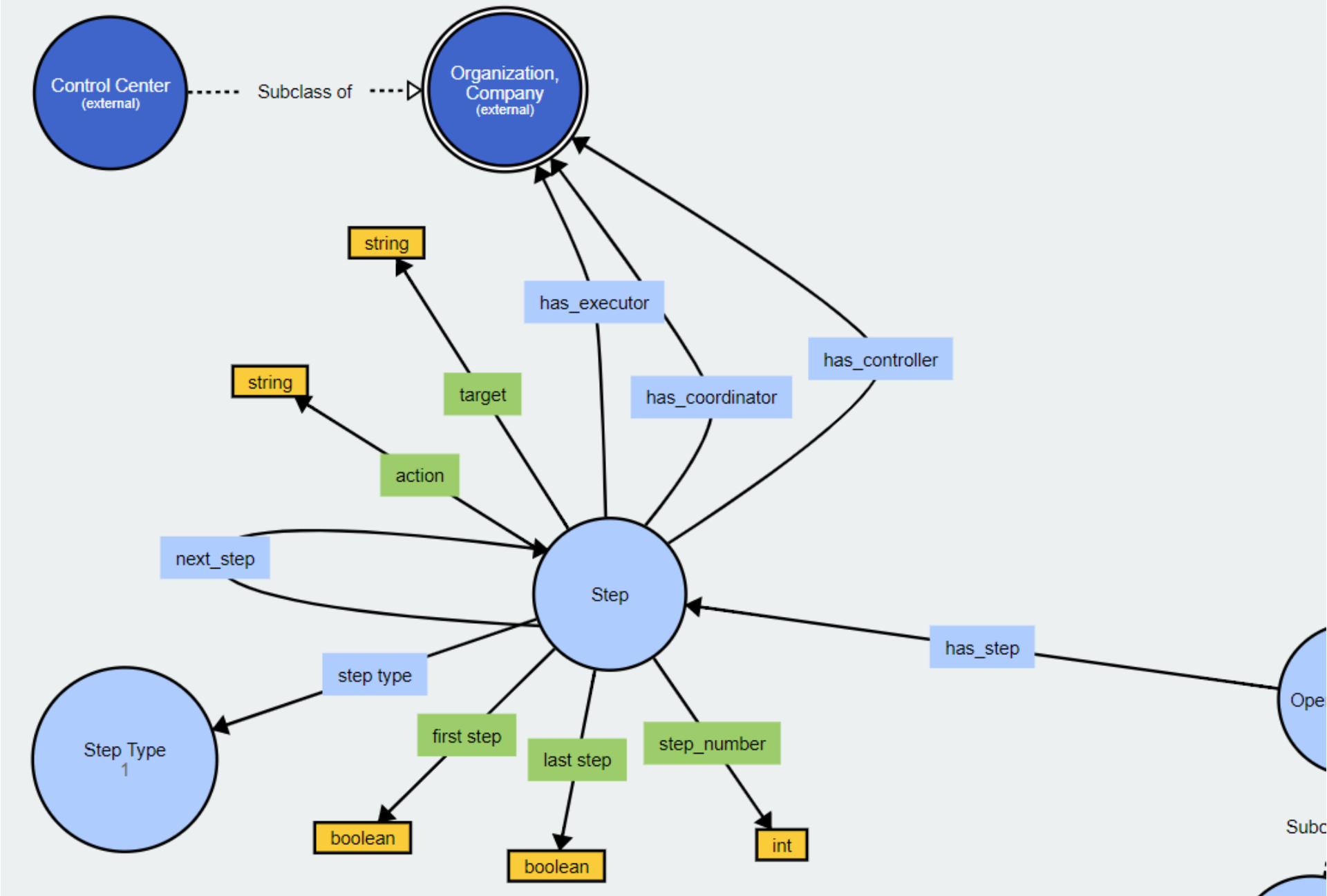
Operating Procedures Ontology - part 1/3



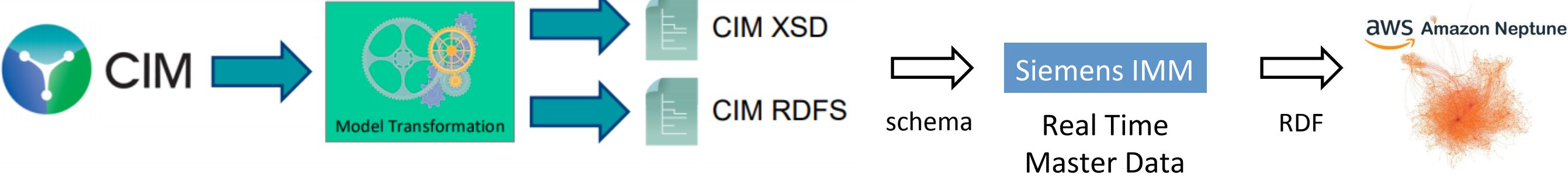
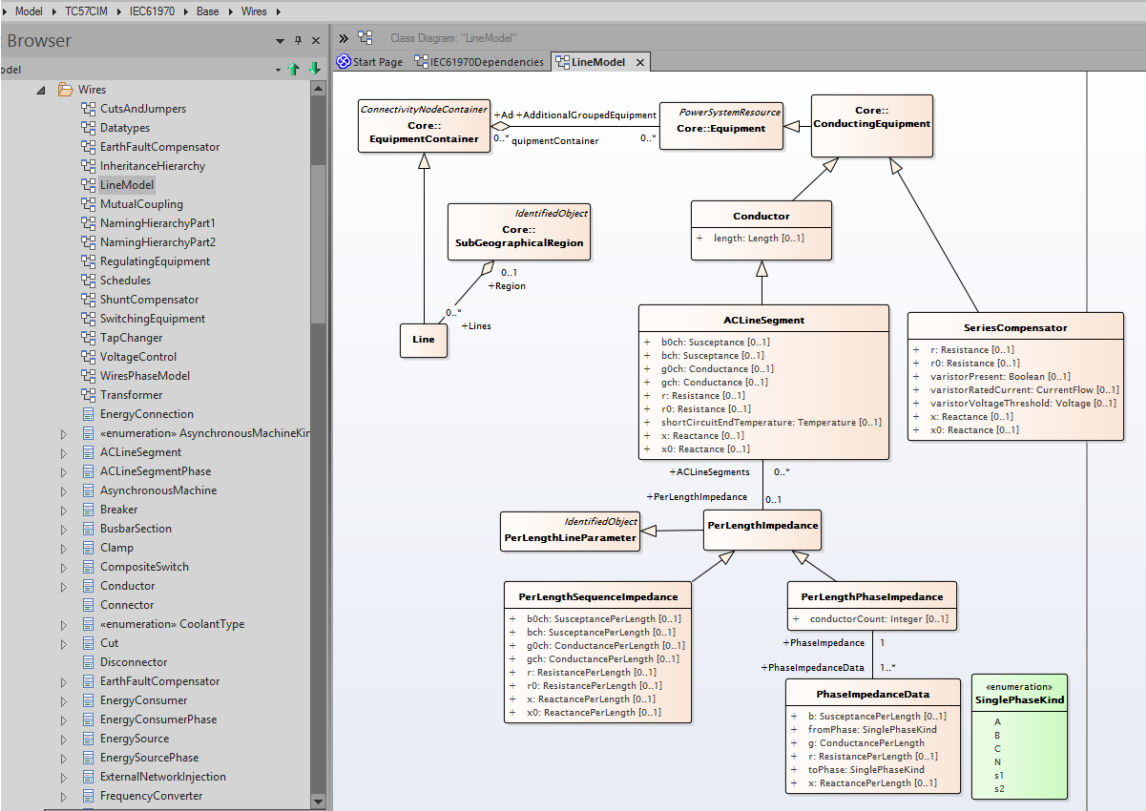
Operating Procedures Ontology - part 2/3



Operating Procedures Ontology - part 3/3



Common information model – CIM IEC - 61970



Demonstration

(Edison Virtual Assistant)



Edison

Assistente virtual

Hi ANDERSON. I'm Edison, ONS virtual assistant.

How can i help you?



Operating history queries (tag search)

The screenshot shows the Osisoft PI System Explorer interface. On the left, a tree view displays a hierarchy of elements under 'REG_SE'. The right pane shows the 'Attributes' tab for the selected element 'REG_SE_PL_MGMAR_RJFTN'. A table lists various attributes and their values.

Name	Value
a	snapfix
agente	
entidade_...	
estado	False
histsoe	false
localname	REG_SE_PL_MGMAR_RJFTN
lscinf	
mastercos	COSR_SE
mrid	_80827333-0AFA-4A71-8781-08E9249850EA
name	PARALELO MARIMBONDO COM SÃO SIMÃO
qs	18877184
s	Estado do ponto digital:off
soe	PI Point not found 'REG_SE_PL_MGMAR_RJFTN.soe'.

Osisoft PI System Explorer Screen

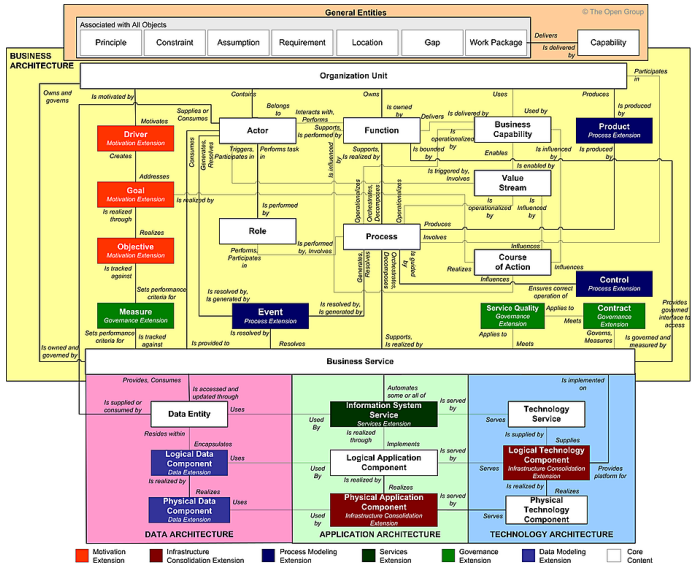
The Edison virtual assistant interface features a green header with a lightbulb icon and the text 'Edison Assistente virtual'. The chat area shows a sequence of messages:

- User: Hi ANDERSON. I'm Edison, ONS virtual assistant.
- User: How can i help you?
- User: tell me the value of his RJSTAD_345_M_VALOR_KV.a
- Assistant: The point Melhor valor de tensão do nível 345 da subestação STAD [Alarmes de medidas analogicas] has value OKV at 2019-06-23T09:28:47Z
- User: How can i help you?
- User: tell me his ARRI_18P0_BA1_KV.a
- Assistant: The point BA1 18 RINCON S. M. KV [Alarmes de medidas analogicas] has value 316KV at 2018-11-28T20:30:18Z

Wiki knowledge features

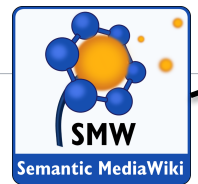
Ask for definitions that are in our internal wiki
SPARQL queries for terms

Label: `rdfs:label`
 Description: `rdfs:comment`



We are in an effort to represent the enterprise architecture in a knowledge graph

The screenshot shows a wiki page for 'Diretoria de Operação' (DOP). It includes a navigation menu, a table of contents with 5 items (Members, Organizational Structure, Assignments, Information Systems, and Value Chain Macroprocesses), a list of members with names and roles, an organizational chart showing the DOP reporting to the National Electric System Operator and overseeing five executive directorates, and a detailed list of attributions for the DOP.



rdf





Edison

Assistente virtual

what are the responsibilities of area DOP?

The DOP is Diretoria de Operação and have the responsibilities:

Coordenar o processo de Programação Eletroenergética Mensal e Diária da Operação
Gestão das Informações meteorológicas, climáticas e recursos hidroenergéticos
Coordenar e executar a operação em Tempo Real do SIN Através dos centros de operação
Coordenar a aprovação, implantação e atualização dos documentos operativos (IOs, MOPs, Diagramas)
Coordenar a análise operacional da programação de intervenções, dos programas de operação e do programa de defluências
Coordenar a análise da operação realizada, e a análise de ocorrências e perturbações
Coordenar a apuração dos resultados da operação (geração, hidrologia, transmissão) e cálculo de indicadores do ONS
Identificar a necessidade, prospectar, especificar, desenvolver e implantar a evolução dos sistemas de apoio à operação

See more: [Wikipédia do ONS](#)

How can i help you?

define SAGIC

See what's I've found about SAGIC

O sistema visa estabelecer as premissas, as diretrizes e os critérios para a coleta, consistência e armazenagem dos dados de geração, intercâmbio e carga, garantindo a segurança dos cálculos e dos dados. Provendo a CCEE as informações para a contabilização

See more at [Wikipédia do ONS](#)



Challenges

1. People usually don't like bots
2. Manual annotation by standardization area
3. Suppliers knowledge lack in these technologies stack
4. Humans vs machine decisions

Next steps

1. Build a Microsoft word add-in for open-xml tagging
2. Query suggestion based on user intention
3. Improve current features

Team

Romeu Bastos
Senior IT Analyst

Iago Godoy
Cloud Application
Developer (IBM)



Me

Ronaldo Pitta
SCADA and EMS Specialist



THANK YOU!

Anderson Gomes Cunha

IT Architect

agcunha@ons.org.br

<https://www.linkedin.com/in/agcunha/>