



DISCERN – an FP7 project relying on standards

Mathias Usler (OFFIS)

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Contents



- Objectives
- Smart Grid Architecture Model (SGAM)
- DISCERN SGAM Visio Template
- Mapping DISCERN Sub-functionalities to SGAM
- Summary
- Decisions

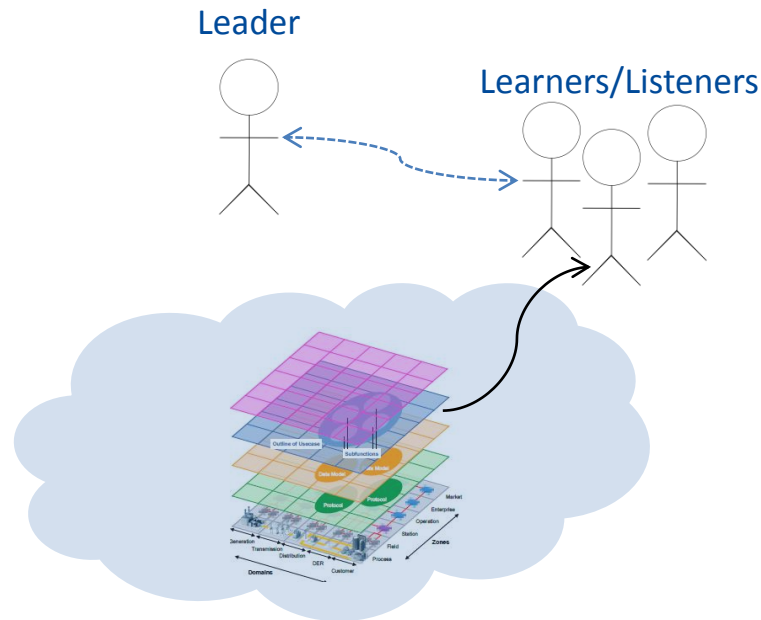
Contents



- **Objectives**
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Objectives

- Discussion between Leaders and Learners/Listeners and assessment of DISCERN Sub-functionalities



- Technology independent
- Intuitive Visualization
- Reusable Descriptions



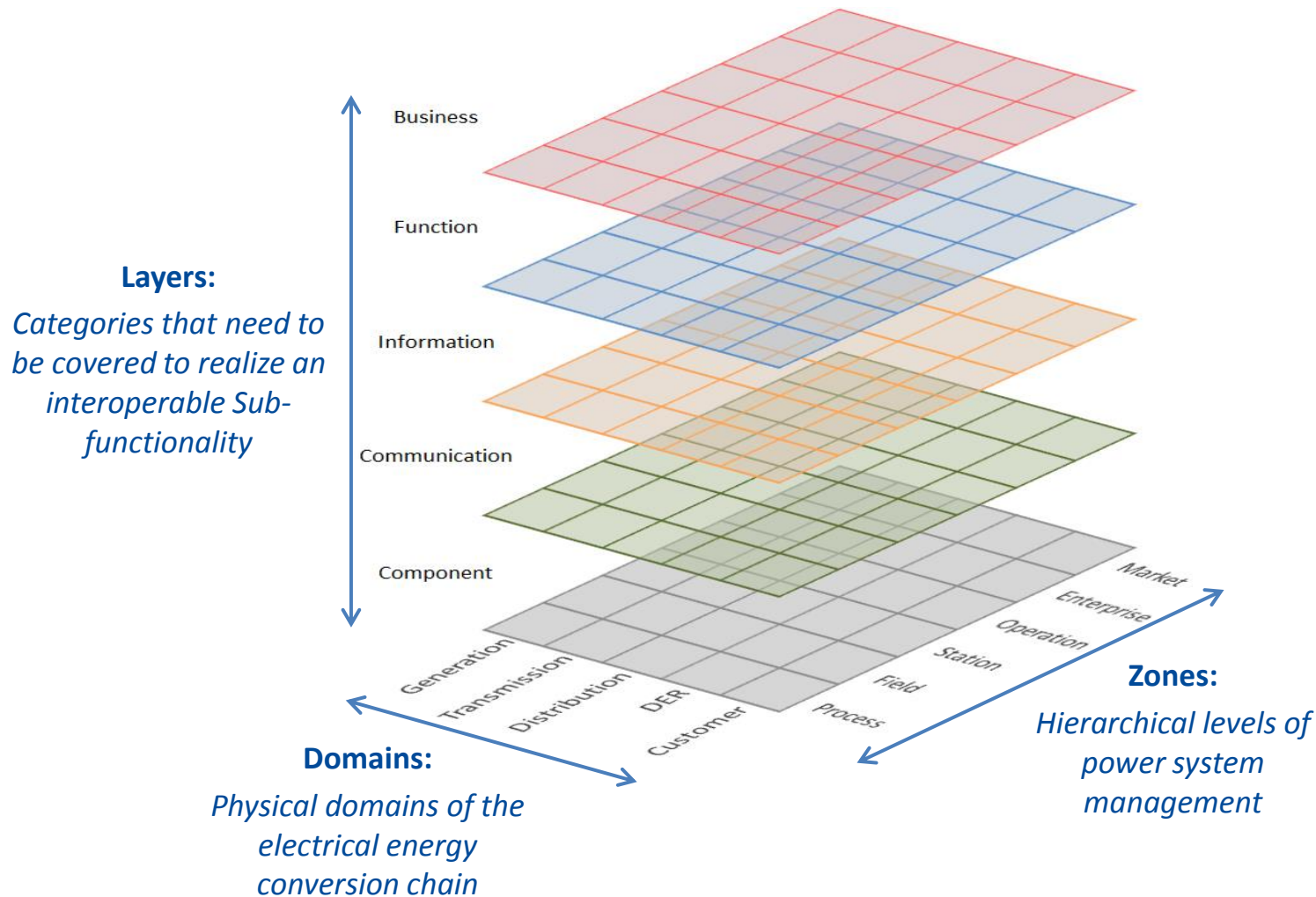
**Smart Grid Architecture Model
(SGAM)**

Contents



- Objectives
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Smart Grid Architecture Model (SGAM)



Contents

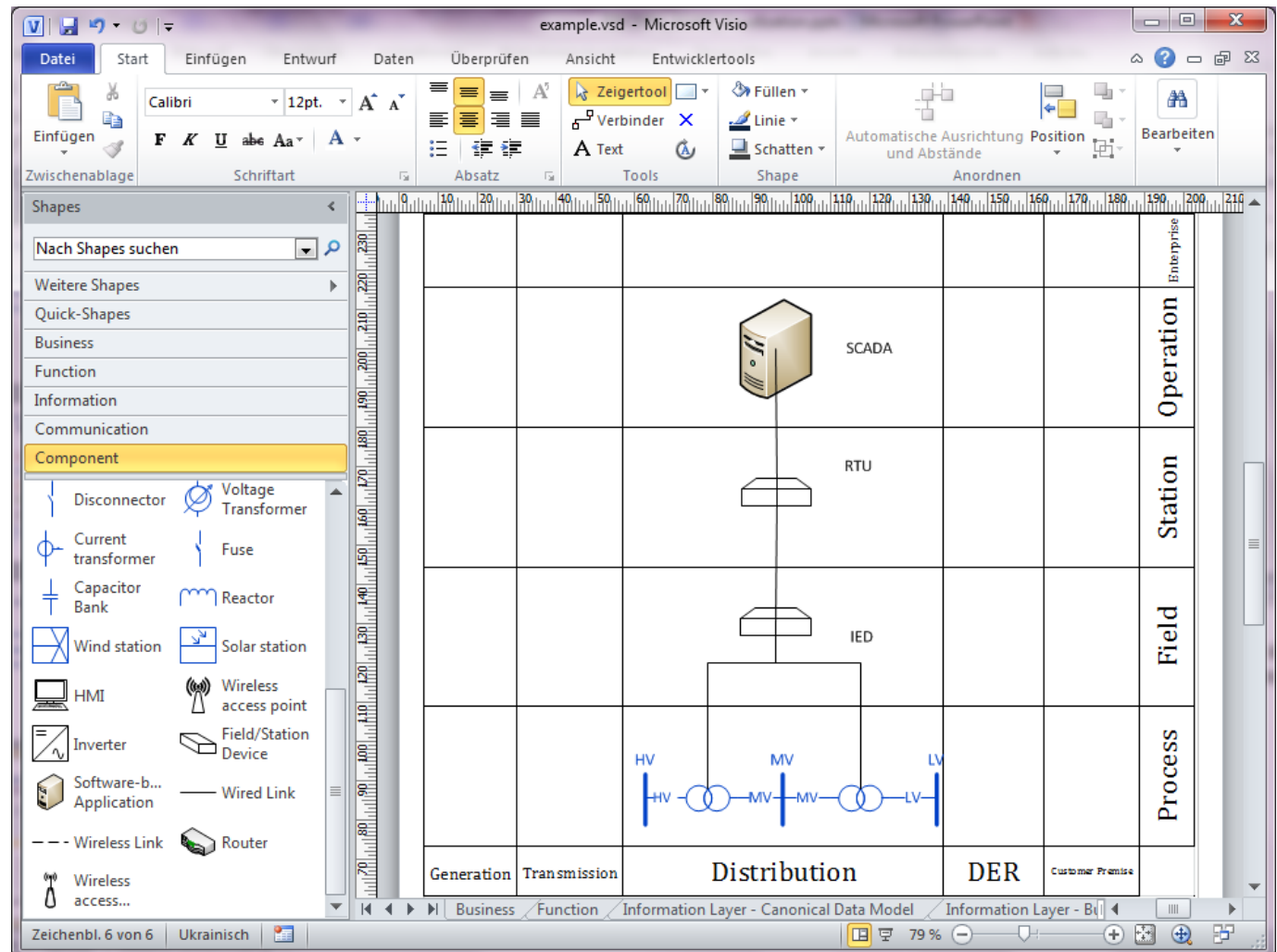


- Objectives
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DISCERN SGAM Visio Template



- Overview

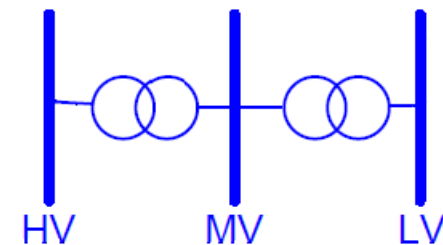
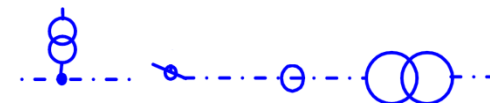


DISCERN SGAM Visio Template



- **Component Layer**

Symbol	Description
<i>Process Components</i>	
 LV MV HV	Low/Medium/High Voltage Grid
	Substation Power Transformer
	Generating Unit DER
	AC Line Segment DC Line Segment
	Circuit Breaker
	Current Transformer

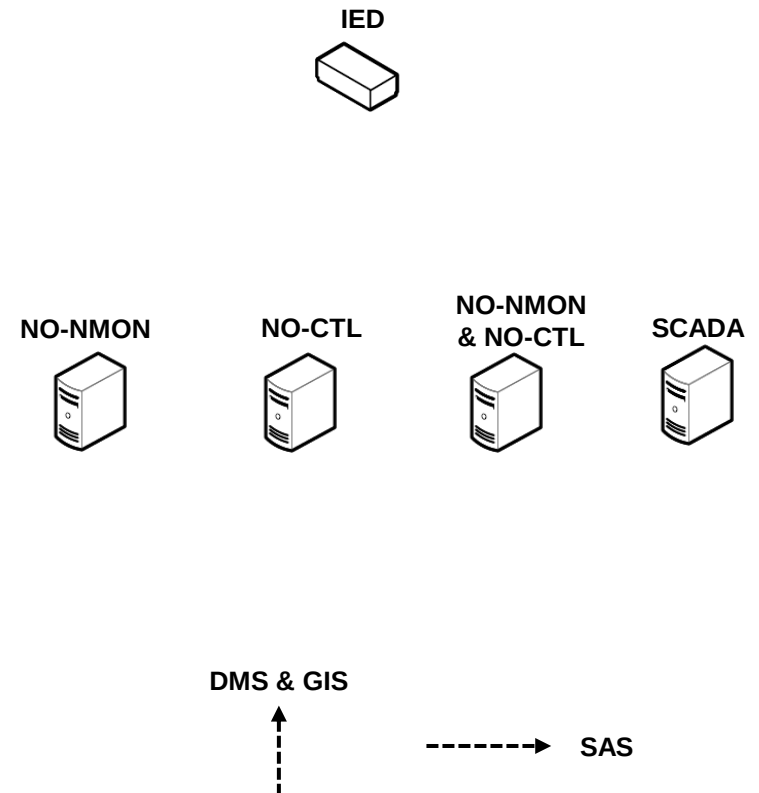


DISCERN SGAM Visio Template



- Component Layer

Symbol	Description
<i>Devices</i>	
	<i>Data Aggregator DER/Load Control IED Smart Meter</i>
<i>Application</i>	
	<i>IRM applications SCADA DMS EMS GIS</i>
<i>Human Machine Interface</i>	
	HMI
<i>External Components</i>	
	<i>External Systems</i>



DISCERN SGAM Visio Template



- Component Layer

Symbol	Description
<i>Communication Elements</i>	
	Gateway Network Interface Controller Router
	Communication Front End Front End Processor
	Transmitter
	Wired Communication Link
	Wireless Communication Link

Gateway



NIC



Router



Communication
Front End



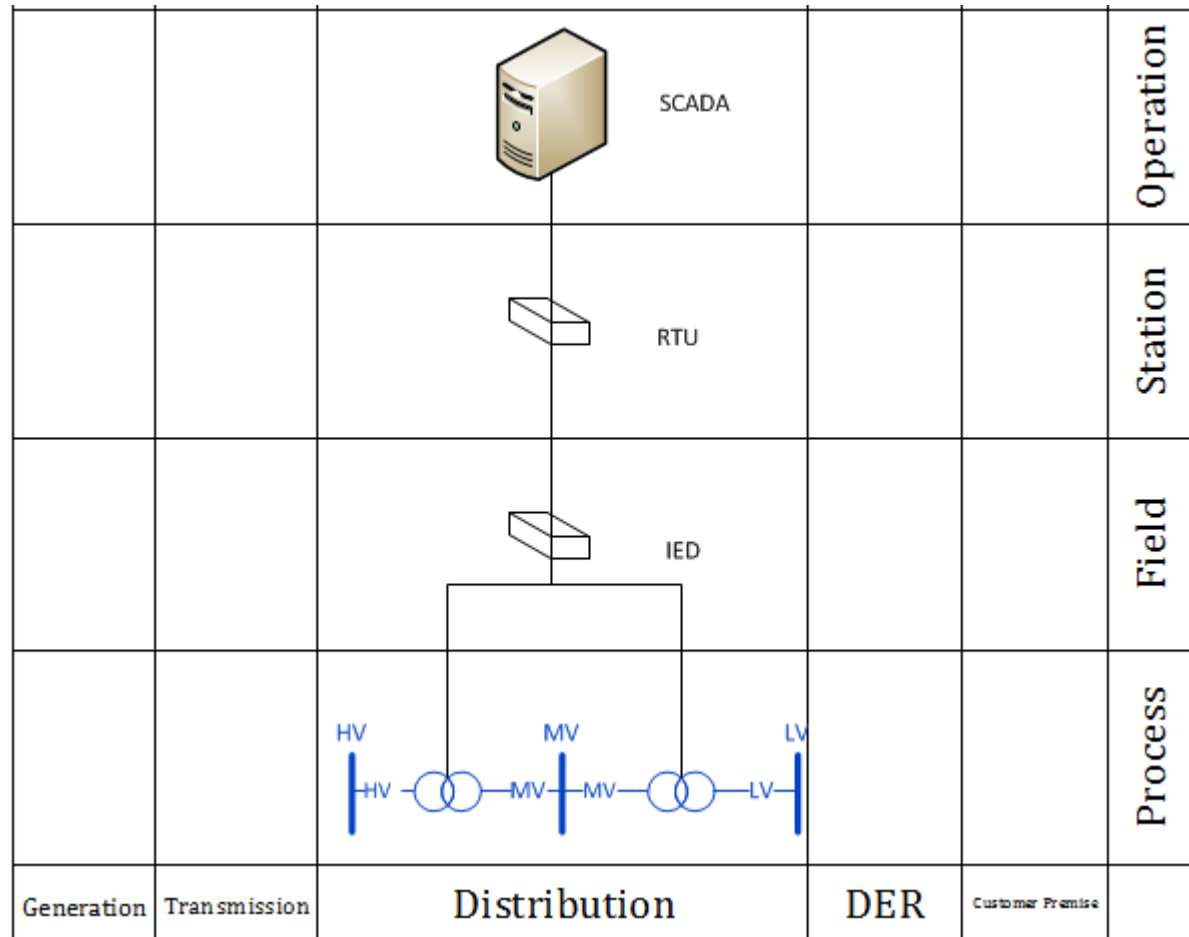
FEP



DISCERN SGAM Visio Template



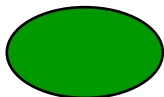
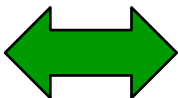
- Component Layer



DISCERN SGAM Visio Template



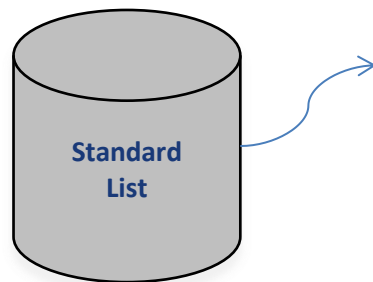
- **Communication Layer**

Symbol	Description
	Communication protocols for the data exchange (area)
	Communication protocols for the data exchange (point-to-point)

DISCERN SGAM Visio Template



- Communication Layer

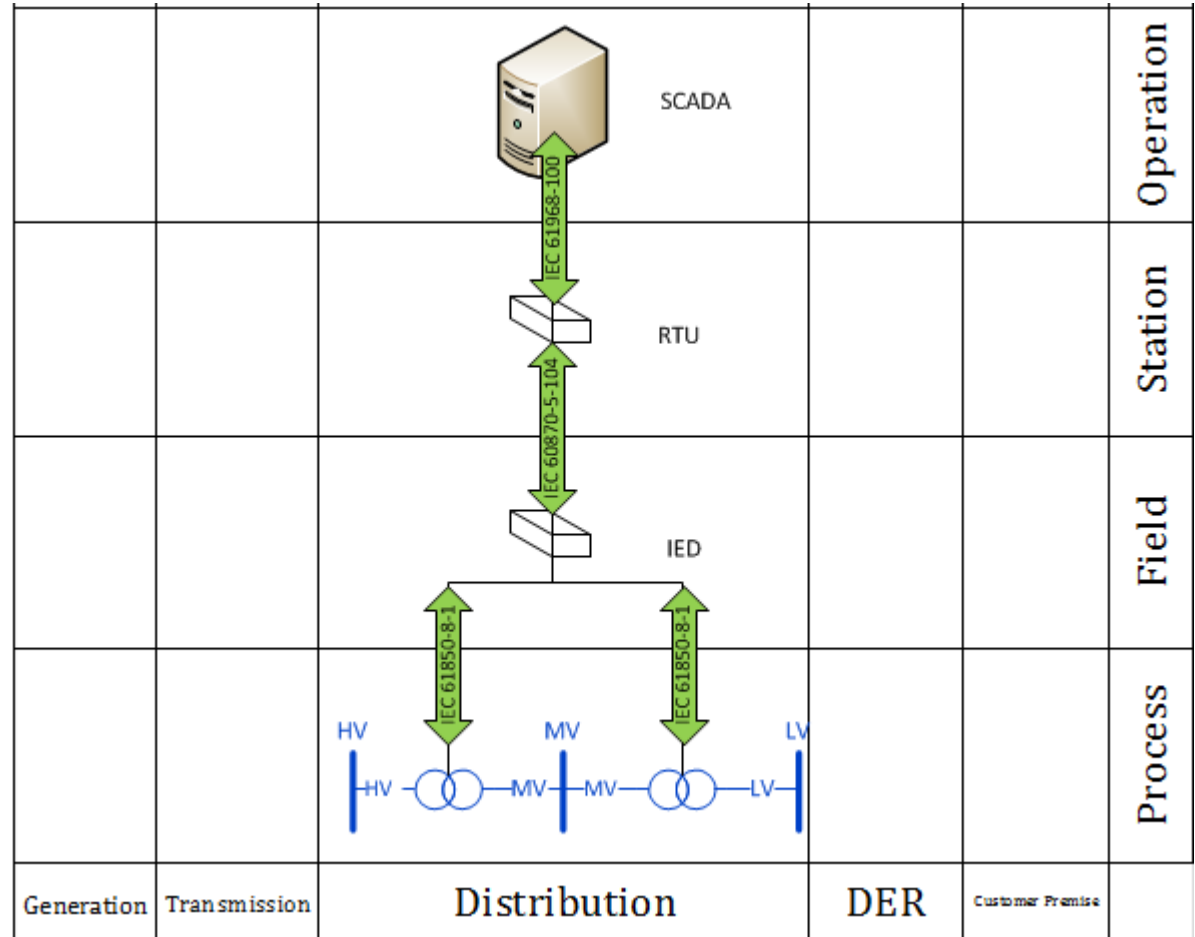


IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 61968-100 IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 61968-100	Market
IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 60870-5 IEC 60870-6 IEC 61968-100 IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 60870-5 IEC 60870-6 IEC 61968-100 IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 60870-5 IEC 61968-100 IEC 62325-301 IEC 62325-451 ENTSO-E ECAN ENTSO-E ERRP ENTSO-E ESP ENTSO-E ESS	IEC 61968-100	Enterprise
	IEC 60870-5-101 IEC 60870-5-104 IEC 60870-6 IEC 61850-90-2 IEC 61968-100	IEC 60870-5-101 IEC 60870-5-104 IEC 60870-6 IEC 61850-90-2 IEC 61968-100	IEC 60870-5-101 IEC 60870-5-104 IEC 60870-6 IEC 61850-8-2 IEC 61850-90-2 IEC 61968-100	IEC 61968-100	Operation
	IEC 60870-5-101 IEC 60870-5-104 IEC 61850-90-2	IEC 60870-5-101 IEC 60870-5-104 IEC 61850-8-1 IEC 61850-90-2	IEC 60870-5-101 IEC 60870-5-104 IEC 61850-8-1 IEC 61850-8-2 IEC 61850-90-2		Station
	IEC 60870-5-103	IEC 61850-8-1	IEC 61158 IEC 61784-1 IEC 61850-8-1		Field
					Process
Generation	Transmission	Distribution	DER	Customer Premise	

DISCERN SGAM Visio Template



- Communication Layer



DISCERN SGAM Visio Template



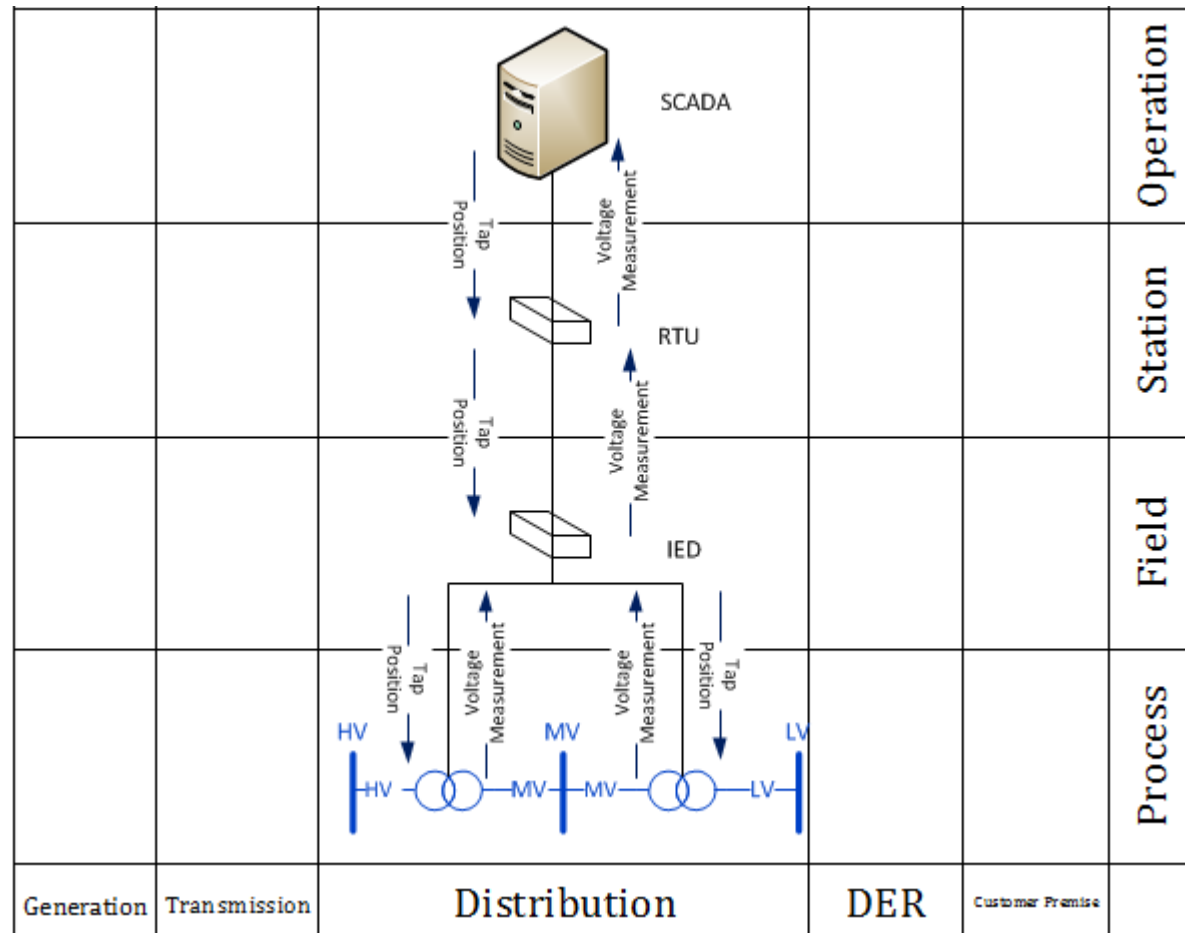
- **Information Layer – *Business Context View***

Symbol	Description
	Exchanged information objects

DISCERN SGAM Visio Template



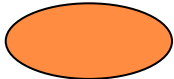
- Information Layer – *Business Context View*



DISCERN SGAM Visio Template



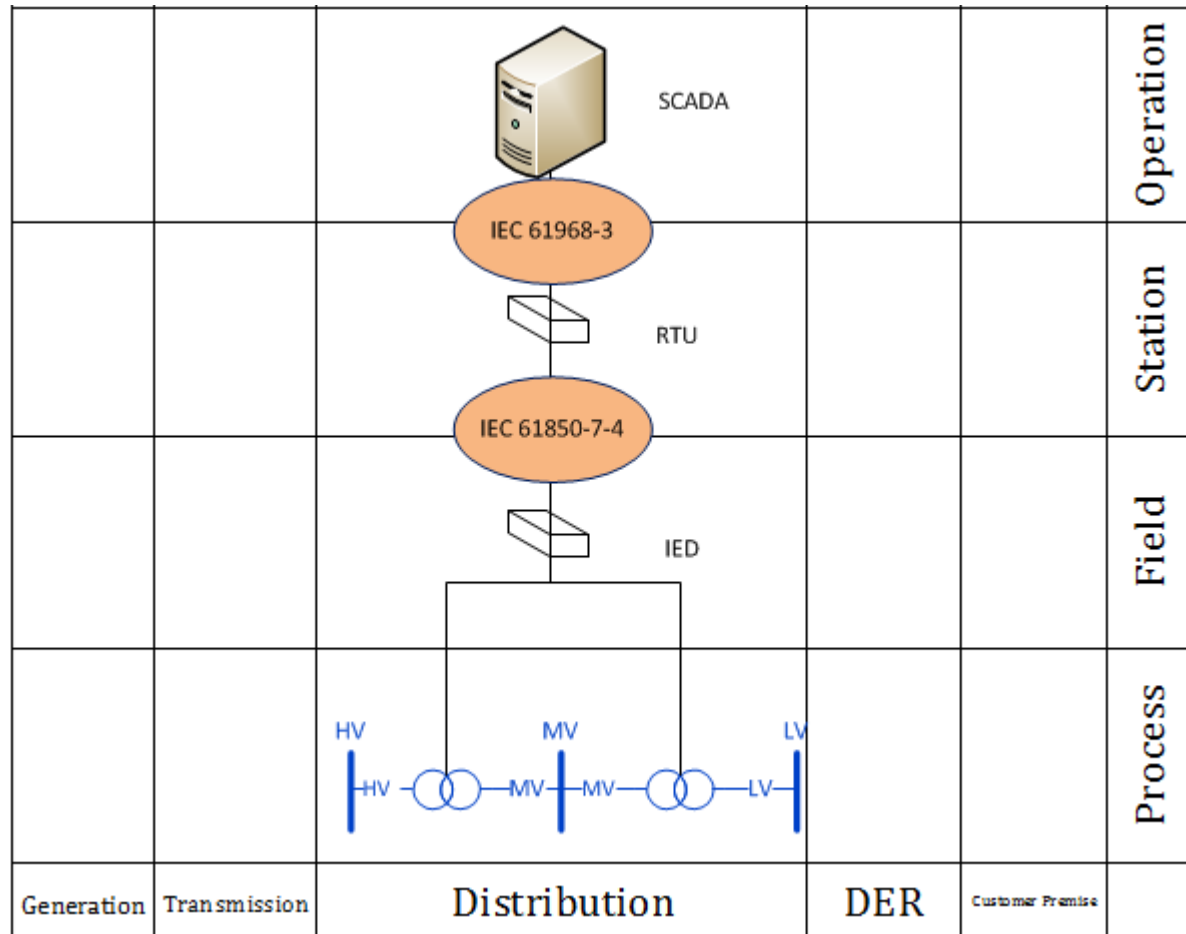
- **Information Layer – *Canonical Data Model View***

Symbol	Description
	Canonical data model (standards)

DISCERN SGAM Visio Template



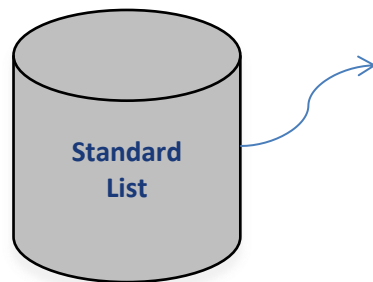
- Information Layer – *Canonical Data Model View*



DISCERN SGAM Visio Template



- Information Layer – Canonical Data Model View**



IEC 61968-11 IEC 61970-301 IEC 62325-301 IEC 62325-351 ENTSO-E HRM WXXM	IEC 61968-11 IEC 61970-301 IEC 62325-301 IEC 62325-351 ENTSO-E HRM	IEC 61968-11 IEC 61970-301 IEC 62325-301 IEC 62325-351 ENTSO-E HRM	IEC 61968-11 IEC 61970-301 IEC 62325-301 IEC 62325-351 ENTSO-E HRM		Market
IEC 61968-11 IEC 61970-301 IEC 62325-301 IEC 62325-351 ENTSO-E HRM WXXM	IEC 61968-11 IEC 61970-301 IEC 61970-4xx IEC 62325-301 IEC 62325-351 ENTSO-E HRM WXXM	IEC 61968-11 IEC 62325-301 IEC 62325-351 ENTSO-E HRM	IEC 61968-11 IEC 61970-301 IEC 62325-301 IEC 62325-351 ENTSO-E HRM		Enterprise
WXXM	IEC 61850-80-1 IEC 61850-90-2 IEC 61970-301 IEC 61970-4xx	IEC 61850-80-1 IEC 61850-90-2 WXXM	IEC 61850-7-410 IEC 61850-7-420 IEC 61850-90-10 IEC 61850-90-11 IEC 61850-90-15 IEC 61850-90-2 IEC 61850-90-7 IEC 61850-90-9 WXXM	WXXM	Operation
	IEC 61850-80-1 IEC 61850-90-2 WXXM	IEC 61850-80-1 IEC 61850-90-2 IEC 61850-90-6 WXXM	IEC 61400-25-2 IEC 61400-25-3 IEC 61850-7-410 IEC 61850-7-420 IEC 61850-90-10 IEC 61850-90-11 IEC 61850-90-15 IEC 61850-90-2 IEC 61850-90-7 IEC 61850-90-9 WXXM	WXXM	Station
		IEC 61850-90-6	IEC 61131 IEC 61400-25-2 IEC 61400-25-3 IEC 61499 IEC 61850-7-410 IEC 61850-7-420 IEC 61850-90-7 IEC 61850-90-9		Field
					Process
Generation	Transmission	Distribution	DER	Customer Premise	

DISCERN SGAM Visio Template



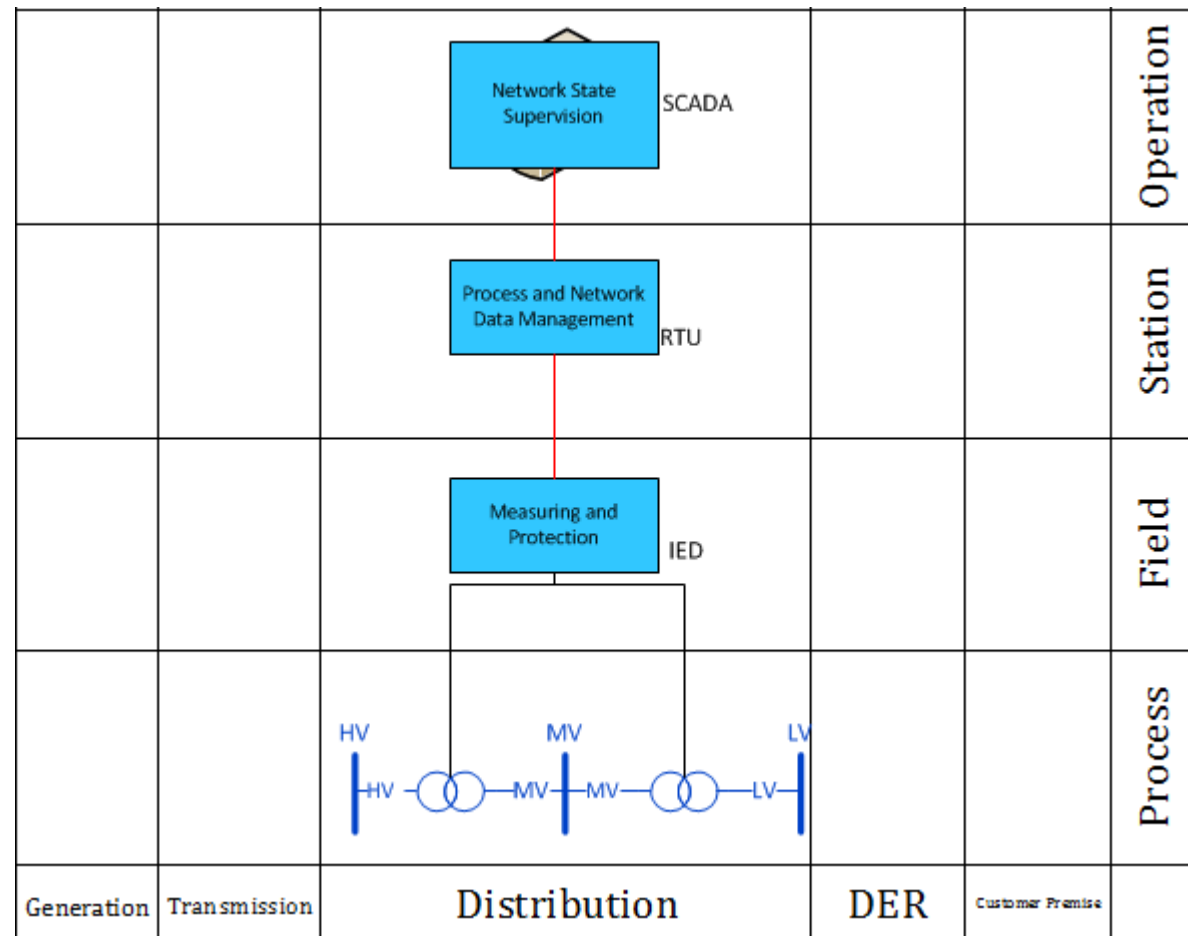
- **Function Layer**

Symbol	Description
	Function
	Interrelation (exchanged information)

DISCERN SGAM Visio Template



- Function Layer



DISCERN SGAM Visio Template



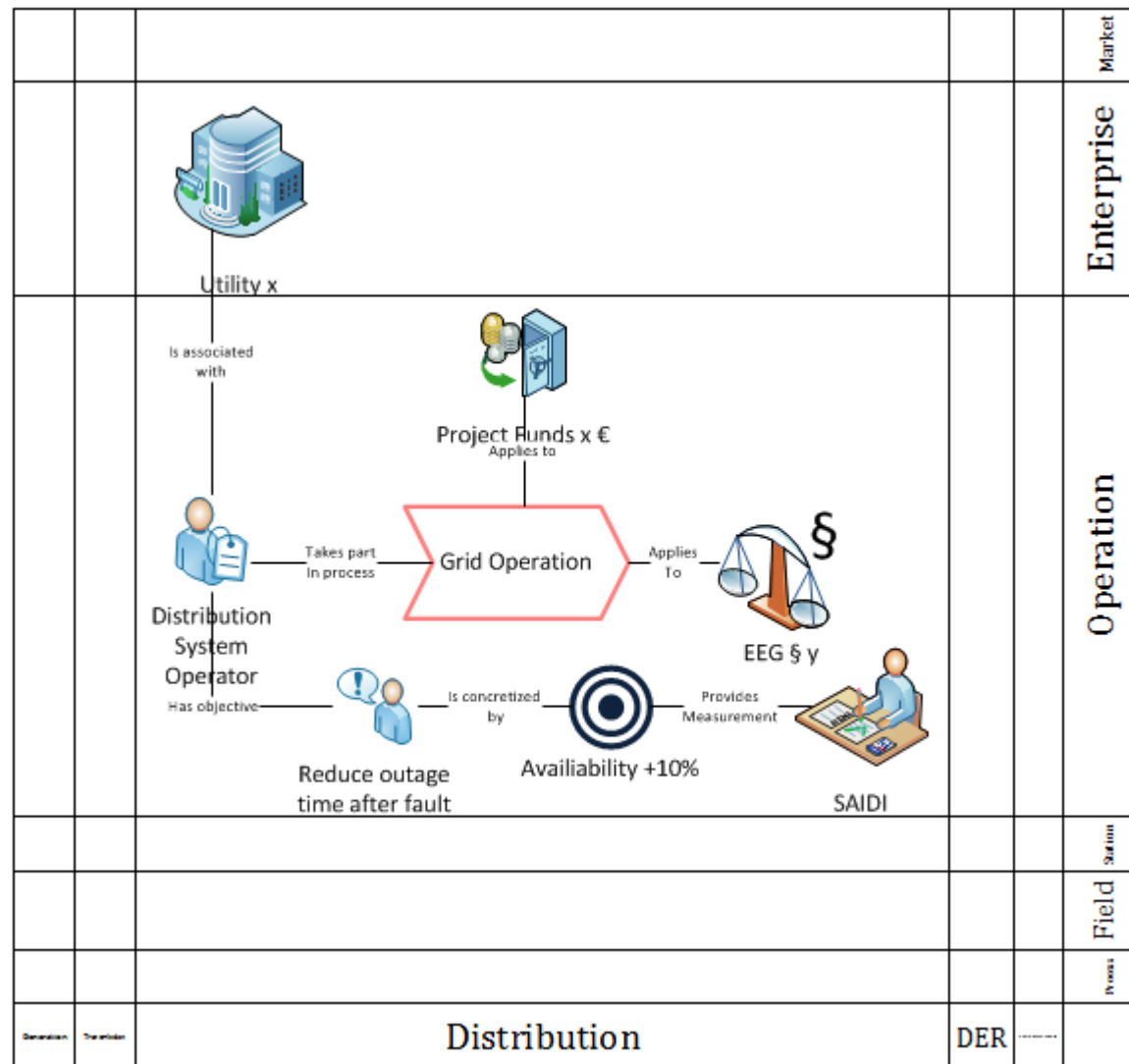
- **Business Layer**

Symbol	Description
	Actor performing in context of a sub-functionality using a specific Business Role
	Organization an <u>Actor</u> is associated with in context of the sub-functionality
	Business Process that is affected by the sub-functionality
	Objective that relates to certain <u>Actors</u> and <u>Business Processes</u> and is pursued in context of the sub-functionality
	Target which concretizes an <u>Objective</u> by adding measurable statements
	Key Performance Indicator which is used to measure the achievement of a <u>Target</u>
	Legal/Regulatory Constraint which is connected to a <u>Business Process</u> or the Business Role of an <u>Actor</u> in context of the sub-functionality
	Economic Constraint which applies to a <u>Business Process</u> or the Business Role of an <u>Actor</u> in context of the sub-functionality

DISCERN SGAM Visio Template



- Business Layer



Contents

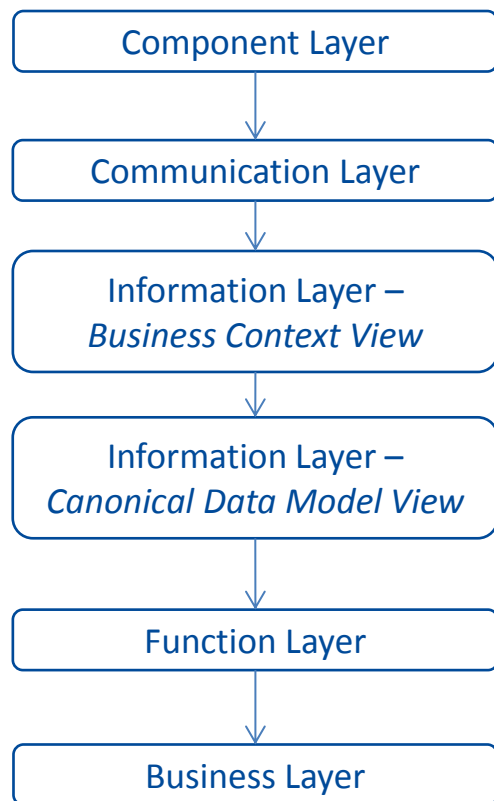


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Mapping DISCERN Sub-functionalities to SGAM



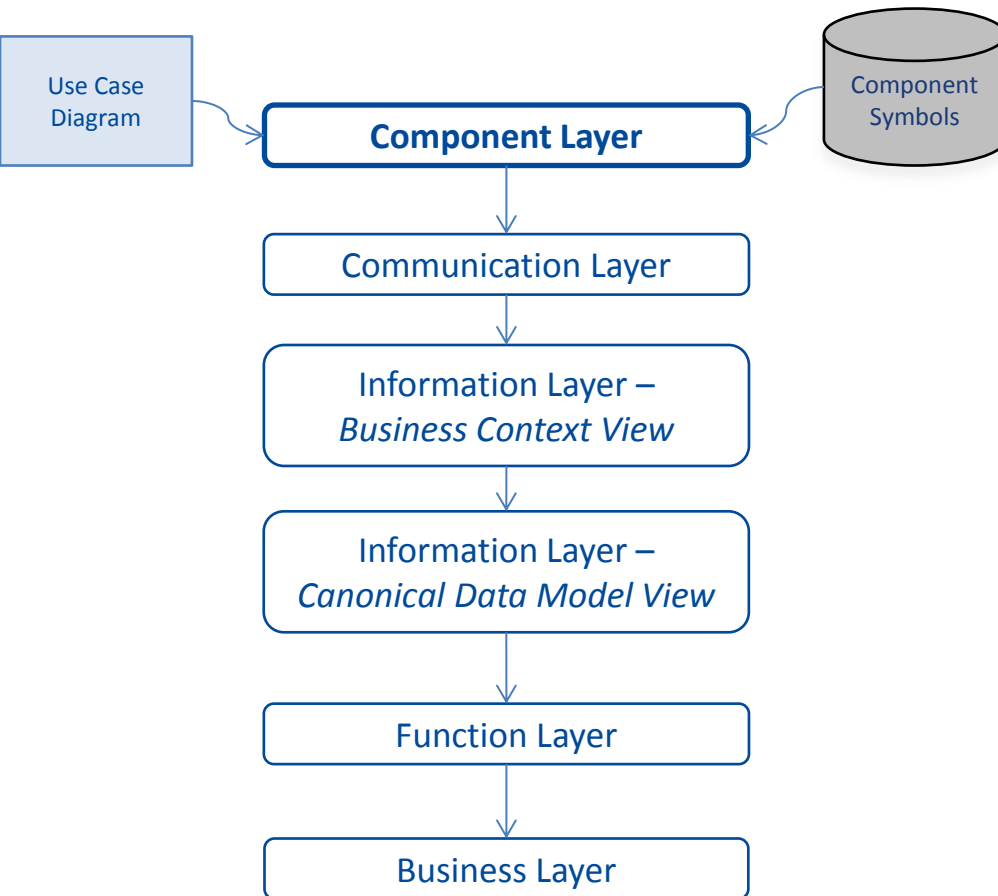
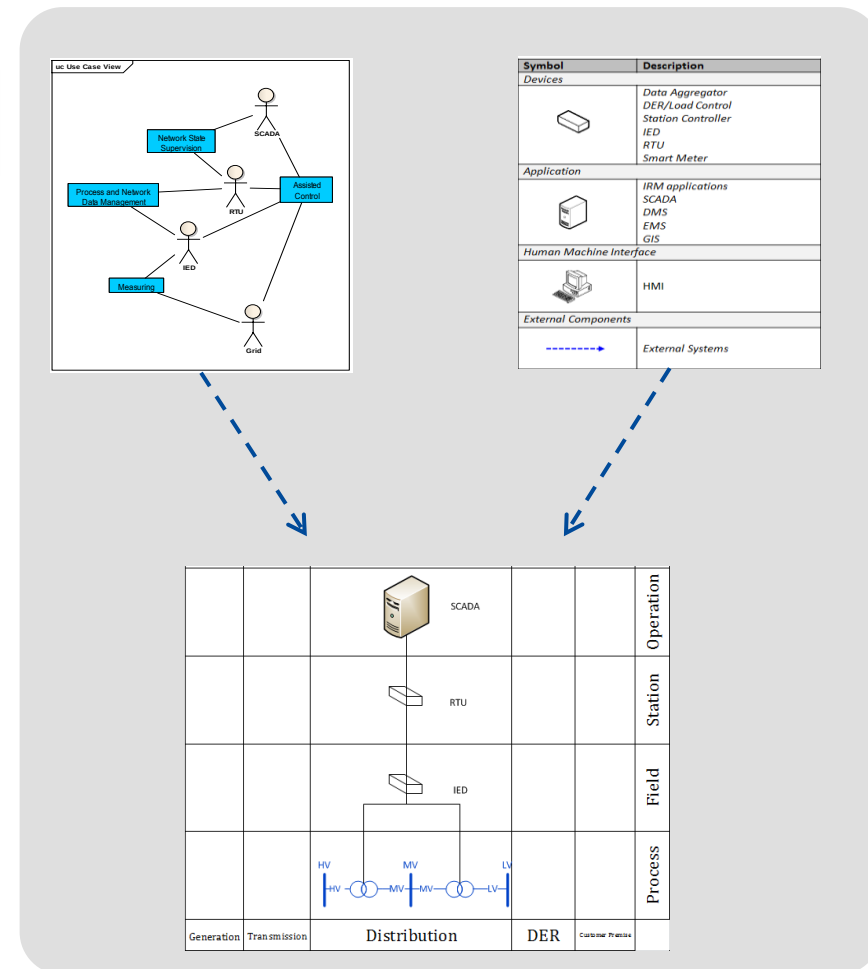
- **Bottom-Up Approach**



Mapping DISCERN Sub-functionalities to SGAM

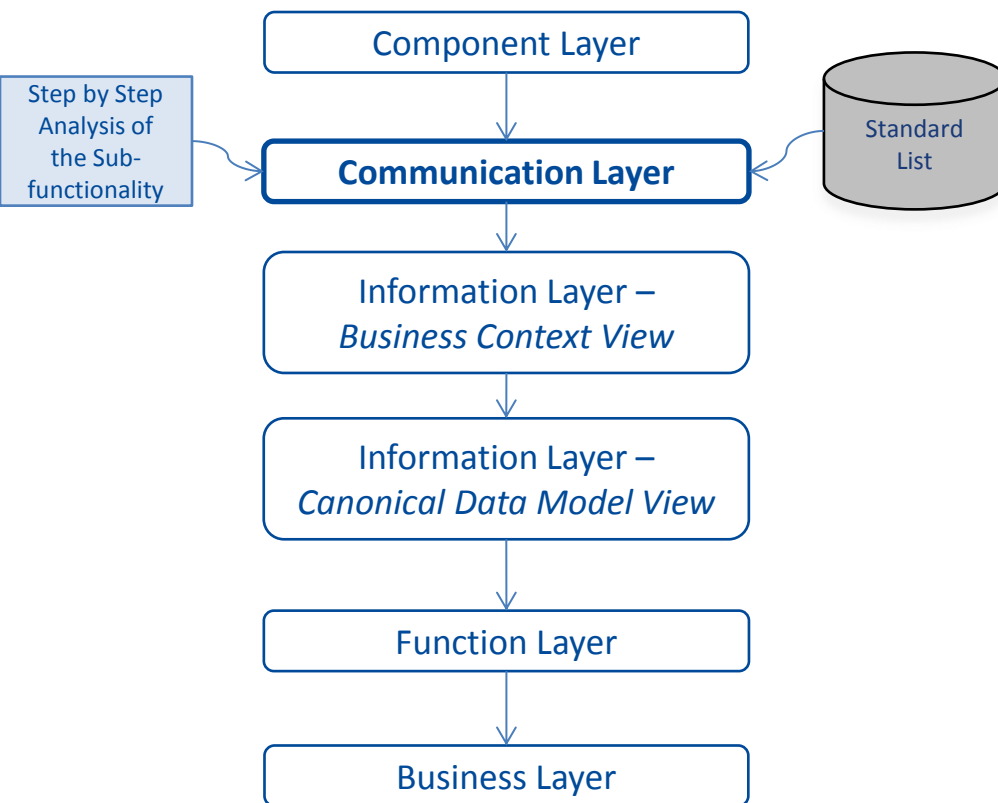


- Bottom-Up Approach

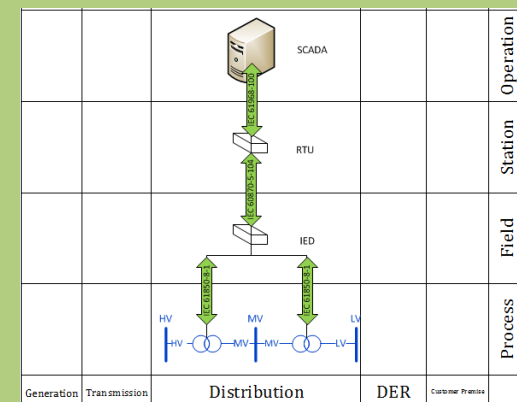


DISCERN

- **Bottom-Up Approach**



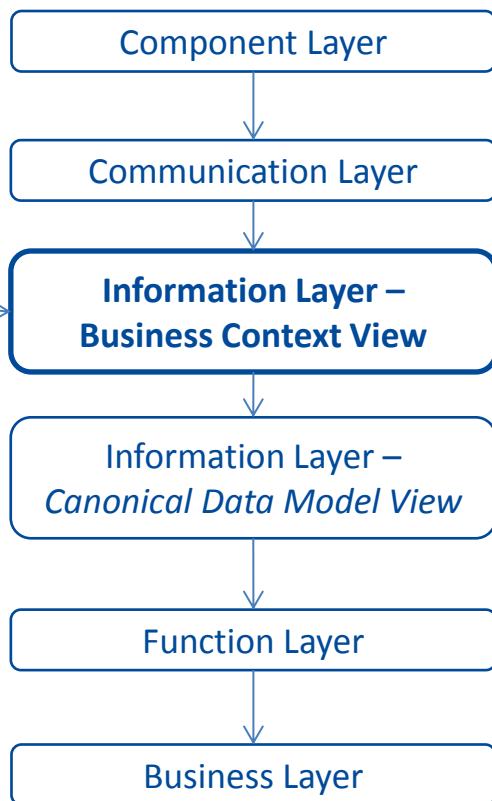
Scenario Name		Scenarios						
Step No.	Step Description	Normal Sequence	Normal Pre-conditions	Normal Post-conditions	Service	Abnormal Pre-conditions	Abnormal Post-conditions	Expected Results
1	Launch System Operator's interface by clicking on the Start Menu icon	Activate main menu		Start-Up System Operator window and main menu is presented	None	None	None	Activation of main menu is successful
2	A valid reading is entered in the field of ± 45 m/s	Valid entry		Valid information is entered into the main menu activation	None	None	Start Menu	Activation of main menu is successful
3	Enter the speed	Enter the speed		Enter the speed information into the data collection	None	None	Start Menu ± 45 m/s	Enter the speed
4	Save the speed	Save the speed		Save the speed information into the data collection	None	None	Start Menu ± 45 m/s	Save the speed

[illegible]

Mapping DISCERN Sub-functionalities to SGAM

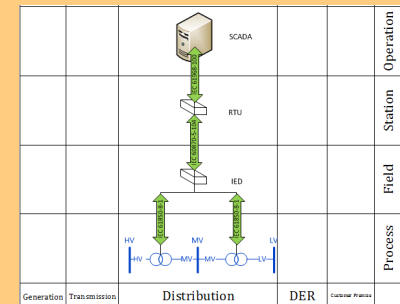
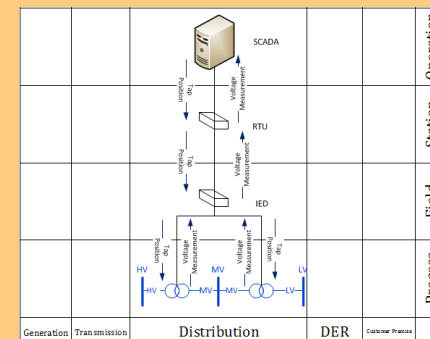


- Bottom-Up Approach



Step by Step Analysis of the Sub-functionality

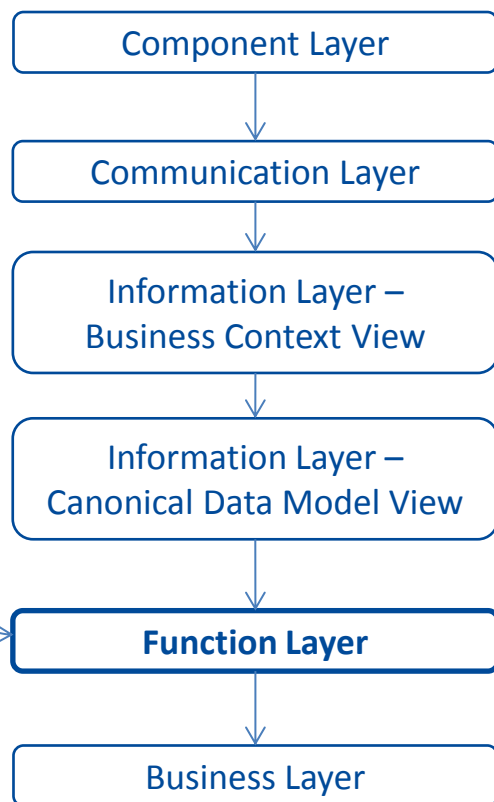
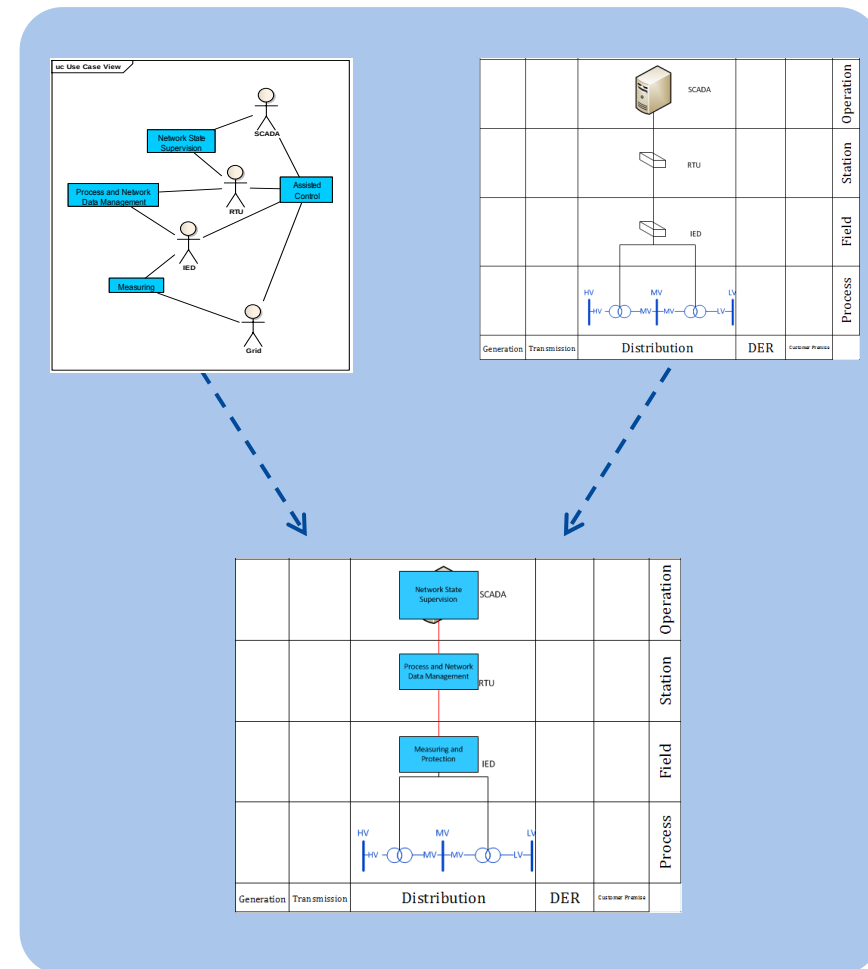
Scenarios									
Scenario No.	Event	Name of Process/Functionality	Description of Process/Functionality	Sender	Receiver/Actor	Information Element	Information Element	Information Element	Requirement
1	Real Time System Operator is informed that meter reading is required for the Smart Meter's meter.	Activate metering scheme	Real Time System Operator activates metering scheme for the Smart Meter's meter.	Real Time System Operator	Real Time System Operator	Activation Message to meter reading scheme	Activation Message to meter reading scheme	Activation Message to meter reading scheme	Description of requirement
2	A meter reading scheme is activated at HES level.	Notify meter	HES informs Smart Meter about activation of meter reading scheme. Subsequent meter data is to be reported by the meter. HES informs the meter about activation of data collection scheme.	HES	Smart Meter	Activation Message to meter reading scheme	Activation Message to meter reading scheme	Activation Message to meter reading scheme	Description of requirement
3	Time has expired	Real metering data	When the time expires, a meter real time metering data is triggered. Real time metering data is triggered. Time triggers meter read at HES level. Time triggers meter read at Smart Meter level.	HES	Smart Meter	Time event notification	Time event notification	Time event notification	Description of requirement



Mapping DISCERN Sub-functionalities to SGAM



- **Bottom-Up Approach**



Contents



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Summary



- **SGAM in DISCERN**
  - Intuitive Visualization
  - Reusable Description
- The **DISCERN SGAM Visio Template** was presented
- Different alternatives for **mapping DISCERN solutions to SGAM** were proposed
  - Down-Top
  - Top-Down
  - Mixed