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**Agent Based Testbed Design for Cyber Vulnerability Assessment in Smart-Grids**

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# Agent Based Testbed Design for Cyber Vulnerability Assessment in Smart-Grids

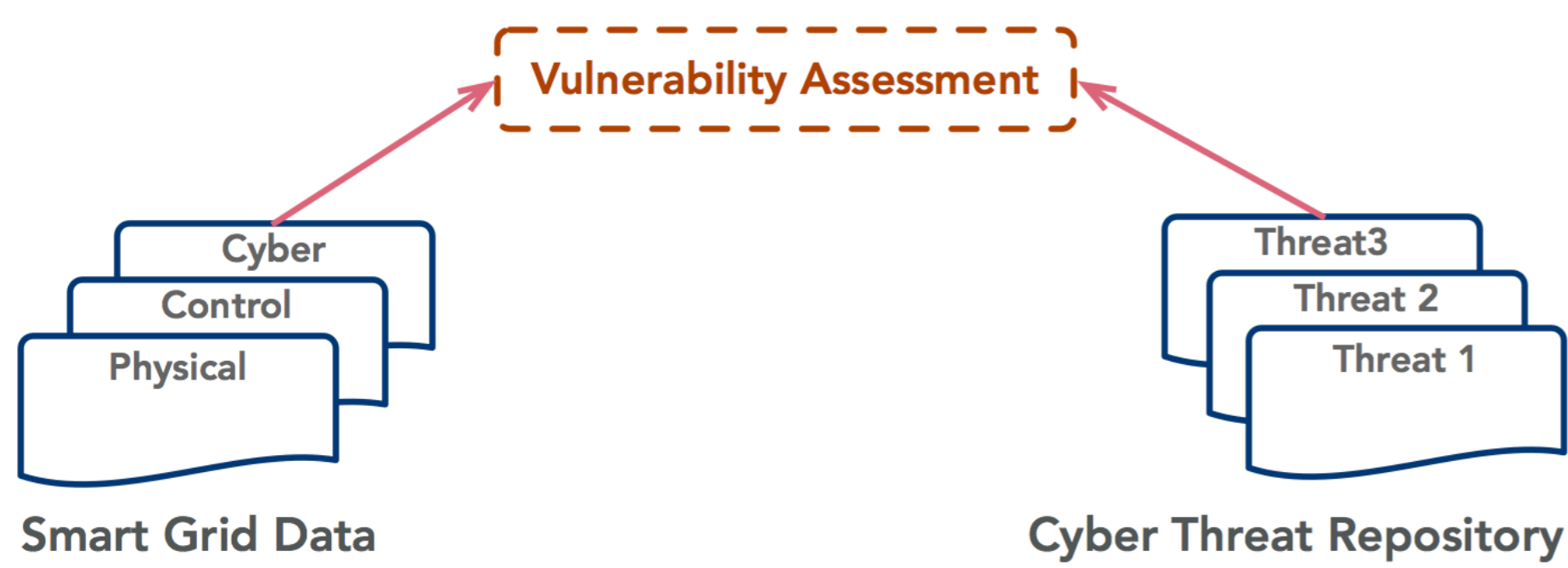
SWITIS, CySeP, 2018

PhD student: Yuning Jiang, Supervisors: Yacine Atif, Jianguo Ding  
 School of Informatics, University of Skövde, Sweden  
 {yuning.jiang, yacine.atif, jianguo.ding}@his.se



## 01 Motivation

- Smart grid evolution introduces efficiency but increases **vulnerabilities** due to cyber threats.
- Vulnerability assessment involves data analysis from both smart-grid infrastructure and known cyber-threat repository.



## 02 Goal

- A testbed framework to analyse vulnerability and evaluate impacts of cyber-threats on smart grids.

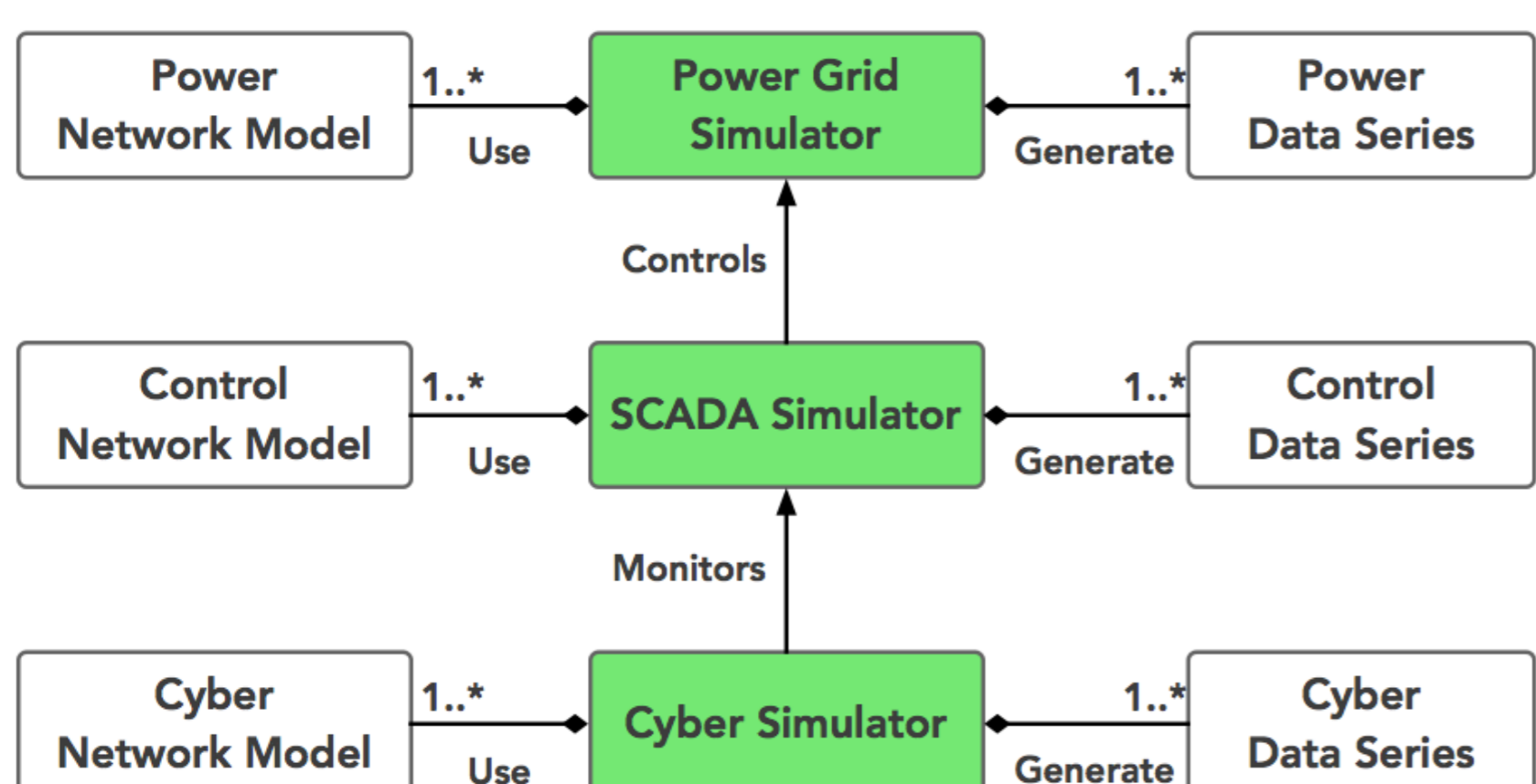
## 03 Methodology

- **Step 1: Cyber and Physical Data Collection**  
*Develop a data-collection simulation model.*
- **Step 2: Security Events Aggregation**  
*Filter data for cyber, control and fault events.*
- **Step 3: Vulnerability Analysis**  
*Detect threat-patterns and report vulnerability.*
- **Step 4: Impacts and Mitigations**  
*Connect vulnerability to attack patterns and mitigations.*



• Step 1

• Step 2



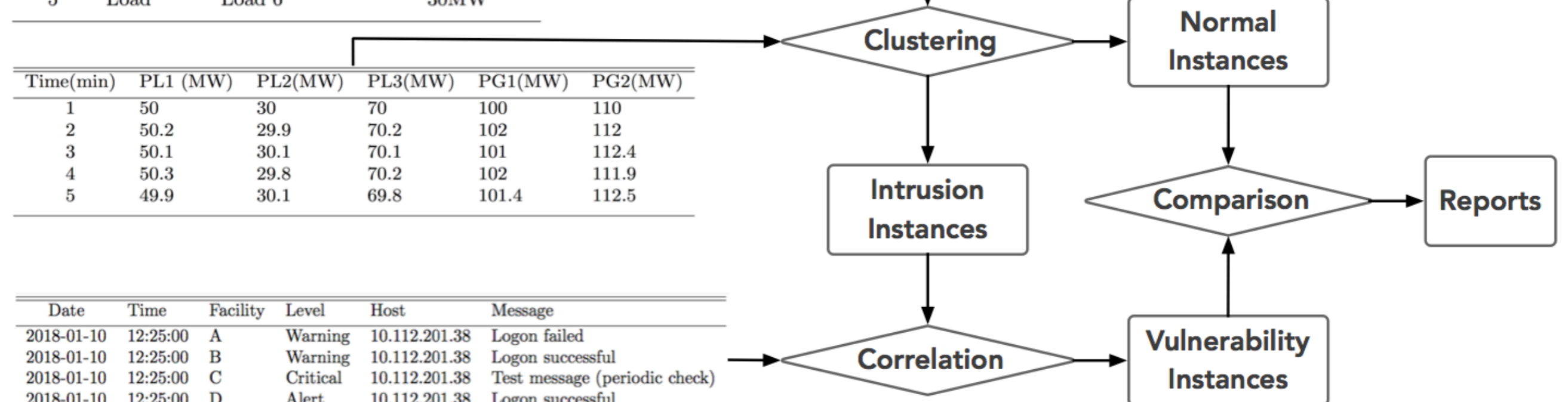
BusID	BusType	Connections	Parameters
1	Load	Generator 1, Load 2	100MW
2	Generator	Load 3	105MW
3	Generator	Load4	102MW
4	Load	Generator2, Load 5	70MW
5	Load	Load 6	30MW

Time(min)	PL1 (MW)	PL2(MW)	PL3(MW)	PG1(MW)	PG2(MW)
1	50	30	70	100	110
2	50.2	29.9	70.2	102	112.4
3	50.1	30.1	70.1	101	112.4
4	50.3	29.8	70.2	102	111.9
5	49.9	30.1	69.8	101.4	112.5

Date	Time	Facility	Level	Host	Message
2018-01-10	12:25:00	A	Warning	10.112.201.38	Logon failed
2018-01-10	12:25:00	B	Warning	10.112.201.38	Logon successful
2018-01-10	12:25:00	C	Critical	10.112.201.38	Test message (periodic check)
2018-01-10	12:25:00	D	Alert	10.112.201.38	Logon successful

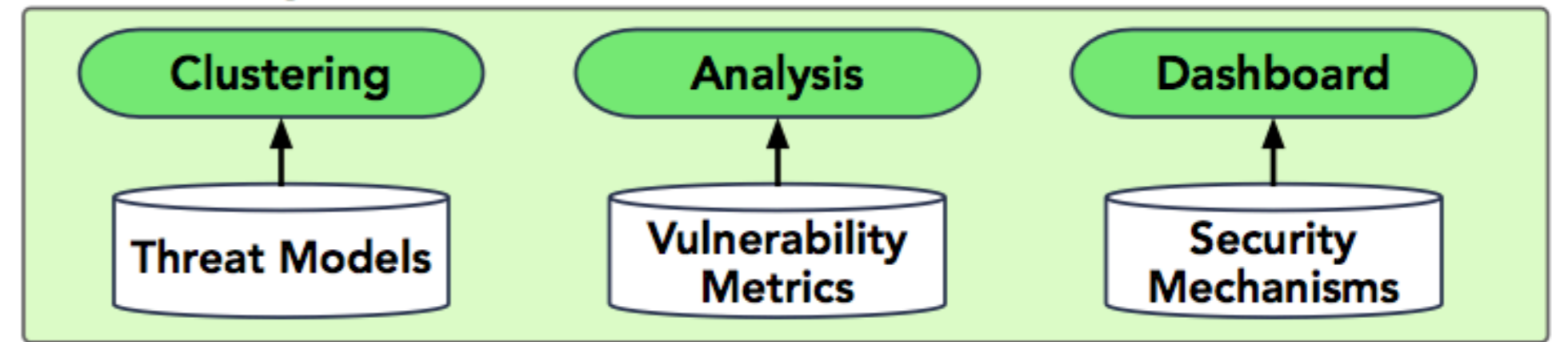
• Step 3

• Step 4

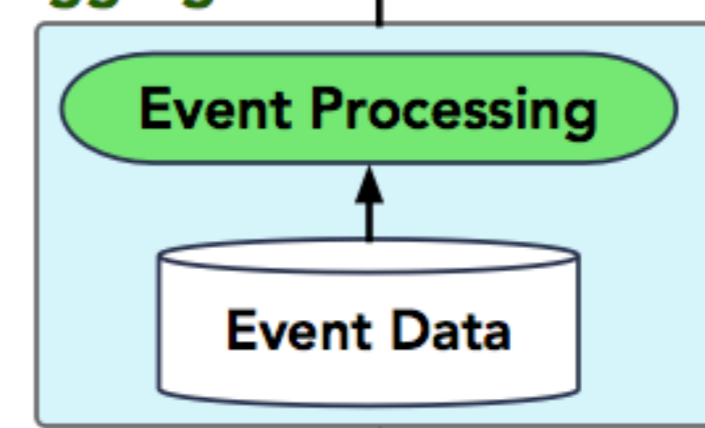


## 04 Testbed Design

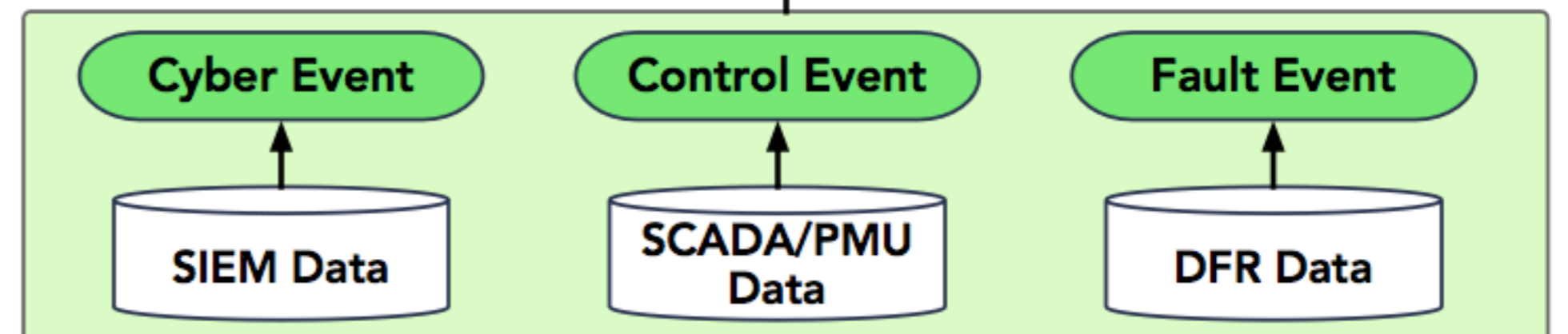
### Vulnerability Model



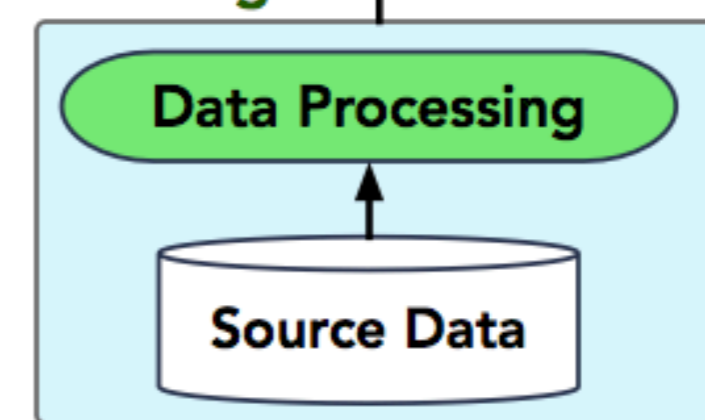
### Aggregation



### Event Model



### Filtering



### Simulation Model

