



# Maximizing IEC 61850 Value With Software Tools

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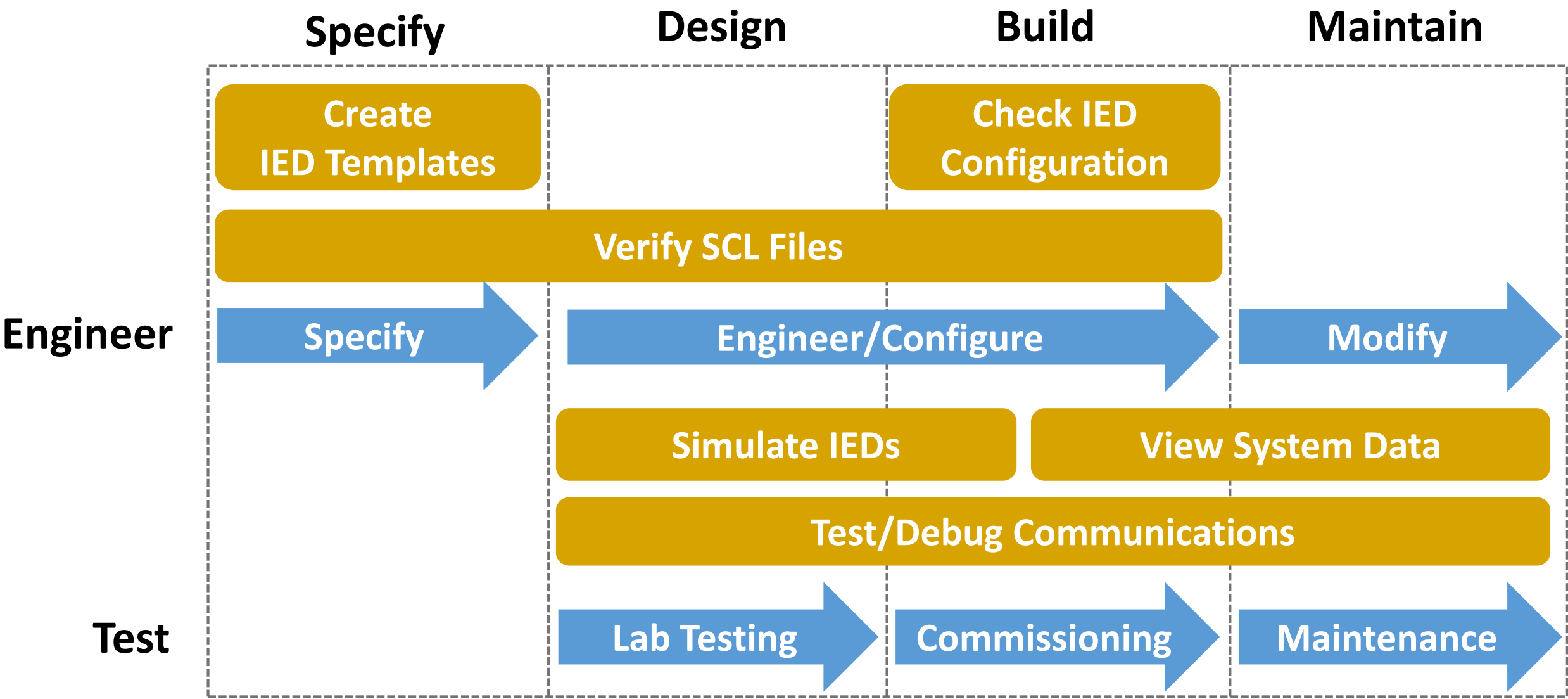
# A Tale of Two Cities



The Value of IEC 61850	Counter point of view
Interoperable, standardized data models	"It was so much easier to find a point before"
Machine readable configuration language that supports multi-vendor systems	"SCL is hard to create, test, and share"
Reliable, low cost GOOSE instead of wires	"But how do I know it is working?"

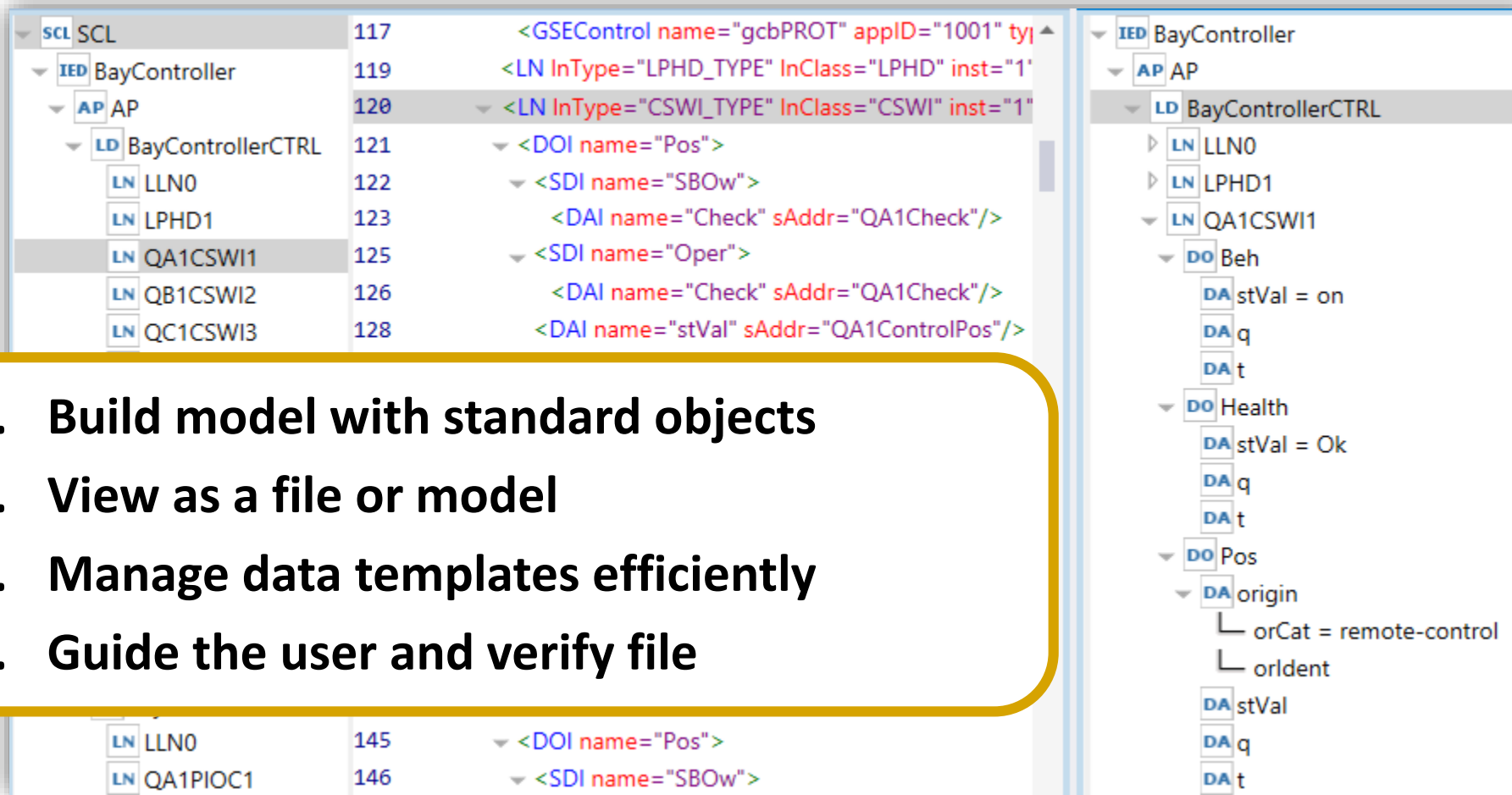
The good news: these counter views can be addressed

# Tools throughout the IEC 61850 Lifecycle



# Build Effective IED Templates

**Challenge: vendors need to build clean IED templates for engineering process**



The screenshot displays an IED template editor interface. On the left is a hierarchical tree view showing the structure: SCL -> IED BayController -> AP -> LD BayControllerCTRL -> LN QA1CSWI1. The central pane shows the XML code for the selected object, with line numbers 117 through 128. The XML includes a GSEControl block, an LN block with InType="LPHD\_TYPE", and a DOI block with name="Pos" containing SDI and DAI elements. The right-hand pane shows a tree view of the object's data, including LLN0, LPHD1, QA1CSWI1, and its associated data (Beh, Health, Pos, origin, stVal, q, t).

Line	XML Code
117	<code>&lt;GSEControl name="gcbPROT" applID="1001" ty</code>
119	<code>&lt;LN InType="LPHD_TYPE" InClass="LPHD" inst="1"</code>
120	<code>&lt;LN InType="CSWI_TYPE" InClass="CSWI" inst="1"</code>
121	<code>&lt;DOI name="Pos"&gt;</code>
122	<code>&lt;SDI name="SBOw"&gt;</code>
123	<code>&lt;DAI name="Check" sAddr="QA1Check"/&gt;</code>
125	<code>&lt;SDI name="Oper"&gt;</code>
126	<code>&lt;DAI name="Check" sAddr="QA1Check"/&gt;</code>
128	<code>&lt;DAI name="stVal" sAddr="QA1ControlPos"/&gt;</code>

1. Build model with standard objects
2. View as a file or model
3. Manage data templates efficiently
4. Guide the user and verify file

**Value Created: avoid future headaches during the engineering process**

# Verify SCL Files

**Challenge: verify that SCL files are interoperable**

1. Identify missing parameters or non-compliant SCL
2. Resolve control blocks, external references, and datasets
3. Distinguish issues by severity

Warning Count: 119

Information Count: 35

Error Count: 28

SchemaValidation Count:

IEDName Count: 1

Unable to find IED: T07BC

Controls Count: 8

DOType is missing an SBOw which is required by one of it's supported ctlModels. Count: 2

<input type="checkbox"/>	88117	DOType is missing an SBOw which is required by one of it's supported ctlModels.
<input type="checkbox"/>	88041	DOType is missing an SBOw which is required by one of it's supported ctlModels.

**Value Created: avoid SCL issues that can slow down the engineering process**

# Check IED Configuration

Challenge: verify that IEDs are configured according to design

Object	Value
Pos	
ctlModel	sbo
sboTimeout	30000

Object	Value
Pos	
ctlModel	status-only
sboTimeout	30000

Highlight Differences



# Debug Process Bus

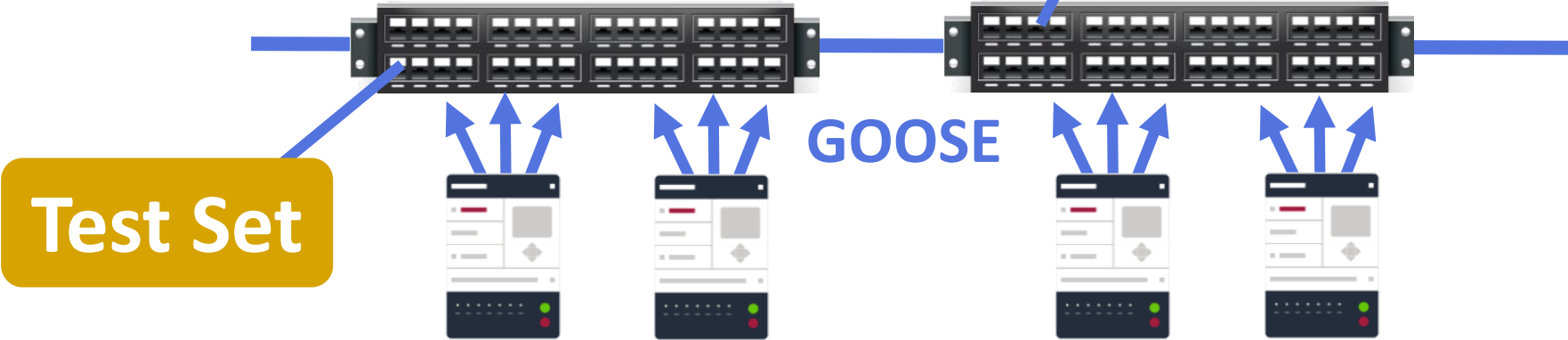
Challenge: debug multiple publishers in a complex network

## SCL

```
<GSEControl name="gcb1" appID="L02BPU/gcb1">  
<GSEControl name="gcb2" appID="L03BPU/gcb2">  
<GSEControl name="gcb3" appID="L04BPU/gcb3">  
<GSEControl name="gcb4" appID="L05BPU/gcb4">
```

## Sniffer

GoID	IED	Timeout	Match SCL	Simulate	ConfRev
gcb1	L02BPU	No	SCL	False	14
gcb1	-----	No	Wire	False	13
gcb3	L04BPU	No	Match	False	14
gcb3	L04BPU	No	Match	True	14



- ✓ Misconfigured
- ✓ Simulated
- ✓ Timed out
- ✓ Network Config

Value Created: identify process bus issues earlier and faster

# Find and View System Data

**Challenge: find data and configuration info in large systems**

## 1. Support huge SCL files

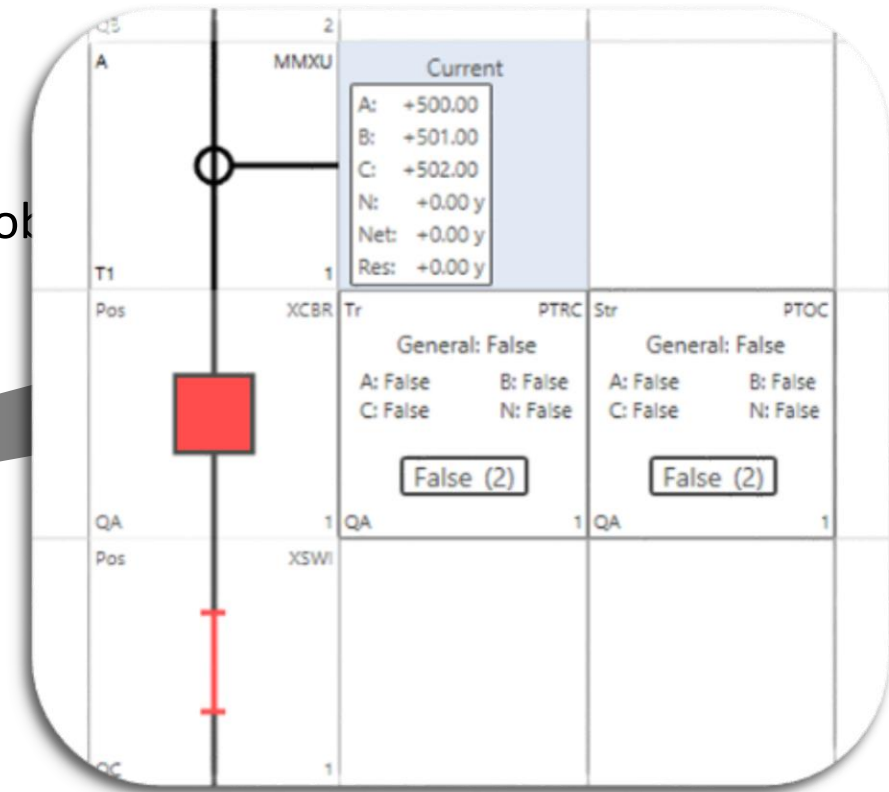
- ✓ Parse entire SCD files and show the “necessary” data by job

## 2. View data at the system level

- ✓ Navigate data across multiple IEDs in the system

## 3. Visualize data

- ✓ Show objects in a way that power engineers understand

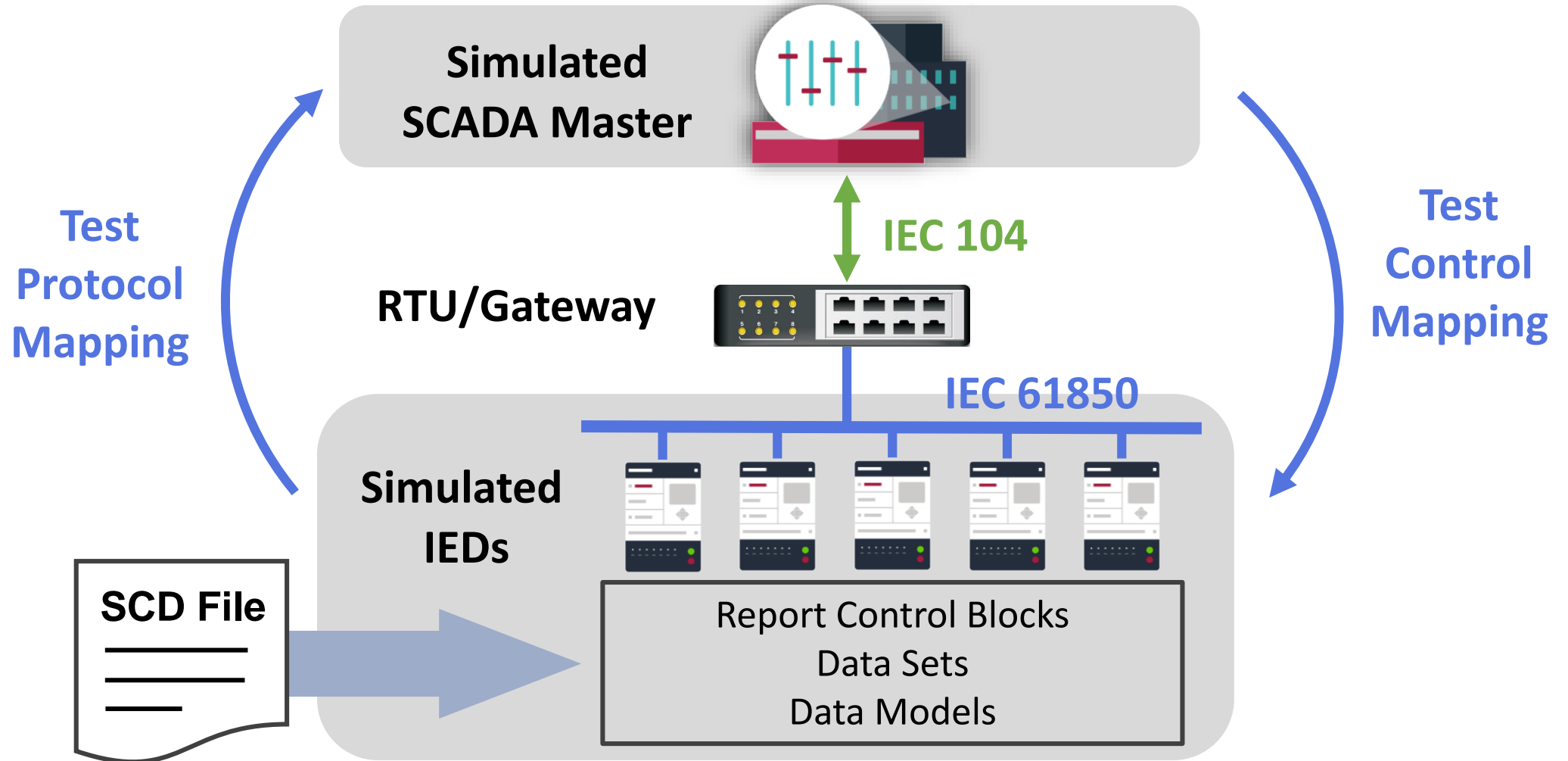


**Value Created: make data accessible to all users (design, build, maintenance)**



# Simulate IEDs

**Challenge: perform system level tests without real IEDs**



**Value Created: avoid costly issues during commissioning by testing in the lab**

# Key Takeaways

## Find Issues Earlier

- Test earlier with software tools
- Discover misconfigurations when they are cheaper to fix

## Take Advantage of the Value of SCL

- Leverage a design which is machine readable
- Compare to SCL to find misconfigurations

## Tackle The Complexity

- Make IEC 61850 accessible to all users