CONNECT

2 0
2 2

Maximizing Test Value with Centralized Orchestration
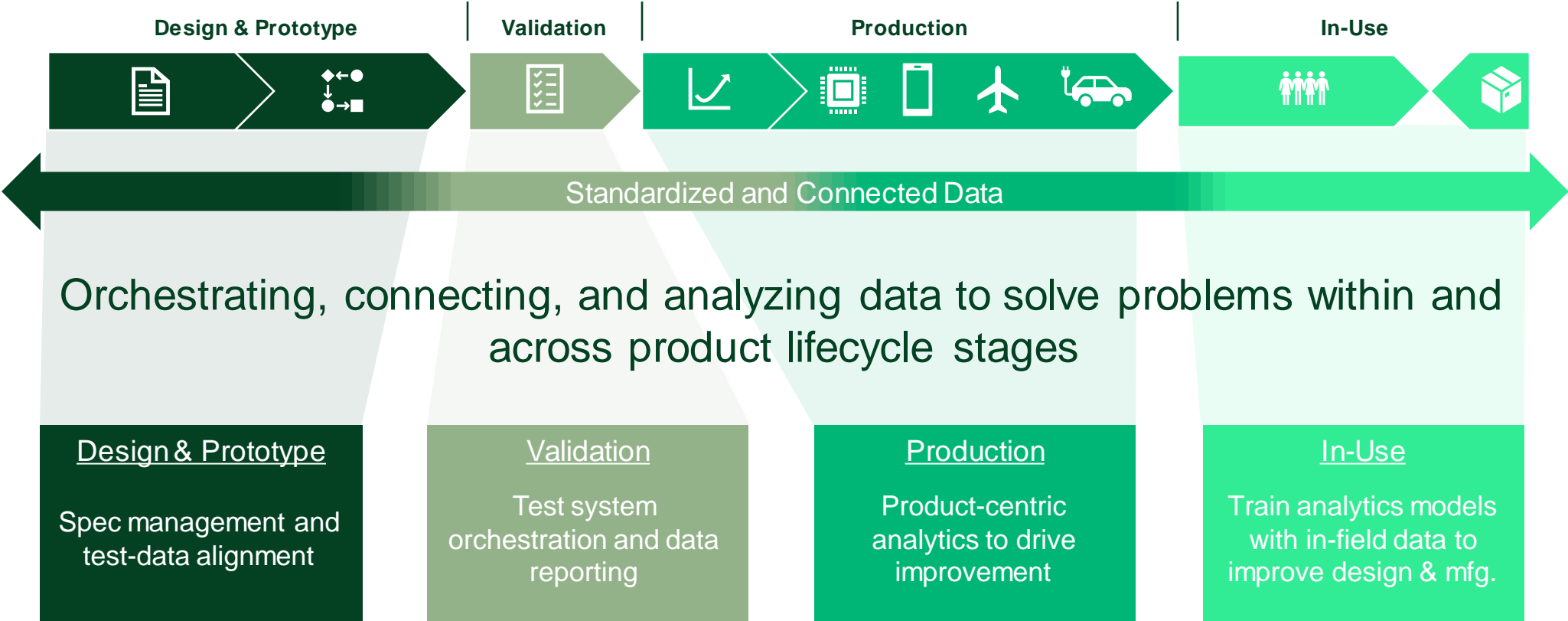
Session time

Josh Prewitt

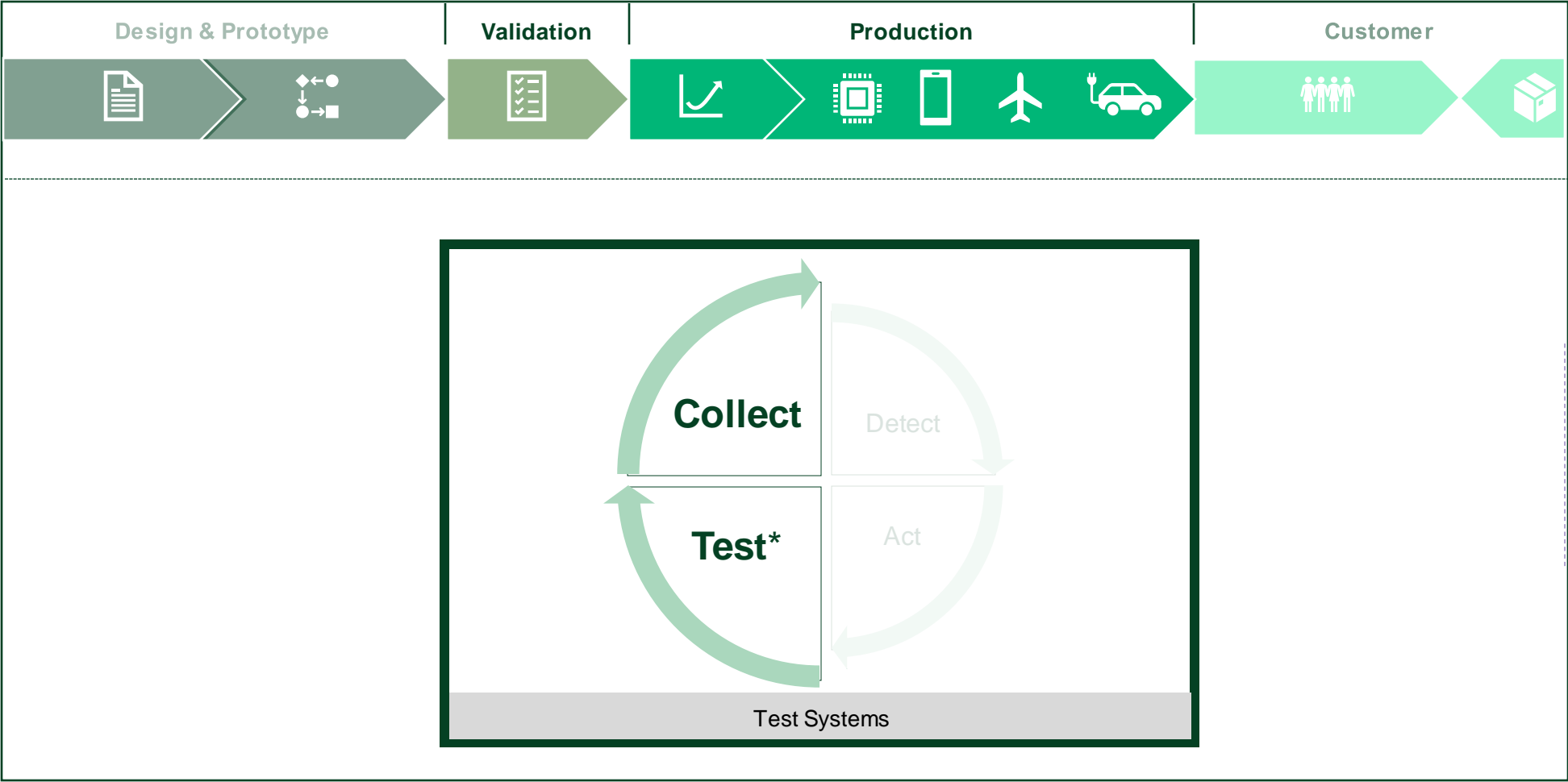SystemLink Product Manager

NI Lifecycle Solutions

Design & Prototype | **Validation** | **Production** | **In-Use**

Standardized and Connected Data

Orchestrating, connecting, and analyzing data to solve problems within and across product lifecycle stages

Design & Prototype	Validation	Production	In-Use
Spec management and test-data alignment	Test system orchestration and data reporting	Product-centric analytics to drive improvement	Train analytics models with in-field data to improve design & mfg.

Test and Data Solutions: Validation and Production

Lifecycle Solutions

Design & Prototype		Validation	Production		Customer	

Collect

Detect

Test*

Act

Test Systems

*Compatible with Test HW and Systems from **any Vendor**

Workflow for Test Organizations

Pre-Test
Prepare and Manage Test Systems

Major Tasks:
Procure Test Assets
Software Configuration and Setup

Concerns:
Increasing # of Systems
Time and HC spent on Pre-Test
Maintenance and Calibrations

Test
Execution of Tests

Major Tasks:
Collect and Store Test Data

Concerns:
Monitor Test Progress
Monitor System Health

Post-Test
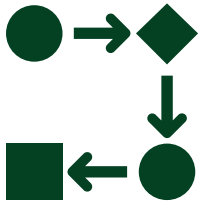### Analysis and Reporting of Test Data

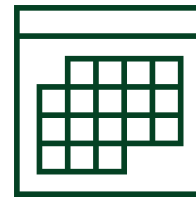**Major Tasks:**
Process and Report Data
Analyze Data for Insights

Concerns:
Location and Access to Data
Consistency and Usability of Data
Timely Analysis for Output

Pressures and Dynamics Affecting Test Organizations

Increasing
Product Complexity

Schedule and
Time-to-Market Pressure

Operational
Efficiency

1

Reduce Overhead
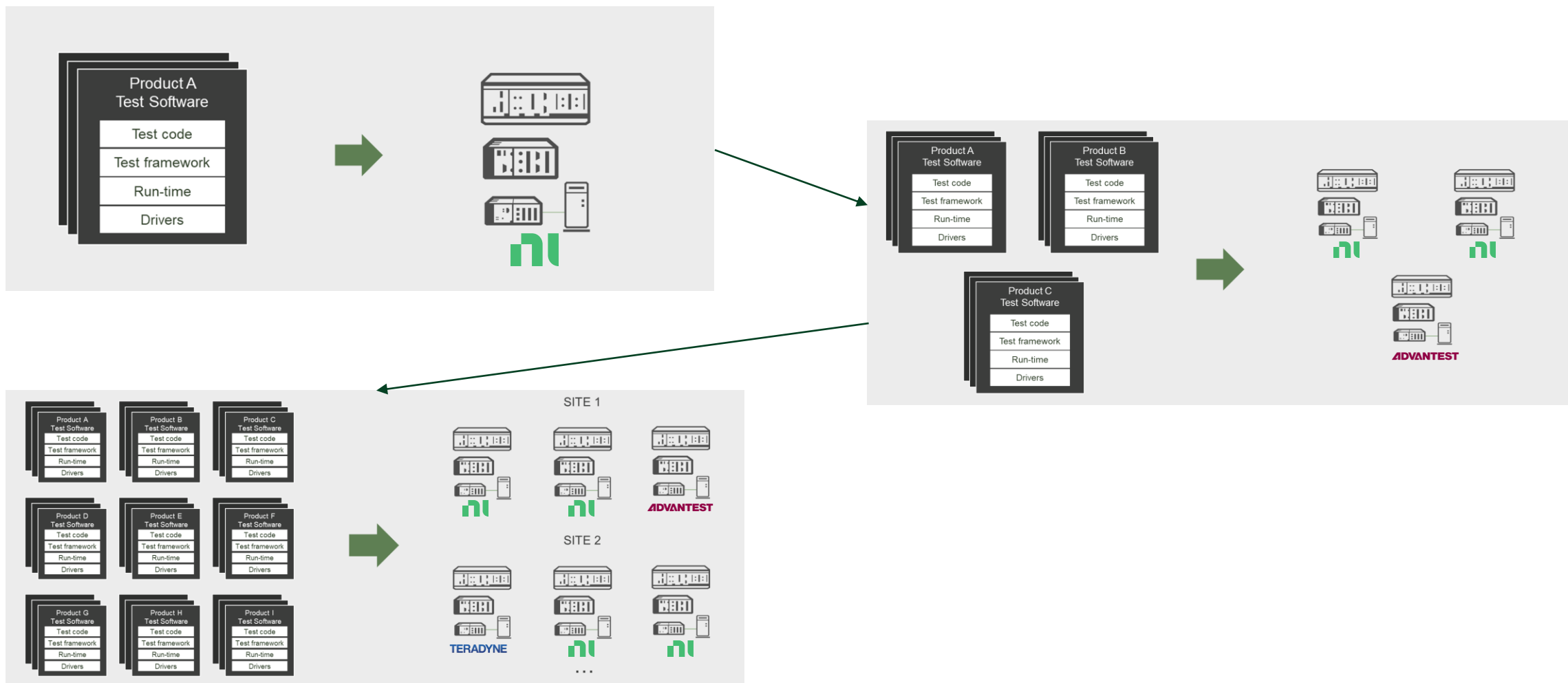of Managing Complex
Test Configurations

2

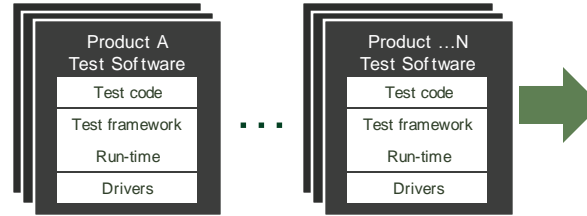**Optimize Expenditure**
with Insights on Operational
Metrics

3

Decrease Time
for Test Data Mining and
Analysis

Managing Systems and Configurations at Scale
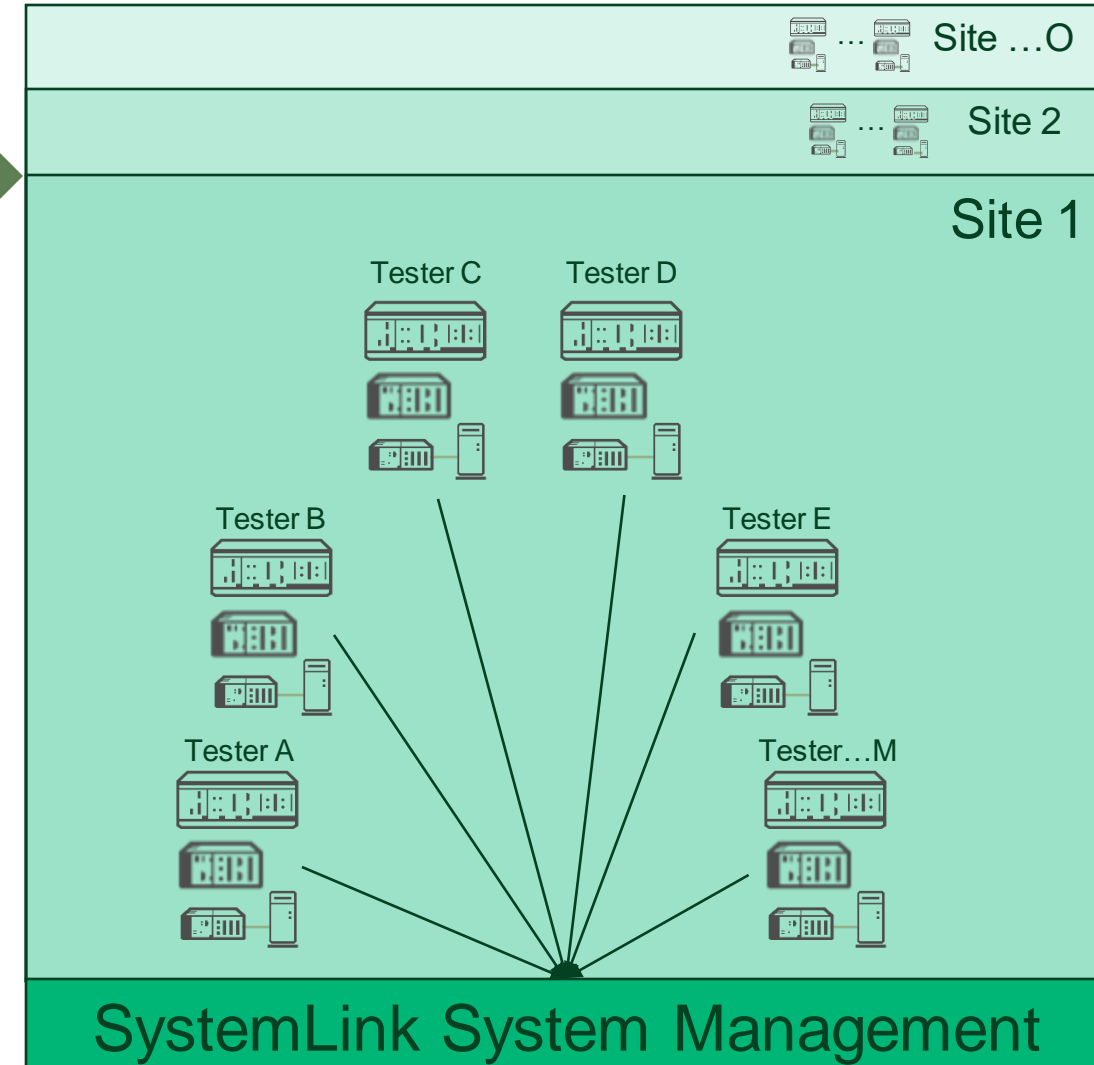
Manage Complexity with SystemLink

Product A
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

. . .

Product …N
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

Site …O

Site 2

Site 1

Central SystemLink System Management

Manage all T&M systems,

From validation through production

Tester C

Tester D

Tester B

Tester E

Tester A

Tester…M

*Simplify **M x N x O** Management Complexity*

M: Centrally manage systems within each lab
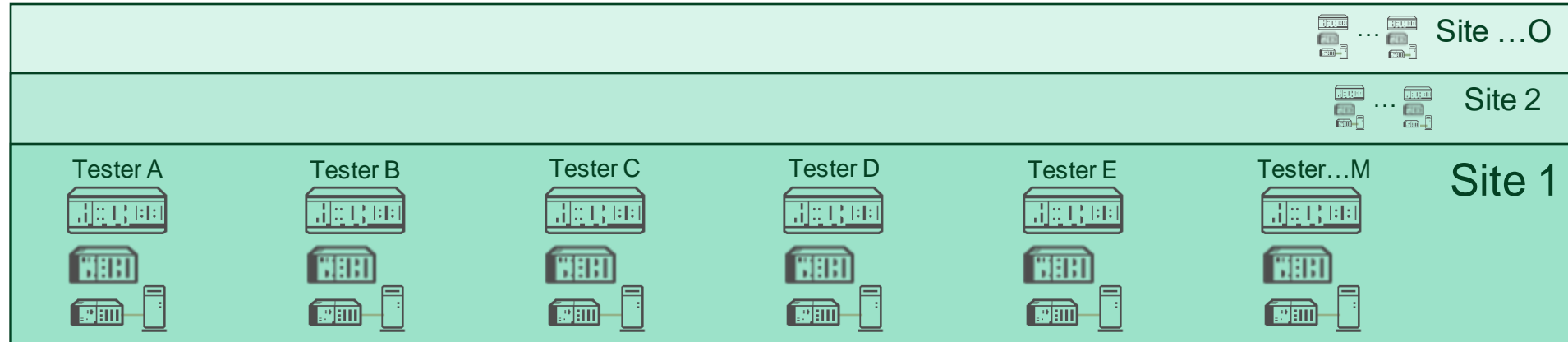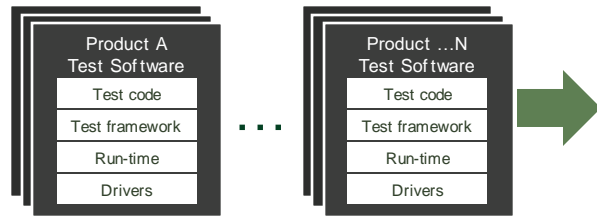
N: Save test profiles and configurations for each product

O: Standardize processes across sites

SystemLink System Management

SystemLink Capabilities

Product A
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

...

Product ...N
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

Site ...O

Site 2

Tester A   Tester B   Tester C   Tester D   Tester E   Tester...M

Site 1

SystemLink System Management

Scalable Management of Assets and Devices

Discover and connect to available HW
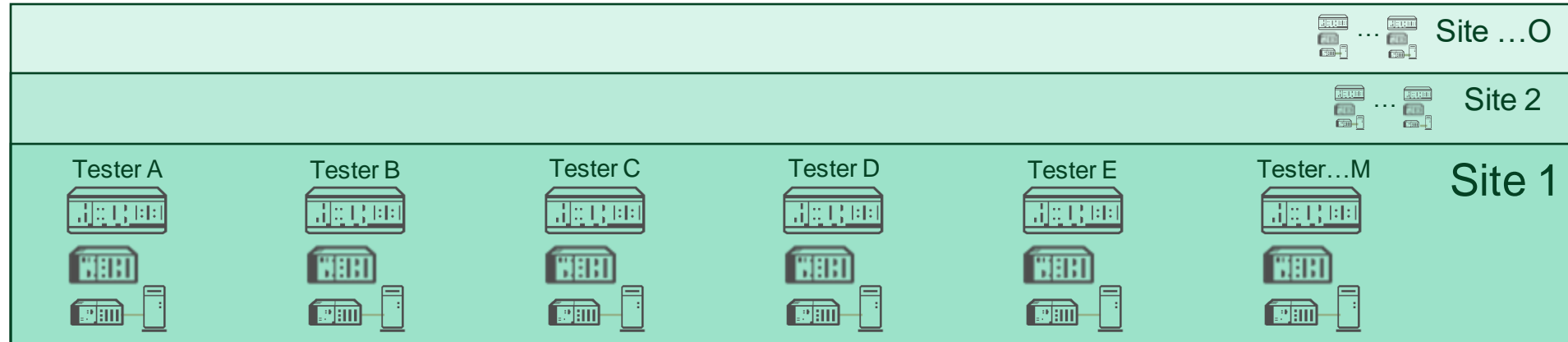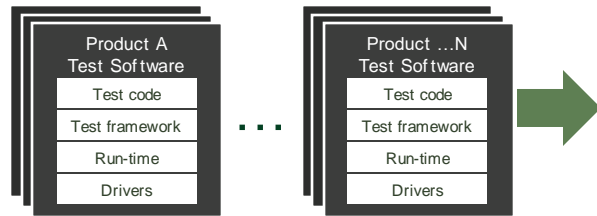
Search and locate specific asset and device types

Track calibration due dates and history

Execute remote diagnostics

SystemLink Capabilities

Product A
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

...

Product ...N
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

Site ...O

Site 2

Site 1

Tester A   Tester B   Tester C   Tester D   Tester E   Tester...M

SystemLink System Management

Maximize Tester Utility and Uptime

Monitor system health metrics with in-box services
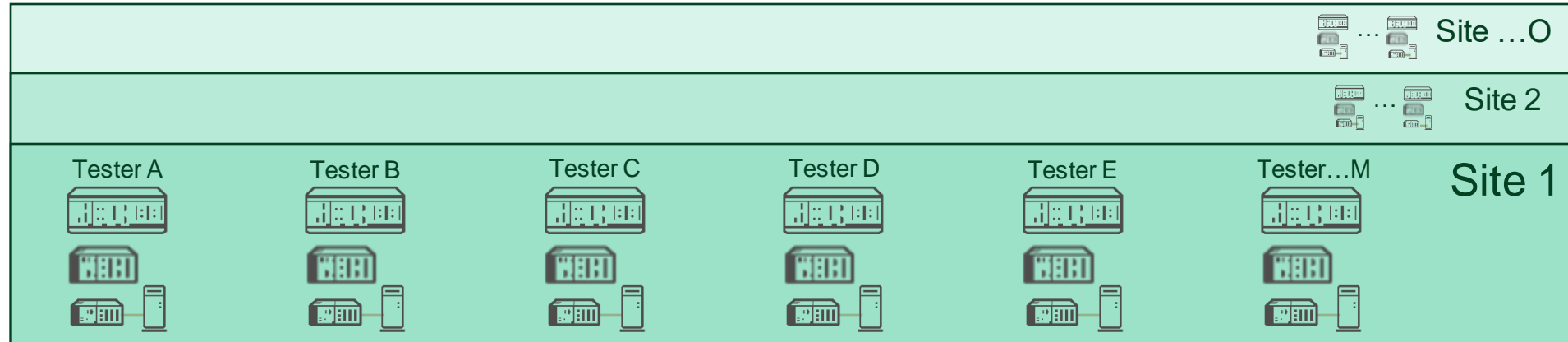
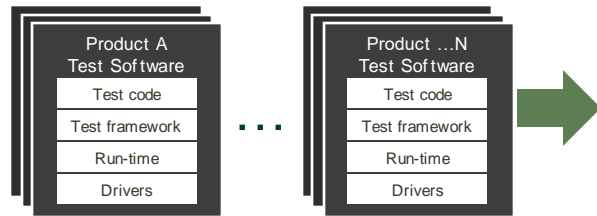Configure health alarms and notifications
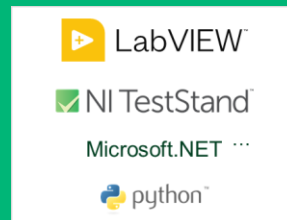
Monitor real-time data from dashboards

Track system utilization and plan asset procurement

SystemLink Capabilities

Product A
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

...

Product ...N
Test Software

| Test code |
| Test framework |
| Run-time |
| Drivers |

Site ...O

Site 2

| Tester A | Tester B | Tester C | Tester D | Tester E | Tester...M | Site 1 |

SystemLink System Management

Simple SW Configuration Deployment

LabVIEW
NI TestStand
Microsoft.NET ···
python

Leverage existing tools to package test application

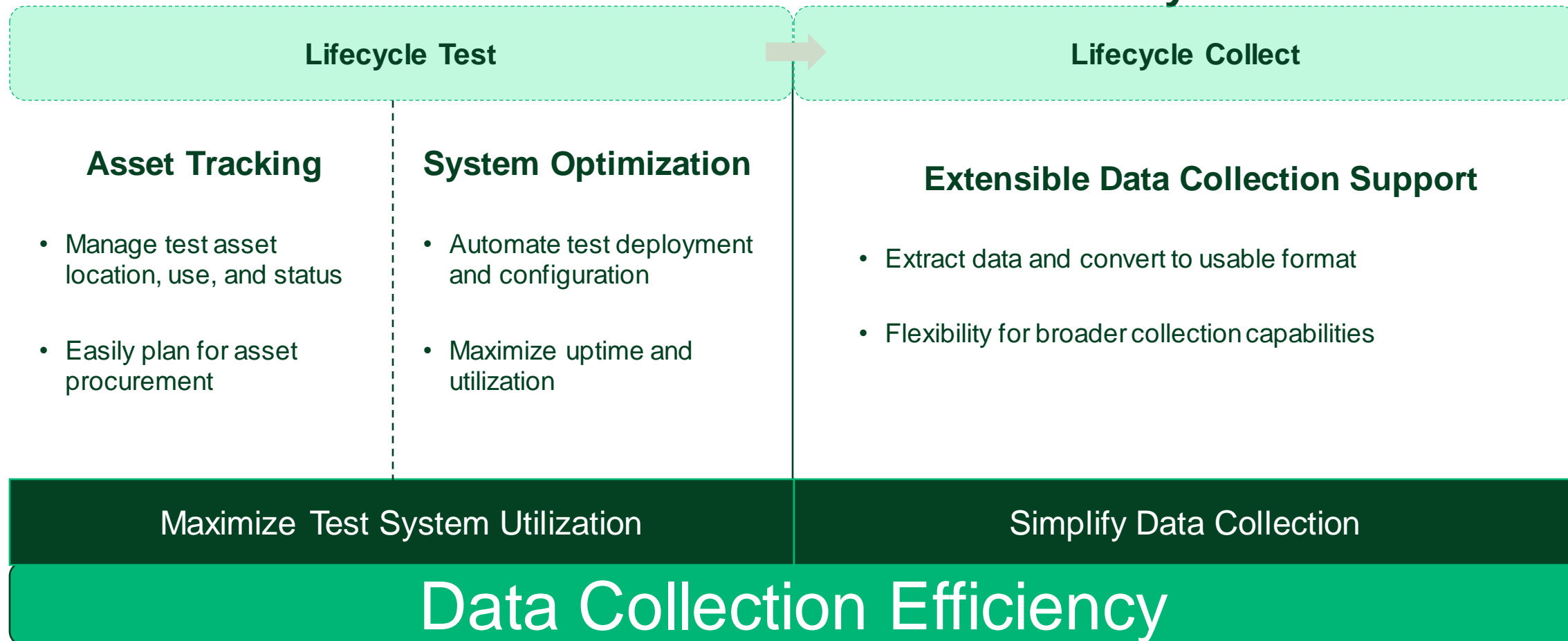**Define system "states" for easily config. replication**

Update SW packages by component
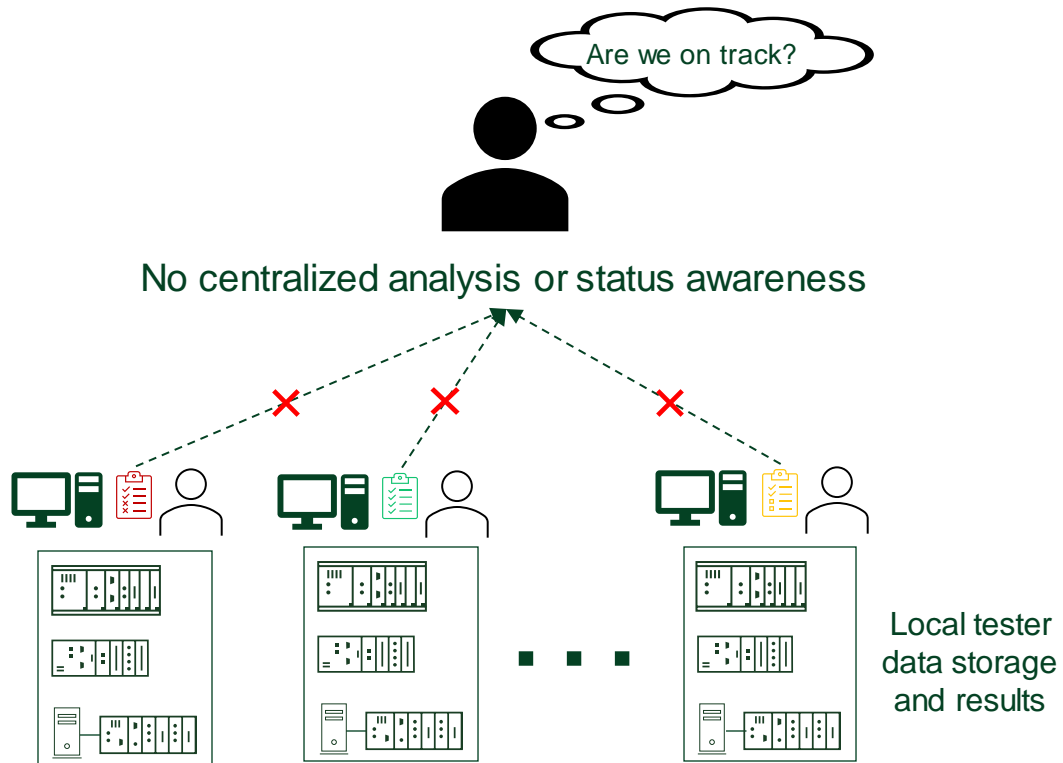
Remote SW install, upgrade, and version control

Target Critical Mass of Test Data

Maximize data collection efficiency

Lifecycle Test		Lifecycle Collect

Asset Tracking

- Manage test asset location, use, and status

- Easily plan for asset procurement

System Optimization

- Automate test deployment and configuration

- Maximize uptime and utilization

Extensible Data Collection Support

- Extract data and convert to usable format

- Flexibility for broader collection capabilities

Maximize Test System Utilization	Simplify Data Collection

Data Collection Efficiency

Data Visibility and Utility

Data Locale and Review

Are we on track?

No centralized analysis or status awareness

Local tester data storage and results

The Inconsistent Data Problem

Multiple Sources and Formats	Metadata	Units	Errors
Raw Data A	Diesel	Pa	100/100 pts
Raw Data B	DIESEL	psi	100/100 pts
Raw Data B	d	bar	76/100 pts
Historical Data	Engine_d	Torr	100/100 pts

Inconsistent Data = Inconsistent Analysis

Time and resources to process data for analysis and reporting

Transform Data Management with SystemLink

Site …

Site 2

Site 1

Data Collection

SystemLink Data Management

Common Data Storage

Standardized Data Format

Data Access

Data Search, Visualization and Reporting
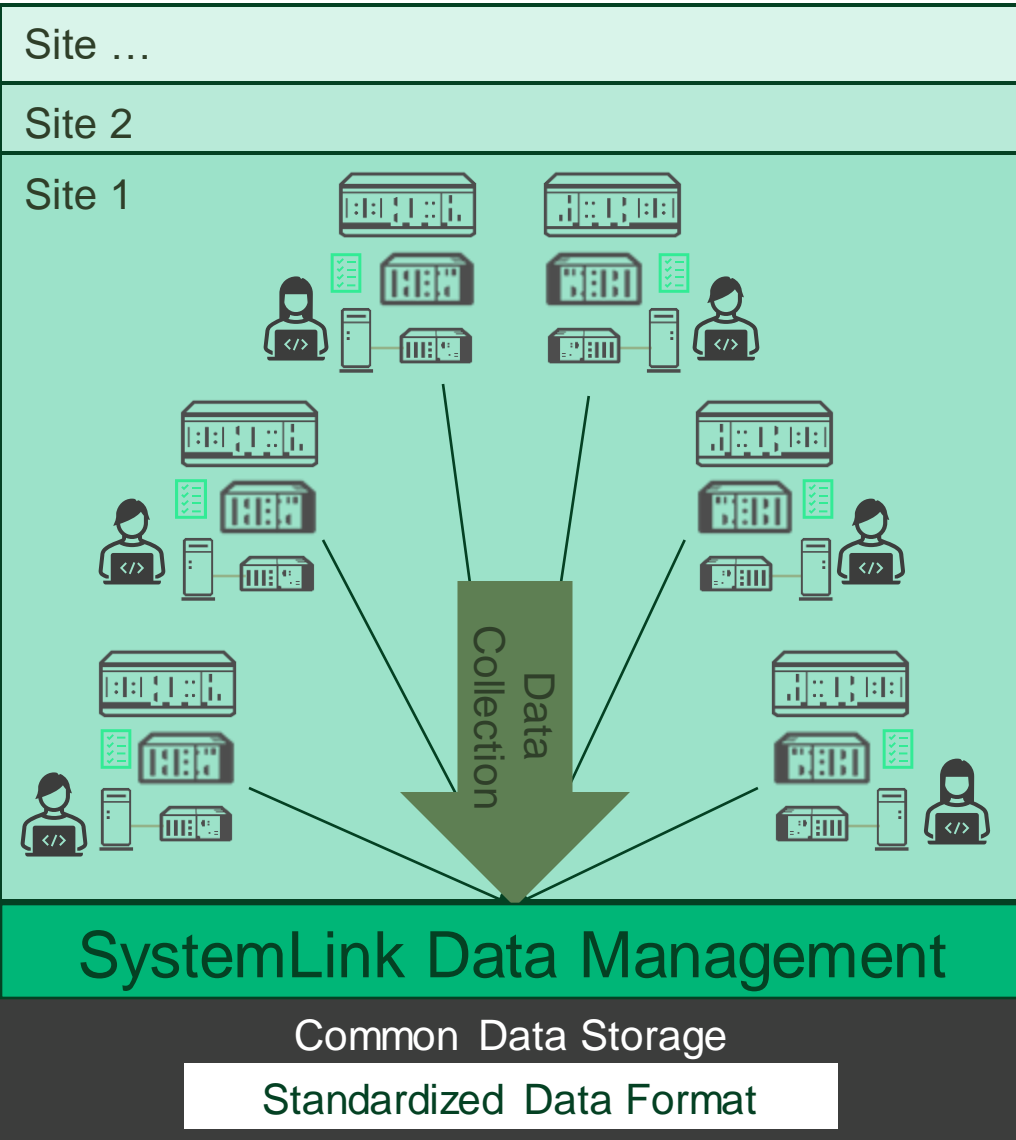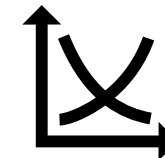
Central SystemLink Data Management

Manage all T&M data incoming from *any system vendor*

Simplify Data Management Complexity

Unify data to a common storage location and format

Increase visibility, decrease manual data activities

SystemLink Data Capabilities

Site …
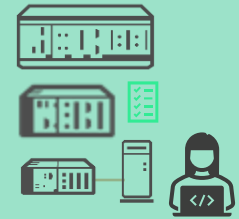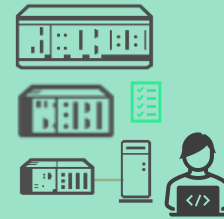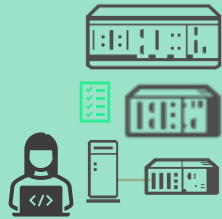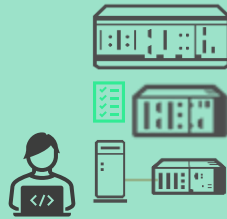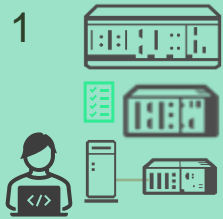
Site 2

Site 1

SystemLink Data Management

Simplify Data Tracking and Ingest

Automatic upload to common storage location

Extract and transform data to a common format

Real-time dashboards of project progress

Monitor test activity and results

SystemLink Data Capabilities

Site …

Site 2

Site 1

SystemLink Data Management

Streamline Data Visualizations and Reporting

Easily search data for specific results
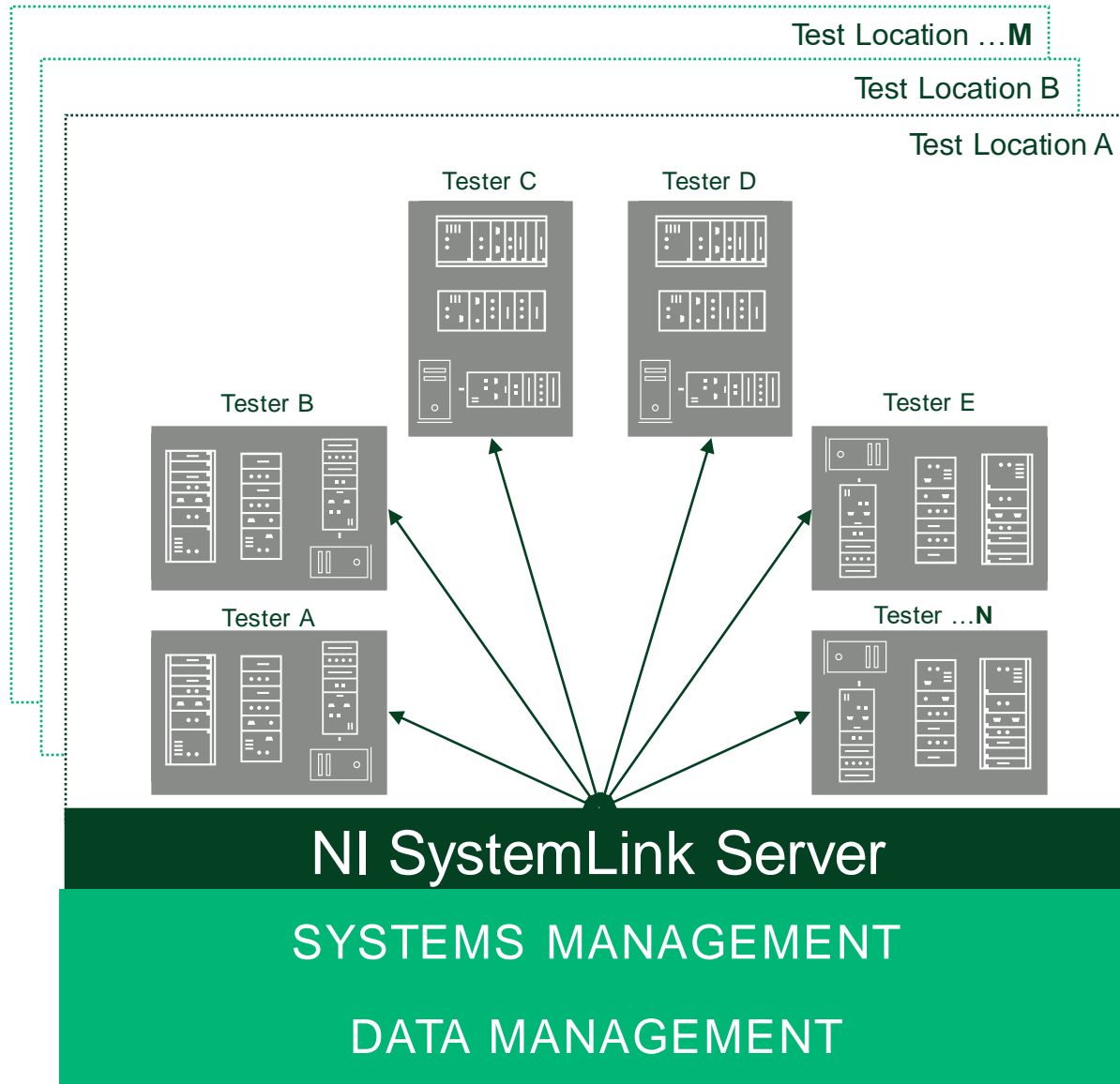
Visualize and analyze parametric data

Automatic report generation

Common toolset across test organization

Connect and Automate Test Operations with SystemLink

Test Location …**M**

Test Location B

Test Location A

Tester C

Tester D

Tester B

Tester E

Tester A

Tester …**N**

NI SystemLink Server

SYSTEMS MANAGEMENT

DATA MANAGEMENT

Simplify management by connecting data from all testers and locations

Centrally manage all T&M systems, from validation through production

Collect and standardize test data for storage, visualization, analysis, and reporting.

Benefits

✓ Monitor system health, utilization, & compliance

✓ Easier asset planning and administration

✓ Data visualization and reporting

✓ Accelerate data-driven decisions about products

An NI Platform for Lab Efficiency

Pre-Test
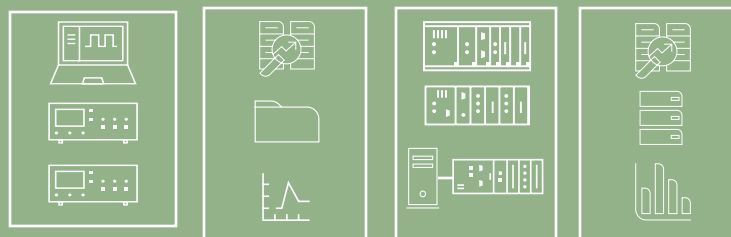### Prepare and Manage Test Systems

Review System Utilization
Deploy Test SW Configurations
Plan Test Asset Procurement

Advantages:

More tests-per-system

Test
Automation and Execution of Tests

Traditional NI or Third-Party T&M Systems

Post-Test
Analysis and Reporting of Test Data

Collect data from all testers
Process into consistent formats
Analyze for insights

Advantages:

Meet project schedules

Standardize and Automate

PXI

TEST AUTOMATION
✓ TestStand™

TEST CREATION
▶ LabVIEW™

Allow Test Engineers to Focus on Test Activities

System Management

SystemLink

Data Management

NI Battery Analytics Applications for Battery Validation

NI Battery Data and Analytics Workflow

SystemLink™

Situational Awareness

BATTERY ANALYTICS | USER DASHBOARDS | CONFIGURABLE REPORTS | ADMIN TOOLS

Systems Connectivity

Data Gateway

DEVICE DISCOVERY | REMOTE EXECUTION | MONITORING AND TAGS | FILE INGESTION | TEST RESULTS

Battery Validation Labs

Desktop PC/Servers

NI Battery Test System

Other Test System

Data Generating Assets

Benefits

REDUCED COST OF BATTERY DEVELOPMENT

100% REQUIREMENT COMPLIANCE

ACCELERATE PRODUCTIVITY AND TIME TO INSIGHTS

OPEN AND INTEROPERABLE FOR FLEXIBILITY AND SCALE

From Data to Insights

Collect, Detect, and Act

Next Up: Turning Data into Actions

1. Data Harmonization

- Identify and connect to any data source
- Unified data model provides clean harmonized data
- Product-centric data for product-driven results

Lifecycle Collect

2. Analytics Toolset

- **Start with the problem**, not the solution
- Insights on KPIs deliver results
- Open platform is a baseline for custom apps or ML/AI

Lifecycle Detect

3. Insights into Actions

- Rules deploy guided actions directly to the source
- Supports evolution toward proactive management
- Holistic view of process, product and supply chain

Lifecycle Act

Guest Speaker: Analog Devices

ni.com

National Instruments
is now NI.