

Modernizing Your Lab Operations

Josh Prewitt
SystemLink Product Manager

SystemLink Enterprise Overview

SystemLink™ streamlines lab operations and amplifies engineering insights as an integrated, scalable, enterprise solution.

Specification Compliance

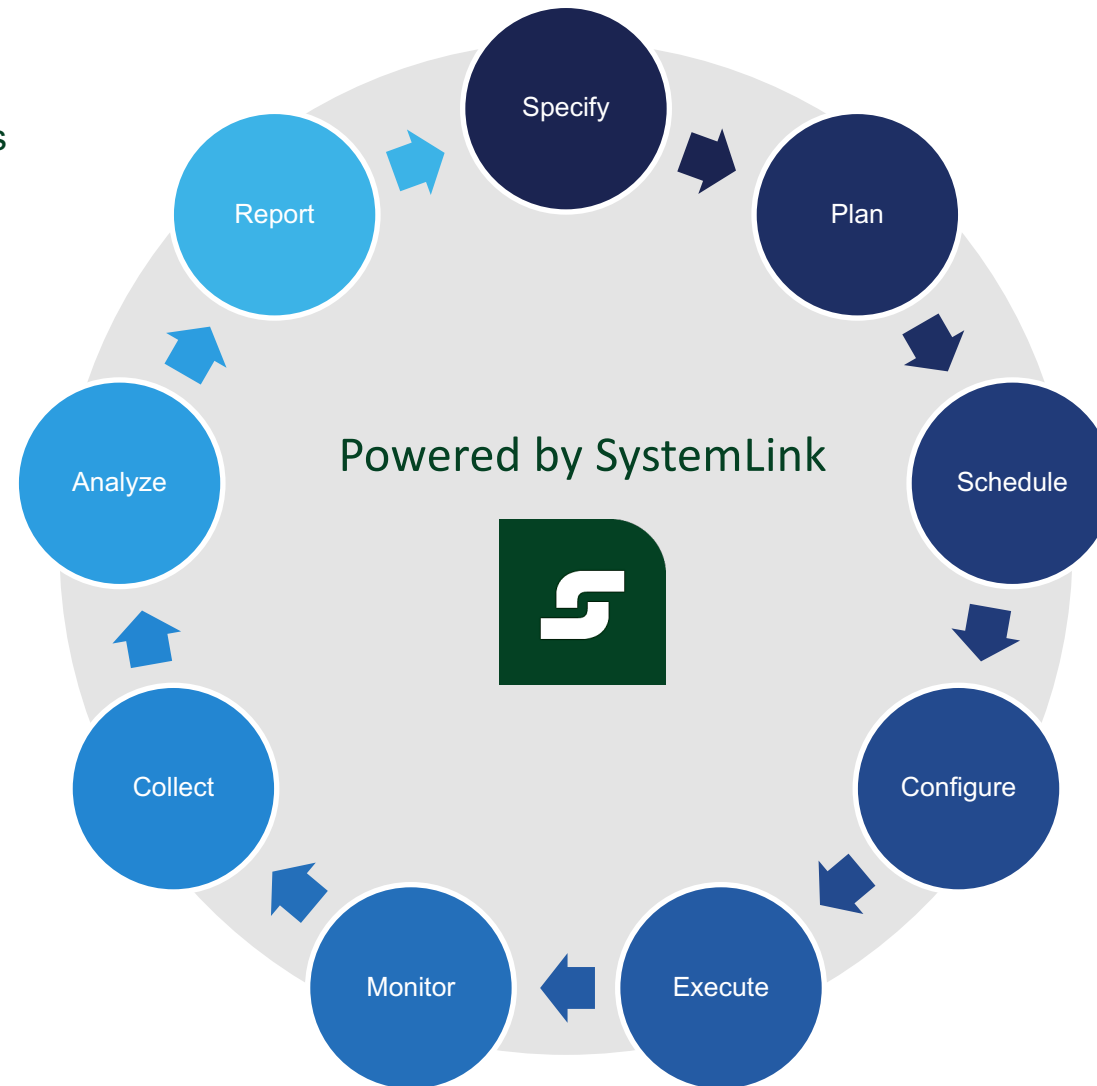
Elaborate requirements into engineering specifications to drive test consistency, quickly discover product issues, and track test progress.

Analysis Automation & Reporting

Fully integrated Jupyter Notebook development environment to create Python scripts to extract, transform, and analyze data.

Test Monitoring & Insights

Collect and view test results, files and parametric data; filter data for additional insights and track KPIs with dashboards and customizable analytics.



Work Orders & Test Plans

Track incoming test requests, define test requirements, schedule, deploy, and remotely execute tests.

Systems & Asset Management

Manage and install software for your entire test fleet, monitor test system health, and manage and track the assets connected to your test systems.

Asset Traceability & Utilization

Automatic asset tracking for NI and 3rd party LXI, USB-TMC, GPIB instruments to maximize utilization and optimize spend.

SystemLink Architecture Fundamentals

Standards-Based

Developed with industry-leading technologies, IP best practices

Scalable

Megabytes to Petabytes of data from 1000s of data sources

Extensible

Config-based dashboards, plug-in applications, open APIs, partners

Secure

HTTPS / TLS data encryption; authentication & access control

Name	IP address	Model	Serial number	Workspace	System start time	Pending status
Desktop Systems (2)						
INTEL-NUC-2	10.2.74.62			Default	April 13, 2021	
INTEL-NUC-1	10.2.74.63			Default	April 13, 2021	
Automated Test Systems (3)						
Tester 1	10.2.74.44	NI PXIe-8133 E...		Default	April 5, 2021	
Tester 2	10.2.74.32	NI PXIe-8133 E...		Default	October 11, 20...	
NI-PXIe-8135-1	10.2.74.46	NI PXIe-8135 E...		Default	April 21, 2021	
ECU Testers (1)						
ECU Tester 4	10.2.96.25	ECU Tester	34563	Default	July 16, 2020	
NIC (2)						
RTTEST014	10.2.96.30	Precision T3600	CYKVBX1	Austin	August 13, 2020	
kevin-fort	10.2.100.10	Precision T3610	1LH7P22	Austin	October 29, 20...	Locked (chang...)
Data Loggers (4)						
Data Logger 1	10.2.74.79	cRIO-9068	190CB7B	Default	April 8, 2021	
Data Logger 2	10.2.74.67	cRIO-9068	190D5D5	Default	April 8, 2021	

Web Application

Central Server
(Cloud or On Prem)

Client / Agent

TCP/IP Connectivity

What is SystemLink?

SystemLink is a scalable, self-hosted enterprise product for managing labs, improving test operations, and analyzing test results.

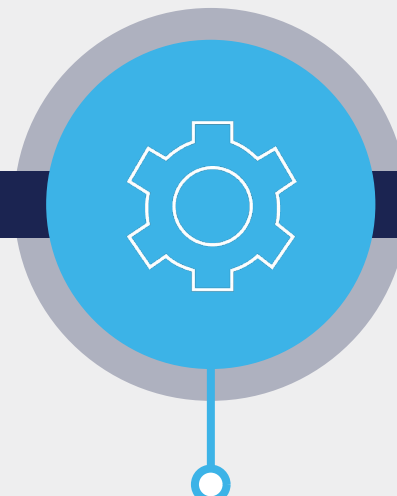
Manage Specifications
& Plan Tests



Collect & Visualize
Test Data



Monitor & Manage
Systems, Assets, & DUTs



Analyze Test Data &
Generate Reports



Spec Compliance

Back

Compliance View 12 Feb 2021 12:30

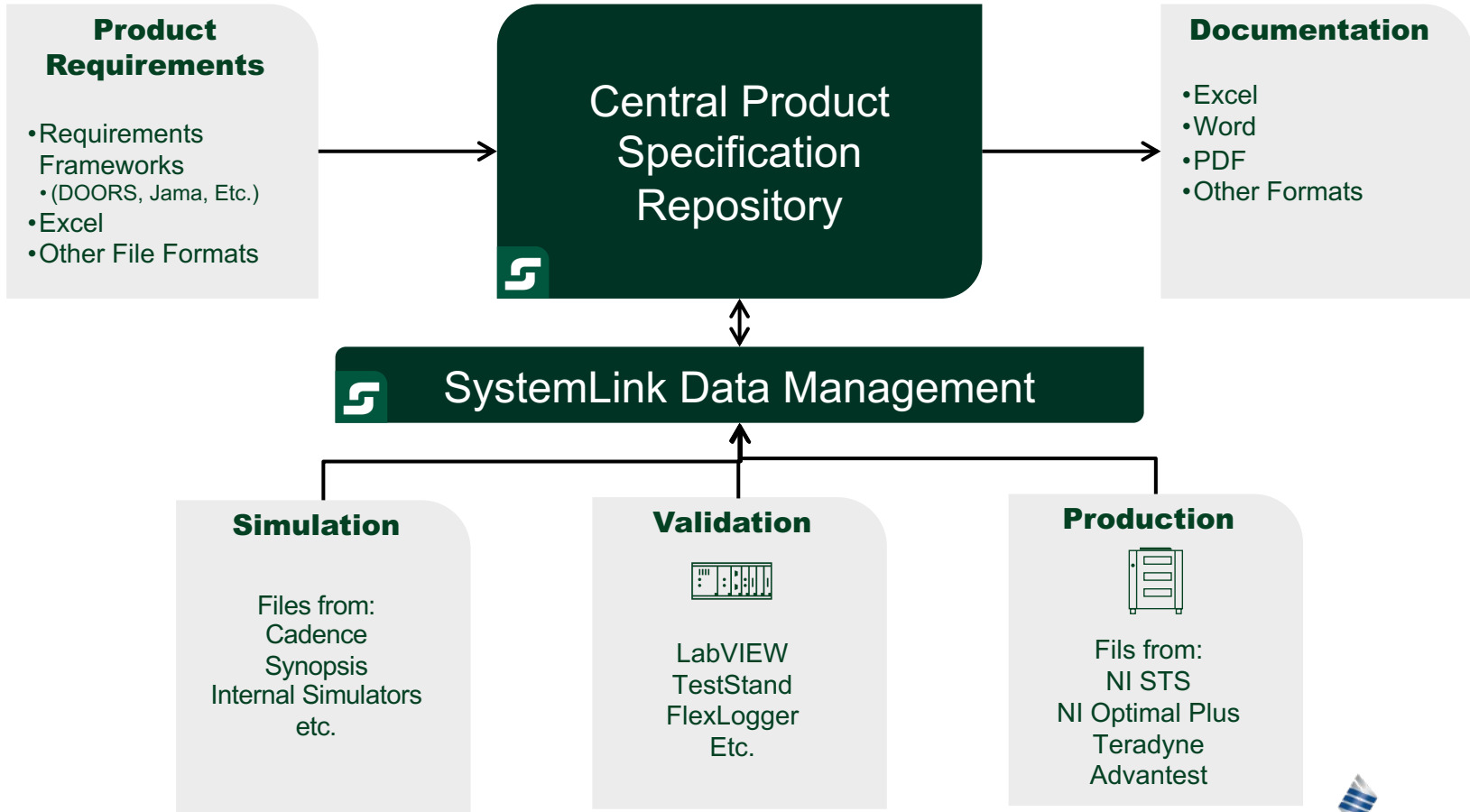
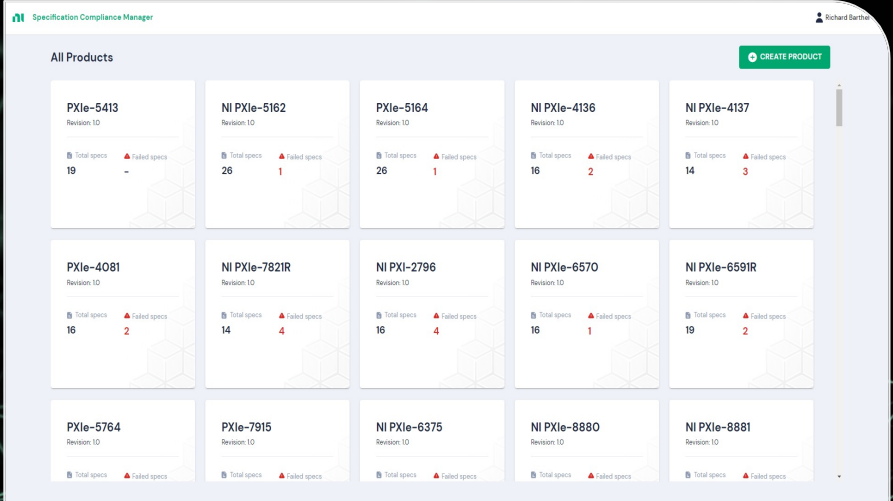
Total Specs (800): Without data (720) Failed (40) Passed (40)

Electrical Characteristics (60/400)

Temperature [degC]	AVDD_3P3[V]	Min	Typ	Max	Unit	Bench-Val					Golden					Sim	
						Health	CPK	Min	Typ	Max	Median	Health	CPK	Min	Typ		Max
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	●	2	40.23	42.35	46.10	52.55	●	1.5	37.54	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	●	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
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0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55
0.25	4.75, 5	40.23	42.35	46.10	uA	▲	2	40.23	42.35	46.10	52.55	●	1.5	40.23	42.35	46.10	52.55

Specification Compliance

- Central repository for specifications
- Connect to and analyze measurements from across the product lifecycle
- Specification compliance and coverage reporting
- Custom measurement & specification analysis.



Work Orders / Check WO

Name: Check WO
Status: New

Assigned to: Nandhini Vijayakumar
Earliest start date: Aug 7, 2023

Due date: Aug 8, 2023
Type: Test request

Workspace: Default
Requested by: Nandhini Vijayakumar

Updated: Aug 8, 2023, 4:39:34 AM

Test plans | Files | Results

Create test plan

<input type="checkbox"/>	Name	Status	Assigned to	Work order
	test name	New	Nandhini Vijayakumar	Check WO
	Check TP 6	New	Nandhini Vijayakumar	Check WO
	Check TP 5	New	--	Check WO
	Check TP 4	New	--	Check WO
	Check TP 3	New	--	Check WO
	Check TP 2	New	--	Check WO
	Check TP 1	New	--	Check WO



Test Plan Management

- Define, manage, schedule, deploy, start, and monitor tests
 - Notify requestor when results are available
 - Comment on test plans and results to help clarify requirements and improve collaboration with others
- Leverage test plan templates to streamline test planning and scheduling
- Schedule systems, assets, and DUTs to be used for test plan execution
- Ability to remotely deploy and start tests remotely
- Monitor test execution in real-time as well as critical resources and get immediate updates as test result data is available

Systems

186 Systems 27 Connected 159 Disconnected 177

Add systems Search Workspa

Name	IP address	Model	Serial n...	Workspace ↑	Syste
APAC (1)					
LVTEST068	10.1.128.233	Precision ...	2L8VNL1	APAC	Marc
BATS Cell Lab (7)					
AM-gjanir	10.116.6.55	Precision ...	D9HQL63	BATS Cell ...	Sept
USAUSLT-PQ8F6N9	10.0.0.2	20UCS1L10N	PF2F1...	BATS Cell ...	Nov
DTP-Win10	172.24.50....	Virtual Ma...	8625-8...	BATS Cell ...	June
EC2AMAZ-M09DALH	10.0.28.2	HVM domU	ec2b35...	BATS Cell ...	June
EC2AMAZ-PMG4KRS	10.0.20.153	HVM domU	ec25cb...	BATS Cell ...	June
EC2AMAZ-LEIIK2T	10.0.30.98	t3.2xlarge	ec2eb0...	BATS Cell ...	Nov
EC2AMAZ-E921BIO	10.0.25.204	HVM domU	ec22e7...	BATS Cell ...	Aug
BATS Historical Ingestion (1)					
USAUSLT-9F3Z542	10.0.0.11	20UCS1L10N	PF2N6...	BATS Histo...	May
BATS Pack Lab (5)					
EC2AMAZ-8H342HM	10.0.28.87	c5.4xlarge	ec27e7...	BATS Pack...	June
EC2AMAZ-THSJNFV	10.0.23.117	HVM domU	ec2049...	BATS Pack...	June
EC2AMAZ-VD4KARS	10.0.22.154	HVM domU	ec27e9...	BATS Pack...	June
EC2AMAZ-H8F069A	10.0.31.153	HVM domU	ec27ac...	BATS Pack...	June
EC2AMAZ-FTQJJ0I	10.0.27.130	HVM domU	ec2462...	BATS Pack...	June
BATS Shared (1)					
USAUSLT-N89G4AS	192.168.1....	20LES11000	R90QF...	BATS Shared	July
BATS Staging (2)					
TestStand25	10.0.1.216	HVM domU	ec2045...	BATS Stagi...	Janu
EC2AMAZ-N478PAL	10.0.29.25	HVM domU	ec2754...	BATS Stagi...	Janu
Battery Process Analysis (1)					
EC2AMAZ-AHMBORQ	10.0.17.160	HVM domU	ec2374...	Battery Pr...	Nov
stHW	130.164.18...	NI cRIO-9045	01CEE...	BTS	Marc
naca	fe80::280...	NI cRIO-9047	01E13...	BTS	Marc
-3	130.164.18...	Virtual Ma...	4728-2...	BTS	Febr
emo (10)					
owling-vm	10.2.126.65	Standard		BTS Demo	Nov

Systems Management

- Manage and install software for your entire test fleet from a central web interface
 - Reduce time required to keep test equipment up to date
 - View and report job history, including software updates and system errors
- Monitoring test system health with support for alarms and notifications from customizable dashboards
 - Out of the box monitoring for CPU, Memory, and Disk Utilization
 - Extend health and monitoring capabilities with the SystemLink Tag API
- Manage and track the assets connected to your test systems
 - Execute remote diagnostics, such as self-test, self-calibrate, and device reset
 - Manage date/time, network settings, and admin passwords for RT systems
- Track system utilization

Assets

736 Assets 109 Connected 627 Disconnected

Add asset Search Refresh: 10 seconds

Calibration due date is before Dec 1, 2023

Name	Model	Calibration status	Calibration due date
Josh's Test System (3)			
cDAQ1Mod1	NI 9211	Calibration past due	Dec 4, 2007
cDAQ1Mod3	NI 9234	Calibration past due	Jul 29, 2016
cDAQ1Mod2	NI 9235	Calibration past due	Jul 30, 2016
Data Logger 3 (4)			
Mod1	NI 9211	Calibration past due	Feb 21, 2008
Mod3	NI 9201	Calibration past due	Jan 3, 2013
Mod4	NI 9234	Calibration past due	Aug 6, 2016
Mod2	NI 9210	Calibration past due	Apr 10, 2020
PXIE-8880-031062CE (2)			
SCOPE	NI PXI-5142	Calibration past due	Jul 3, 2009
FGEN	NI PXIe-5442	Calibration past due	Jan 16, 2010
DESKTOP-DRL276G (1)			
PXI1Slot2	NI PXI-6259	Calibration past due	Dec 28, 2009
FL-PowerSeat (5)			
cDAQ9185-1D195E8Mod2	NI 9229	Calibration past due	Jan 4, 2013
cDAQ9185-1D195E8Mod3	NI 9239	Calibration past due	Nov 21, 2015
cDAQ9185-1D195D6Mod1	NI 9234	Calibration past due	Dec 6, 2018
cDAQ9185-1D195E8Mod1	NI 9214	Calibration past due	Mar 7, 2019
cDAQ9185-1D195D6Mod2	NI 9234	Calibration past due	Mar 22, 2019
Briefing Center Demo A (6)			
PXI1Slot16	NI PXIe-4139	Calibration past due	Aug 23, 2017
PXI1Slot5	NI PXIe-5624R	Calibration past due	Nov 11, 2020
PXI1Slot6	NI PXIe-5606 (26...	Calibration past due	Dec 20, 2020
SCOPE_01	NI PXIe-5162 (4CH)	Calibration past due	Jun 10, 2022
PXI1Slot10	NI PXIe-5653	Calibration past due	Mar 7, 2023
	NI PXIe-4139	Calibration past due	Mar 16, 2023
	NI-5692	Calibration past due	Jun 25, 2019
	NI-5692	Calibration past due	Jul 25, 2019



Calibration Management

Track calibration status and calibration history for connected and disconnected assets.

- Auto-discovers and reports calibration for NI devices
- Supports 3rd party calibration data via API and web interface
- View past calibration history and attach calibration certificates
- Get notifications when assets are approaching their calibration due date
- Export asset calibration data for offline reporting

Assets

736 Assets 108 Connected 628 Disconnected

Add asset Search Refresh: 10 seconds

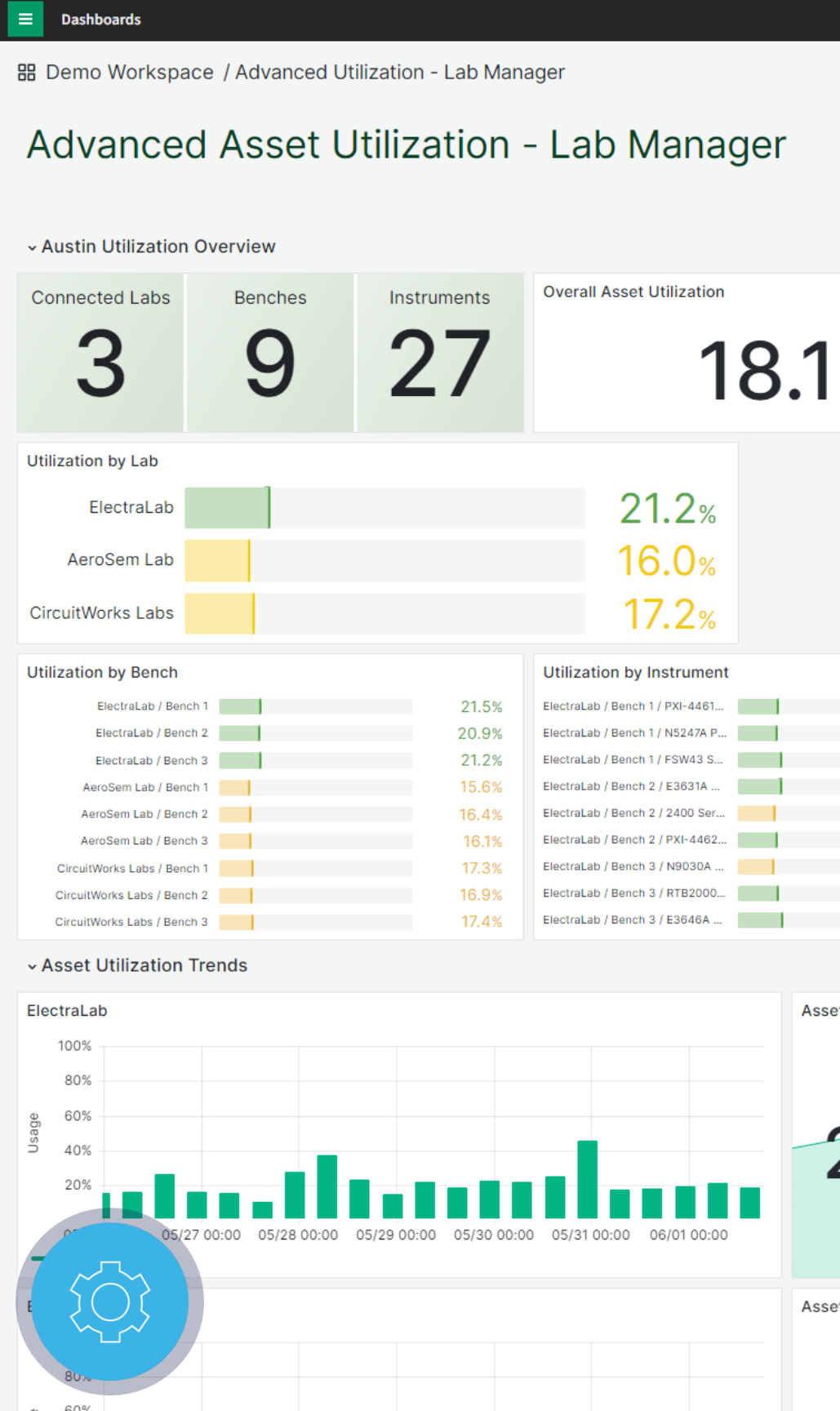
Name	Model	Serial nu...	Location	Presence	Last self c...	Calibrati...
^ NI-sbRIO-9629-01E3834F (10)						
Cell1	234235r	123213	NI-sbRIO...	Present		
Conn0_DIO0-3	DIO 0-3	01E3834F	NI-sbRIO...	Present		
RIO0	NI sbRIO...	1E3834F	NI-sbRIO...	Present		
Conn0_AO	AO 0-3	01DDD051	NI-sbRIO...	Present		
sbRIO1	NI sbRIO...	01E3834F	NI-sbRIO...	Present		
NI-sbRIO-9629-01...	sbRIO-9629	01E3834F	NI-sbRIO...	Present		
Tower1	NI-Cycler	1234567	NI-sbRIO...	Present		
sbrio1	123324	23124	NI-sbRIO...	Present		
Tray1	12343235	123124	NI-sbRIO...	Present		
Conn0_AI	AI 0-15	01DDD051	NI-sbRIO...	Present		
^ FL-PowerSeat (14)						
Seat_Heater	NI cDAQ-...	01D1961C	FL-Powe...	Present		
cDAQ9185-1D196...	NI 9229	0123EA42	FL-Powe...	Not pres...		
cDAQ9185-1D196...	NI 9214	01D0A02C	FL-Powe...	Not pres...		
Power_Seat_2	NI cDAQ-...	01D195D6	FL-Powe...	Present		
cDAQ9185-1D195...	NI 9401	013407EB	FL-Powe...	Present		
cDAQ9185-1D196...	NI 9239	01C879EE	FL-Powe...	Not pres...		
cDAQ9185-1D195...	NI 9401	0170495C	FL-Powe...	Present		
Power_Seat_1	NI cDAQ-...	01D195E8	FL-Powe...	Present		
Cell ID4	ID4	123456789	FL-Powe...	Present		
cDAQ9185-1D195...	NI 9229	016A2878	FL-Powe...	Present		Jan 4, 20...
cDAQ9185-1D195...	NI 9239	019E8825	FL-Powe...	Present		Nov 21, ...
cDAQ9185-1D195...	NI 9234	01CCA52B	FL-Powe...	Present		Dec 6, 20...
cDAQ9185-1D195...	NI 9214	01D0A055	FL-Powe...	Present		Mar 7, 20...
cDAQ9185-1D195...	NI 9234	01D17BC1	FL-Powe...	Present		Mar 22, ...
NI PXIe-8...	21A28B8		g1kam109	Not pres...		
NI PXIe-8...	020B2DDA		g1kam109	Present		
NI PXIe-8...	020B2E4F		g1kam109	Present		
NI PXIe-8...	01E9CB02		g1kam109	Present		

Asset Traceability

Automatic asset tracking for NI and 3rd party LXI, USB-TMC, and GPIB instruments

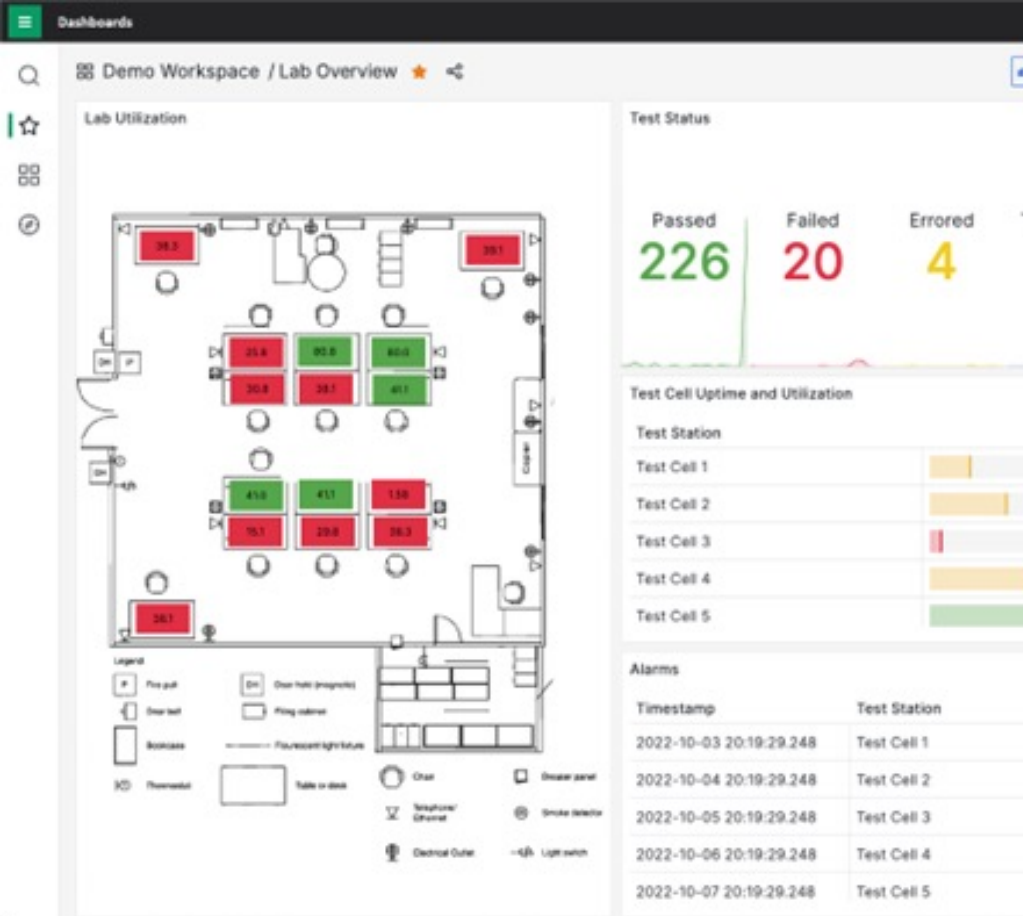
- Search and locate test assets across all systems
- Tracks asset connection and location history over time
- 3rd party assets through programmatic APIs and web interface
- Add custom properties and keywords to assets that can be used when grouping or filtering assets
- Export asset data for external reporting

	B	C	D	E	F	G	H	I
1	System	System Connection	Name	Vendor	Model	Serial Number	Bus Type	Resource URI
2	PXI-ATDEMO-1	Connected	PXIChassis1	National Instruments	NI PXIe-1062	V08X145D2	PciPxi	0/National Instruments/NI PXIe
3	PXI-ATDEMO-2	Connected	PXIChassis1	National Instruments	NI PXIe-1062	V08X191C9	PciPxi	0/National Instruments/NI PXIe
4	NI-WTS	Disconnected	PXIChassis2	National Instruments	NI PXIe-1071	154EE6D	PciPxi	0/National Instruments/NI PXIe
5	ATDEMOKITNIWK18	Disconnected	Chassis 1	National Instruments	NI PXIe-1082	16D9B99	PciPxi	0/National Instruments/NI PXIe
6	DESKTOP-NK98GAG	Connected	PXIChassis1	National Instruments	NI PXIe-1082	318EF6E	PciPxi	0/National Instruments/NI PXIe
7	ni-NI	Disconnected	Chassis 1	National Instruments	NI PXIe-1082	V08X18028	PciPxi	0/National Instruments/NI PXIe



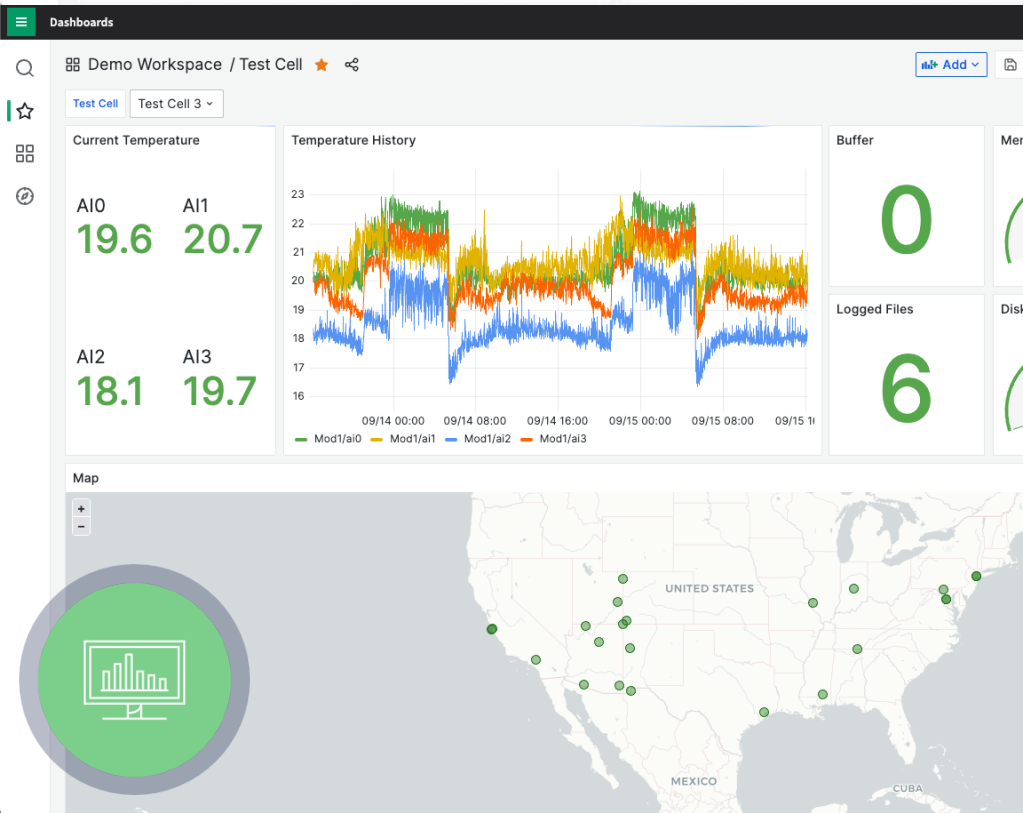
Asset Utilization Tracking

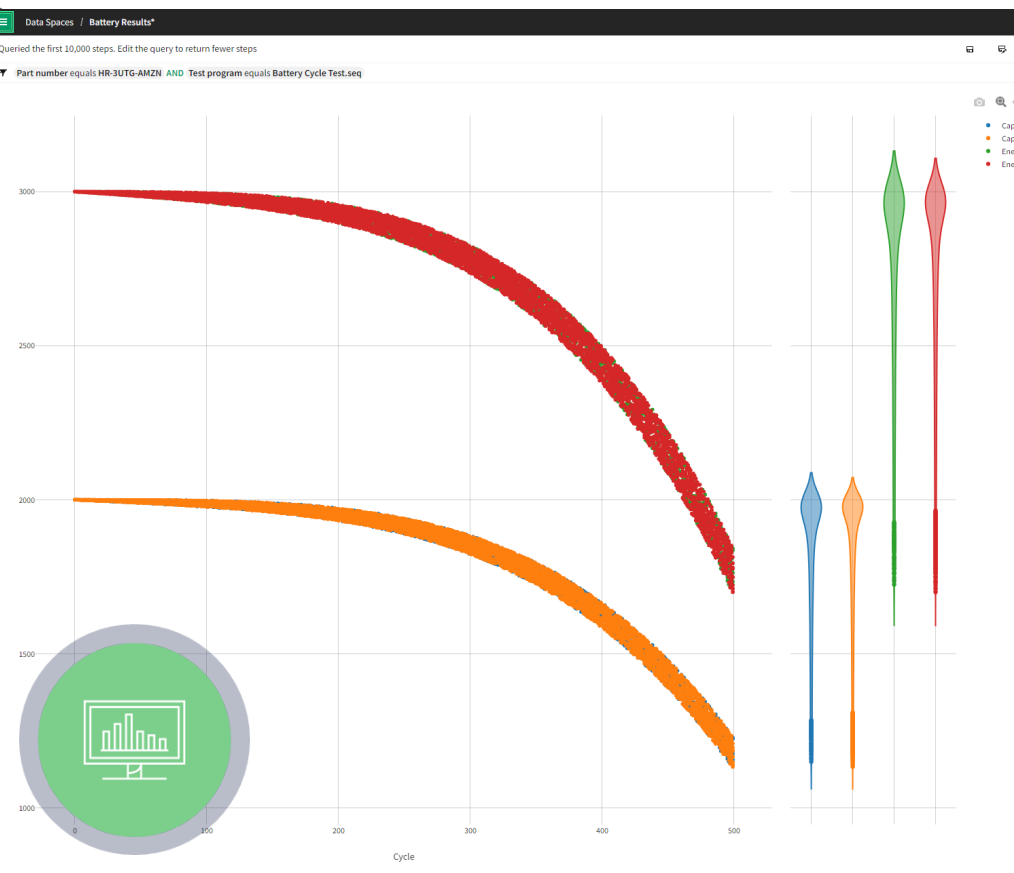
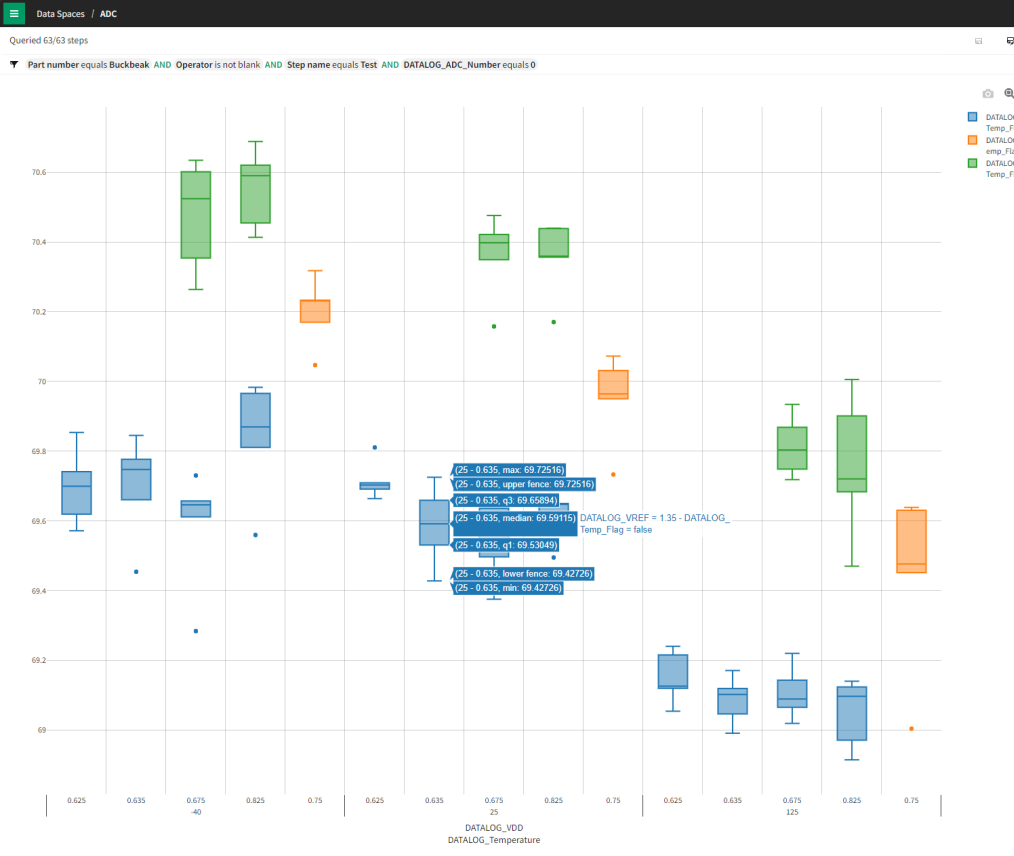
- Low-level device utilization tracking based on actual instrument usage
- Granular, non-obtrusive, and highly performant
- Does not require modifying existing applications or additional manual user steps
- Supports NI and 3rd party instruments via NI-VISA including LXI, USB-TMC, and GPIB
- Identify types of usage, including testing and maintenance
- New highly customizable dashboards and out of the box reports (e.g., under-utilized assets)
- PXI modules and DAQ support coming soon



Real-Time Monitoring & Dashboards

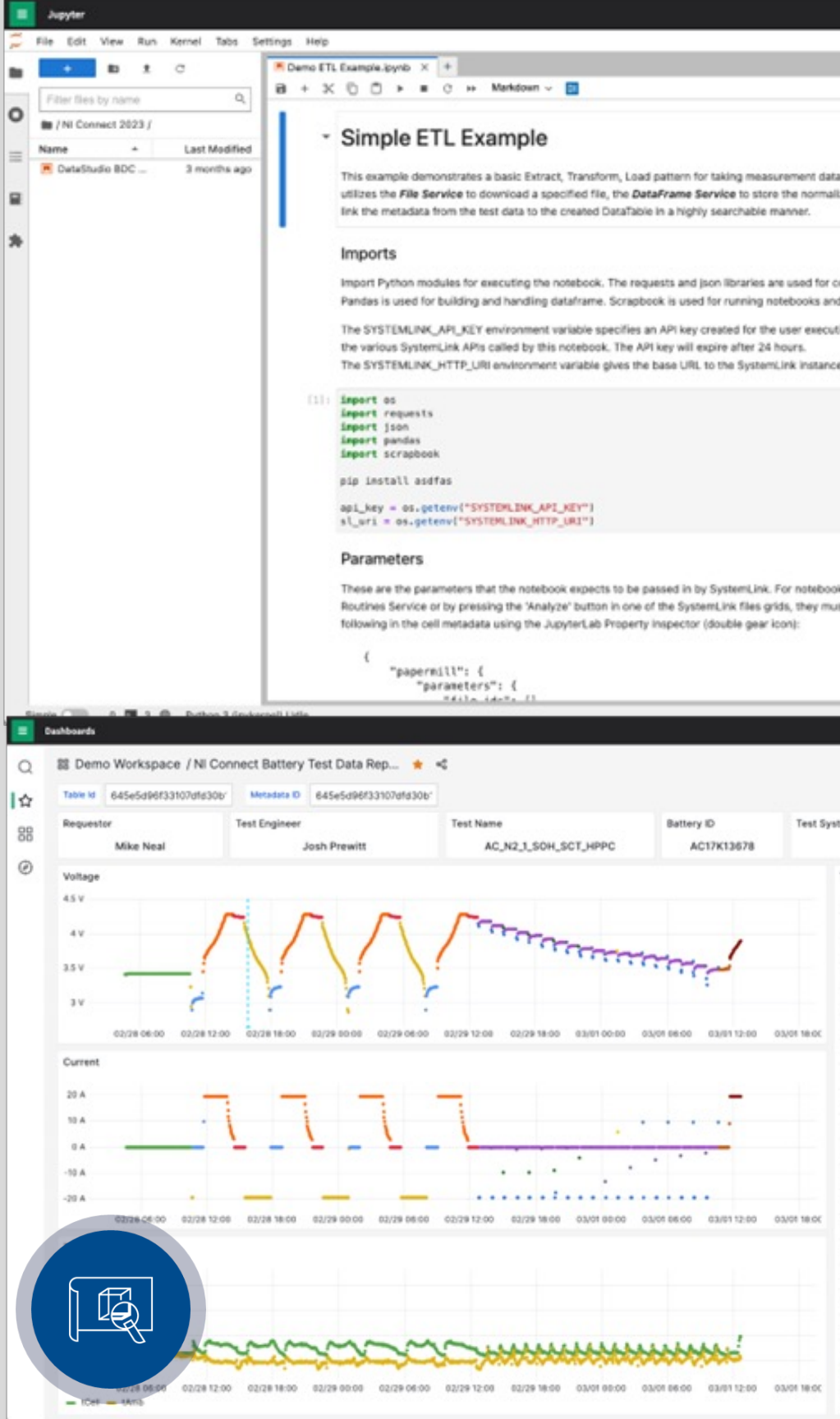
- Monitor test systems and key project indicators in real-time through customizable dashboards
- Track lab, system, and product key project indicators
 - Utilization, throughput, quality metrics, etc.
- Over 20+ different visualizations to choose from
 - Line, bar, pie, and scatter charts
 - Heat maps and histograms
 - Geo maps and lab overviews
 - Gauges
 - Stats
 - Etc.





Data Management

- Collect, store and view test results, files and parametric data
 - Ingest data from TestStand or 3rd party sequencers using SystemLink's Test Monitor LV, Python, .NET, or HTTP APIs
- Quickly search and filter data to analyze past results and gain additional insights
 - View waveform and parametric measurement data from a web-based user interface
- Interactive web-based data visualization and analysis
 - Plot and group measurement data across different conditions
 - View distributions using box and violin plots as well as histograms



Analysis Automation & Reporting

- Develop analysis routines
 - Leverage SystemLink’s fully integrated Jupyter Notebook development environment to create Python scripts to extract, transform, and analyze data
 - Publish notebooks to SL make them available for automated routines
- Automate data transformation and analysis
 - Interactively run notebooks on selected data sets
 - Automatically trigger notebooks when new data arrives
 - Schedule notebooks to run on a periodic basis
 - View notebook analysis in customizable dashboards
- Track key project indicators
 - Leverage dashboard and customizable analytics to track KPIs such as throughput, utilization, first pass yield and overall equipment effectiveness



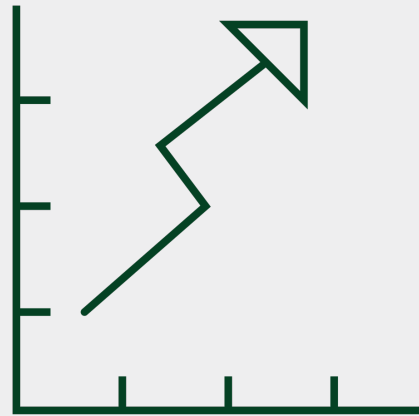
Modernizing Your Lab Operations

Demo

- Create and define your testing specifications
- Plan and schedule your tests
- Deploy your tests
- Remote execute your tests
- Monitor your tests and lab operations in real-time

Business Impact of SystemLink

SystemLink Benefits



Improve test operations by automating test system configuration and updates



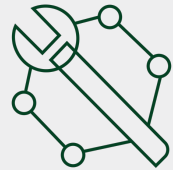
Reduce cost of test through improved asset utilization and uptime



Improve product insights through automated analysis

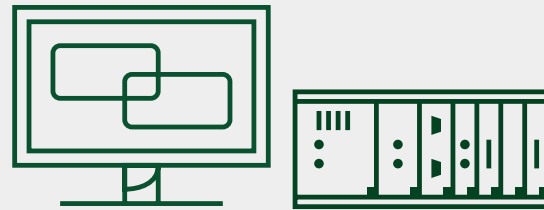
The right approach for your test operations

Standardize on an open platform



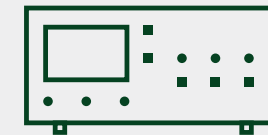
Fully Customized System

“Customer Does Everything”
Costly (Time, Upkeep)
No Ecosystem
Customer Maintains



Open Platform-Based System

“Customer Knows Best”
Customizable Solution
Open, Valuable Ecosystem
Customer Designs



Closed Turnkey System

“Vendor Knows Best”
Fixed Functionality
Closed Ecosystem
Customer Pays

Calendar View

Calendar							
April 07 - April 13, 2024							
Systems	7 Sunday	8 Monday	9 Tuesday	10 Wednesday	11 Thursday	12 Friday	13 Saturday
TC18B-01			Test pla...	High-Temperature		Module 304 Dynamic Test Cycle	
TC18B-02		Dynamic Test Cycle 1		Pack 098 Energy vs			
TC18B-03	Test pla...	Dynamic Test Cycle 3		Module 304 Dynam			
TC18B-04	Module 309 Dynamic Test Cycle	Module 306 Dynamic Test Cycle					
TC18B-05			Cell 048 Charge Discharge Thermal Test				
TC18B-06		Module 100-4 Fast Charge					
TC18B-07							
TC18B-08	Pack 21 Leakage Test, Pack37 Leakage Test						
TC18B-09			Cycle Test				
TC18B-10	Pack 13 HV Insulation Test		Thermal Test Pack 1094	Product 234 Energy Efficient Test 2			
TC18B-11	Maintenance						
TC18B-12							
TC18B-13		Pack37 Leakage Test		Pack 13 HV Insulation Test			
TC18B-14	Product 234 Energy Efficient Test 1	Module 100-4 Fast Charge			Dynamic Test Cycle 5		
TC18B-15			Module 100-5 Fast Charge				
TC18B-16		Module 100-5 Fast Charge					
TC18B-17							
TC18B-18				Cell 445 Life Cycle Test		Cell 467 Life Cycle Test	
TC18B-19		Pack 21 Leakage Test		Cell 435 Life Cycle Test			
TC18B-20	Cell Power Test						
TC18B-21	Pack 20 HV Insulation Test		Thermal Test Pack 94	Product 2 Energy Efficient Test 2			
TC18B-22		Module 111-5 Fast Charge					

TC18B-05 ✕

Cell 048 Charge Discharge Thermal Test 🔗

Apr 9, 08:00:00 - Apr 10, 06:00:00

👤 Madhumita Ashok

📦 Product AAA

🏷️ DUT 12121

Edit 📅 Reschedule ▾

🗑️ Delete

Scheduling Assistant

Calendar / Cell 048 Charge Discharge Thermal Test / Schedule Assistant

Name: Cell 048 Charge Discharge Thermal Test | Product: Product_AAA | State: Defined | Assigned to: Madhumita Ashok | Test Program: --

Time slot: April 9, 2024, 08:00:00 → April 10, 2024, 08:00:00 | Estimated duration: 1 days 0 hours 0 minutes Save

	7 Sunday	8 Monday	9 Tuesday	10 Wednesday	11 Thursday	12 Friday	13 Saturday
Suggested Slot			Cell 048 Charge Discharge Th...				
Systems							
TC18B-01		Power test (DUT 1456)					
TC18B-02			Cycle test (DUT 123)		Cell 048 Charge Discharge Thermal Test (DUT 119)		
TC18B-03	Energy test (DUT 419)						Fast charge test (DUT 8899)
TC18B-04							
TC18B-05				Continuous current limitation (DUT 101)			
TC18B-06		Voltage test (DUT 960)					
DUTs							
DUT 12121	Thermal Test Pack (DUT 3421)						Cycle test (D..
DUT 3421			Thermal test (DUT 12121)				
DUT 9988		Charge/discharge thermal test (DUT 7)					

Other “Connectivity, Data, and Insight” Activities

May 21

Modernizing Your Lab Operations

10:15-11:15

Generative AI to Accelerate Test Workflows

2:00-3:00

Modern Lab Operations with SystemLink: Hands-On

2:00-4:15

Automating the Lab with SystemLink (Automotive Track)

Gaining Product Insight From Your Test Data

11:30-12:30

Maximize Your Lab with SystemLink Software

3:15-4:15

May 22

Analytics From Wafer To Reel To Strip (Semiconductor Track)

10:15-11:15

Modern Lab Operations with SystemLink: Hands-On

10:15-12:30

AI at the Edge

1:30-2:30

Modernizing Your Lab Operations

11:30-12:30

From Concept Through Execution: Analytics in Action

Analytics From Wafer to Reel to Strip

SystemLink Ask Me Anything

2:45-3:45



May 23, NIC

SystemLink User Group Meeting

9:00-1:00

0+ User Forum

New

SystemLink Learning Courseware (V/ILT)
Managing Systems and Assets with SystemLink Enterprise