VENUS software

Simplifying automation

SLAS 2023

Hamilton Company

The measure of excellence

Automation

Laboratory

Process Analytics

OEM

Medical

HAMILTON

Hamilton Company

Liquid Handling Automation

VANTAGE

STAR

NIMBUS

PREP

VENUS software

VENUS software

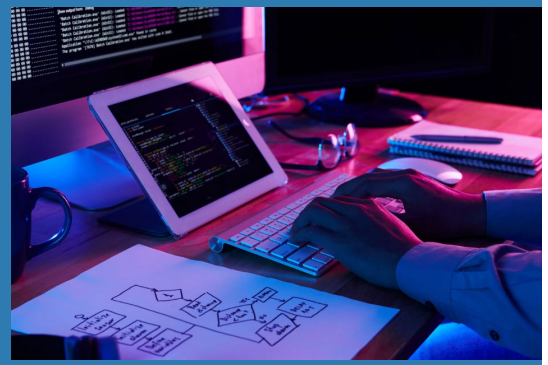
Different users, different needs

Lab Technician
Lab Scientist

Easy to operate
Easy to program
Easy to customize
Remote monitoring

Applications Specialist

Flexible programming
Simplify redundant coding
Easy to deploy
Custom dialogs



Software Integrators / OEM

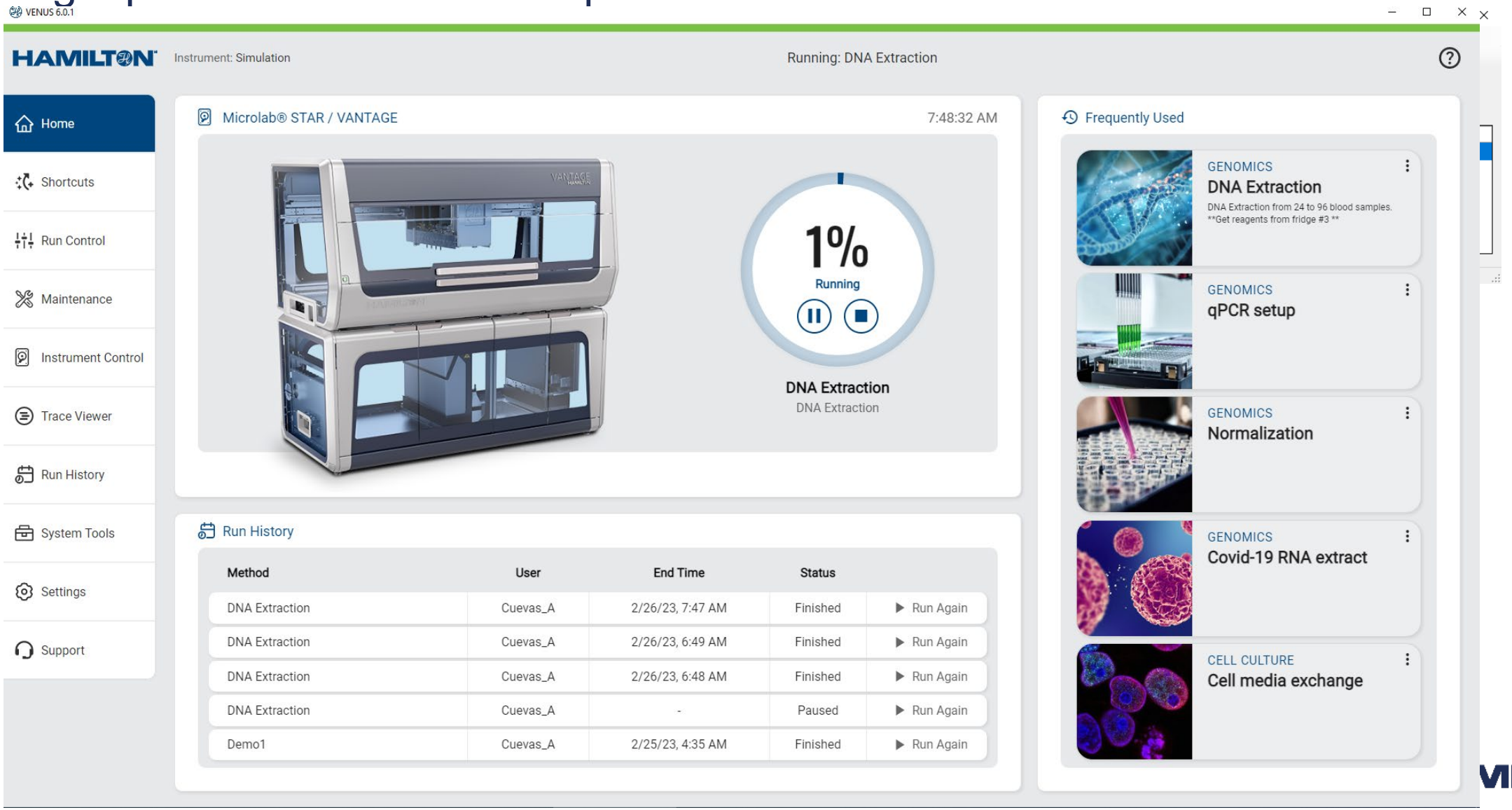
Easy to connect
Easy to deploy
Remote monitoring
API

HAMILTON

EASY to operate

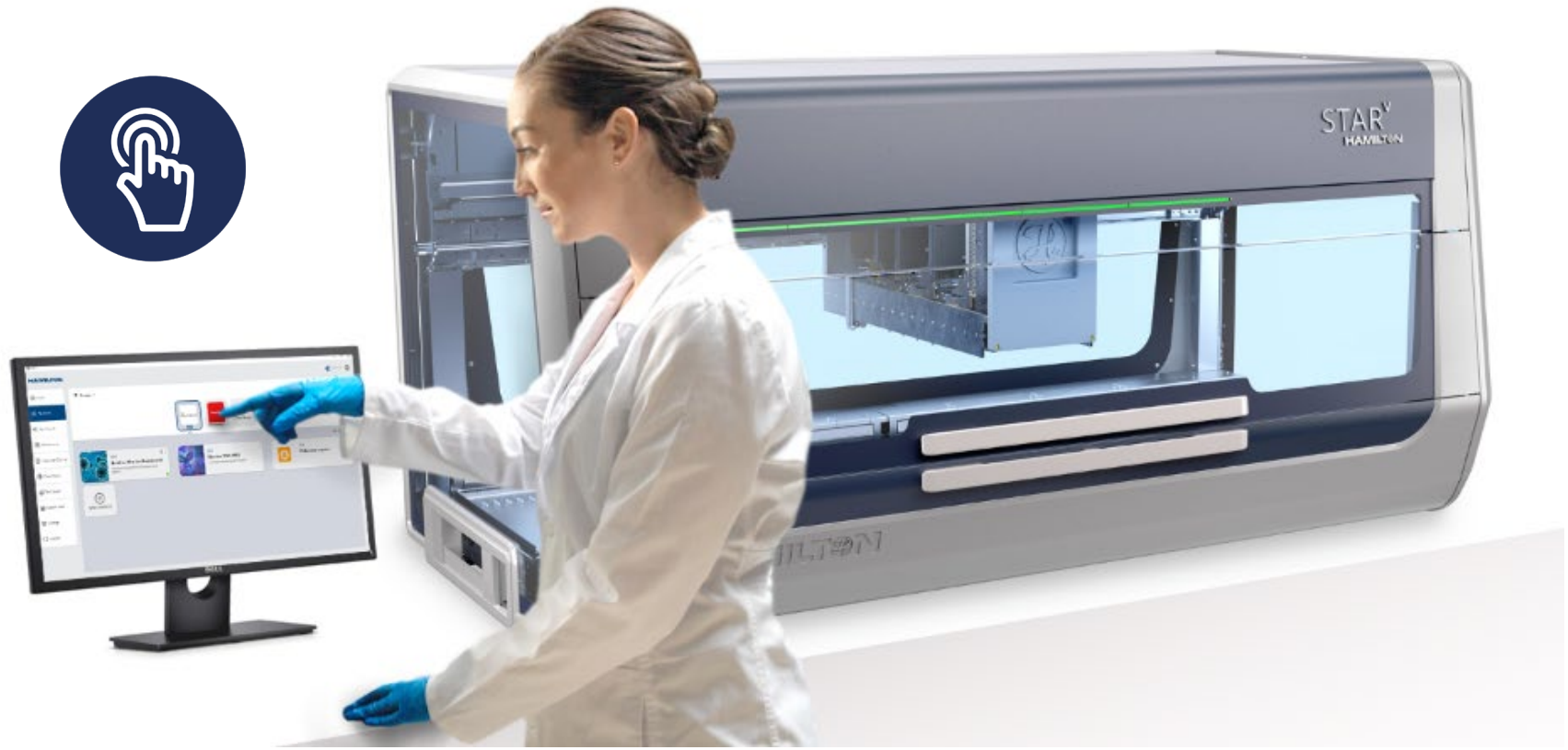
New user interface

Single point of access for all operations



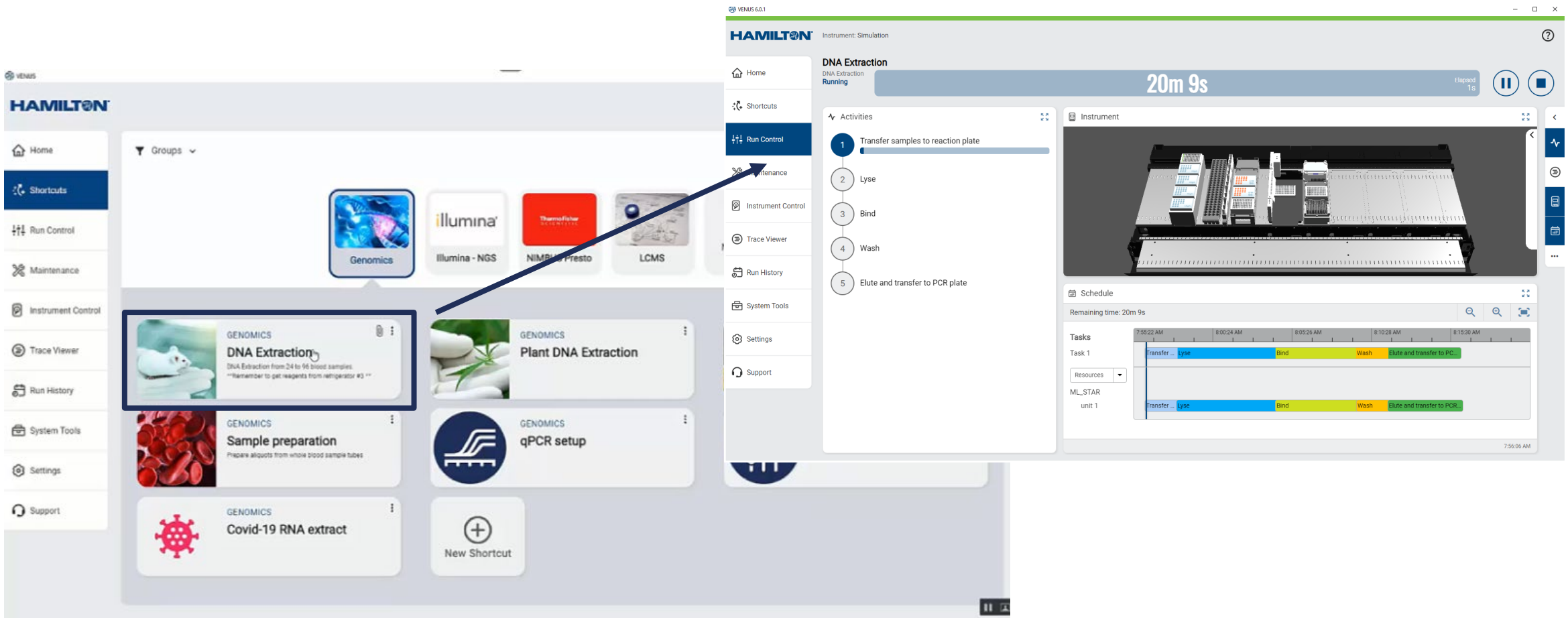
New user interface

Touch screen compatible



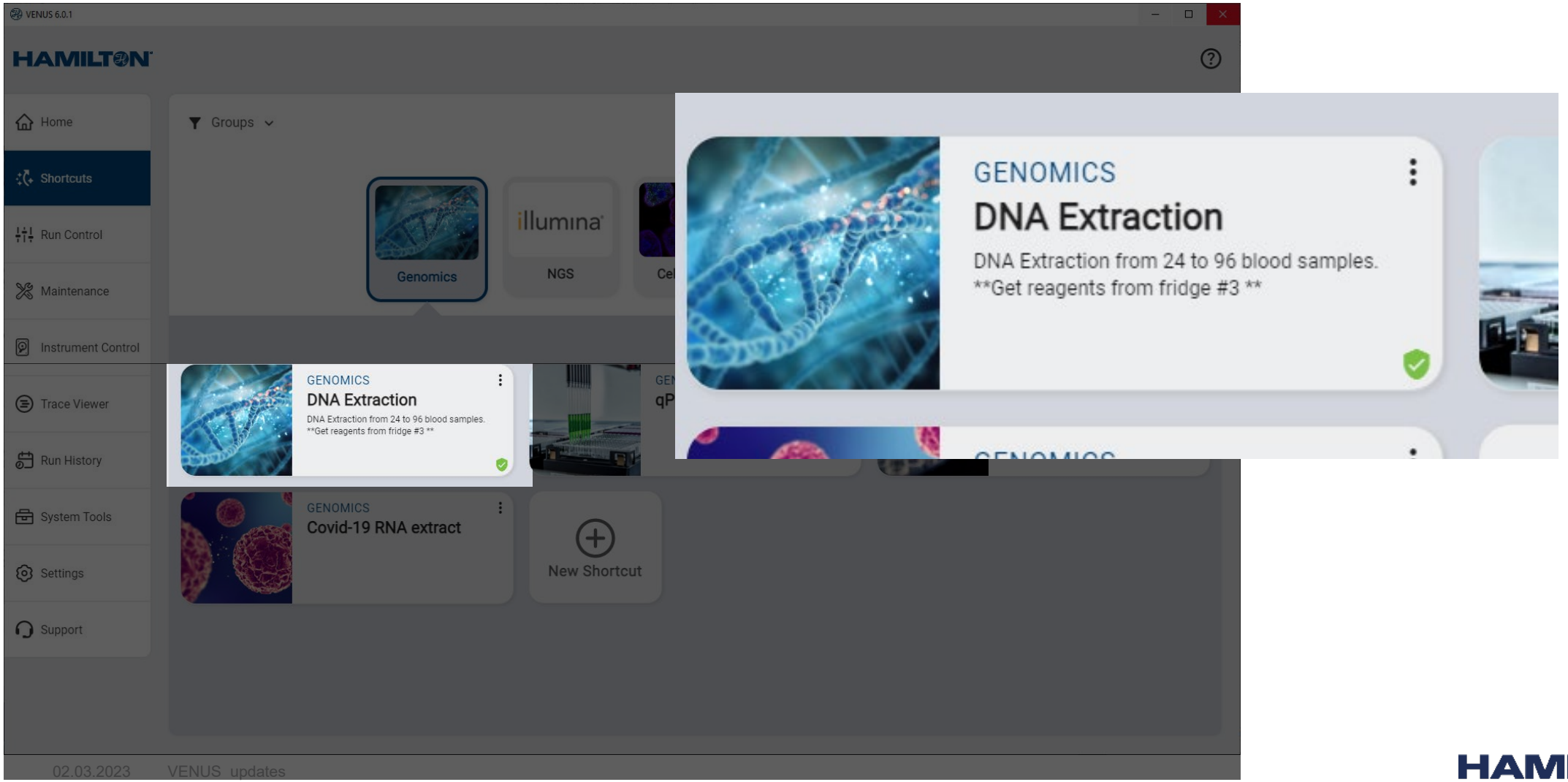
New user interface

One-Click method launch



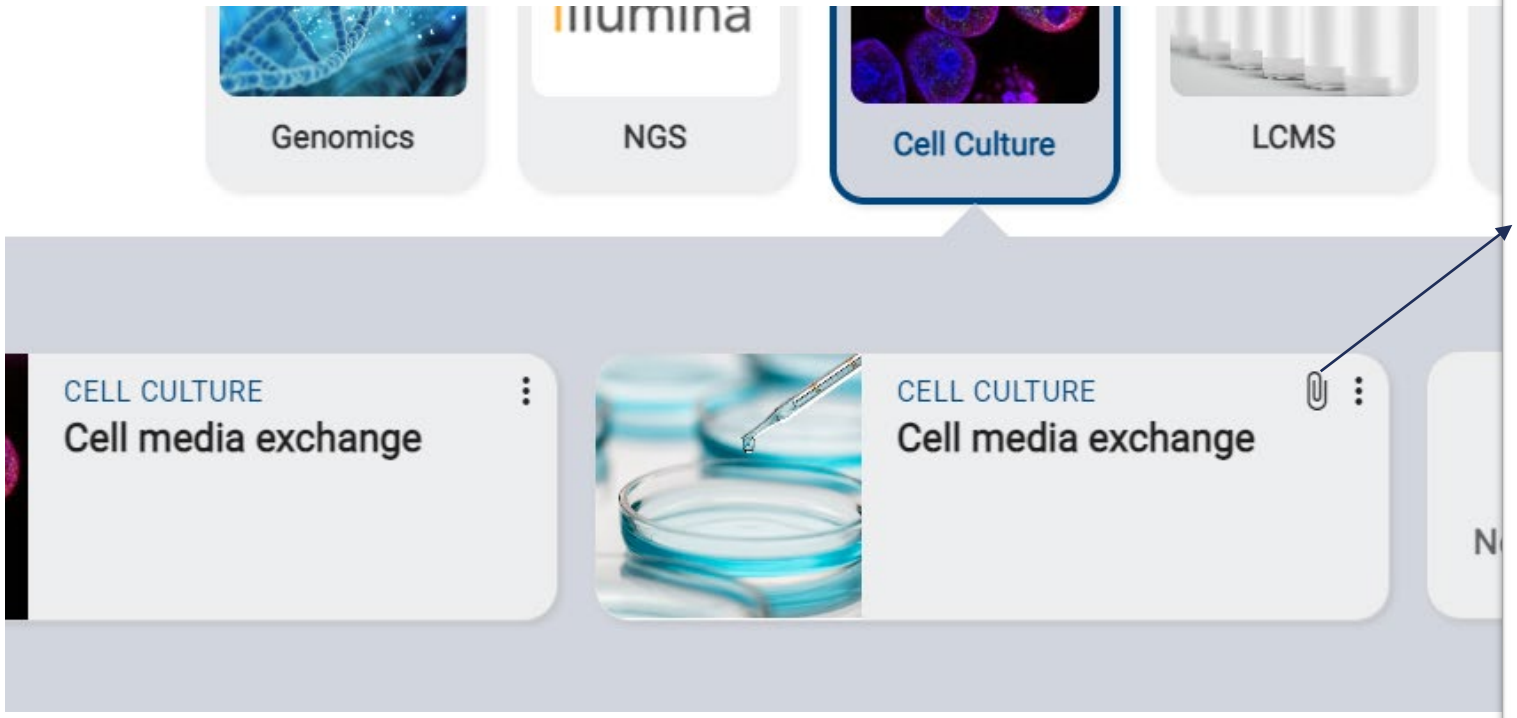
New user interface

Validation flag



New user interface

Attachments



documentation errors. Two ELx405™ HT Microplate Washers (BioTek Instruments, Winooski, VT) and four heated shakers were integrated into the deck of the STARlet for added workflow efficiency and convenience (see Deck Layout at end). Finally, in order to facilitate user-friendly operation, minimize operator intervention, and reduce input errors, the STARlet software was pre-programmed with the SMC™ workflow steps to create a standardized solution.

Using plasma samples and controls, we demonstrate that the assay-ready automated workstation delivers results on par with those achieved through manual methods, while maximizing assay reproducibility, reducing active labor time, and eliminating risks of error and variability from manual intervention.

Materials and Methods

Automated and manual workflows were compared using the SMC™ Interleukin 6 (IL-6) Immunoassay Kit (P/N 30-0572-01-TED), SMC™ Tumor Necrosis Factor (TNF-α) Immunoassay Kit (P/N 30-0571-01-TED), and SMC™ Interleukin 1-β (IL-1β) Immunoassay Kit (P/N 30-0573-01-TED) from MilliporeSigma. In each assay, the manufacturer's protocol was followed[1-3].

Standard, Sample, and Control Preparation

Standard protein curves were created manually as follows. IL-6 standard protein was thawed and diluted to 100 pg/mL in standard diluent to make the top standard, followed by ten 2-fold serial dilutions, down to 0.1 pg/mL. TNFα standard protein was thawed and diluted to 200 pg/mL in standard diluent to make the top standard, followed by ten 2-fold serial dilutions, down to 0.31 pg/mL. IL-1β standard protein was diluted to 50 pg/mL in standard diluent to make the top standard, followed by ten 2-fold serial dilutions, down to 0.05 pg/mL. Each standard curve also included a zero blank.

Human K2 EDTA plasma samples from five healthy individuals (BioreclamationIVT P/N HMPLEDTA2, Westbury, NY) and 3 plasma controls (MilliporeSigma, Hayward, CA) were tested as described in Table 1. Three vials of each sample and plasma control were thawed, lightly mixed, and filtered through a 96-well, 1.2 µm Durapore® membrane filter plate (Millipore, #MSBVN1210) according to each kit protocol.

SMC™ Immunoassay Workflow

For each automated assay type, a 4 Row, Pyramid Bottom 292 mL High Profile Reagent Reservoir (E&K Scientific, P/N EK-2216) was loaded onto the STARlet with assay-specific reagents. Using 300 µL conductive non-filtered CO-RE tips (P/N 235950), a total of 100 µL of microparticles per well were added to four 96-well v-bottom polypropylene microplates (E&K Scientific, P/N EK2470, Santa Clara, CA), followed by 100 µL of each respective 12-point standard protein curve in triplicate. For each assay kit, 100 µL of sample or plasma control filtrate was added to each of the four microplates. The microplates were then incubated on the STARlet deck for two hours at 25ºC with shaking to allow binding of the target biomarker. The assay plates were then transferred to the microplate washer, where the microbeads were magnetically retained, and unbound material was removed in a single wash step. After washing, 20 µL Alexa Fluor 647-labeled detection reagent was added to the wells, using 50 µL conductive non-filtered CO-RE tips (P/N 235947), and the microplates were incubated for one hour in order to bind the microbead-captured analyte. After incubation, the assay plates were again transferred to the microplate washer, where the microbeads were magnetically retained and washed four times in order to remove any unbound detection reagent. The microparticles were then automatically transferred from the 96-well assay microplates to new microplates to avoid eluting non-specific plate bound detection reagent. Detection reagent specifically bound to the target analyte was then eluted and transferred to a 384-well polypropylene microplate (ThermoFisher Scientific P/N 264573, Waltham, MA). The 384-well microplate was manually transferred to the Erenna® Instrument for detection. Alternatively the plate could also be read on the SMCxPro® Instrument.

The entire workflow was also performed using manual methods and one microplate per assay.

Three signal outputs were obtained from the Erenna® Instrument: Detected Events (DEs; low end signal), Event Photons (EPs; low end and mid-range signal), and Total Photons (TPs; high end signal). Using the SgxLink™ algorithm, unknown concentrations were interpolated from the standard curve.

1. *SMC® Human IL-6 High Sensitivity Immunoassay Kit: Immunoassay kit for the quantitative determination of Interleukin 6 (IL-6) in human EDTA plasma. MilliporeSigma, Hayward, CA. Dec 14, 2017. Kit P/N: 30-0572-01-TED*

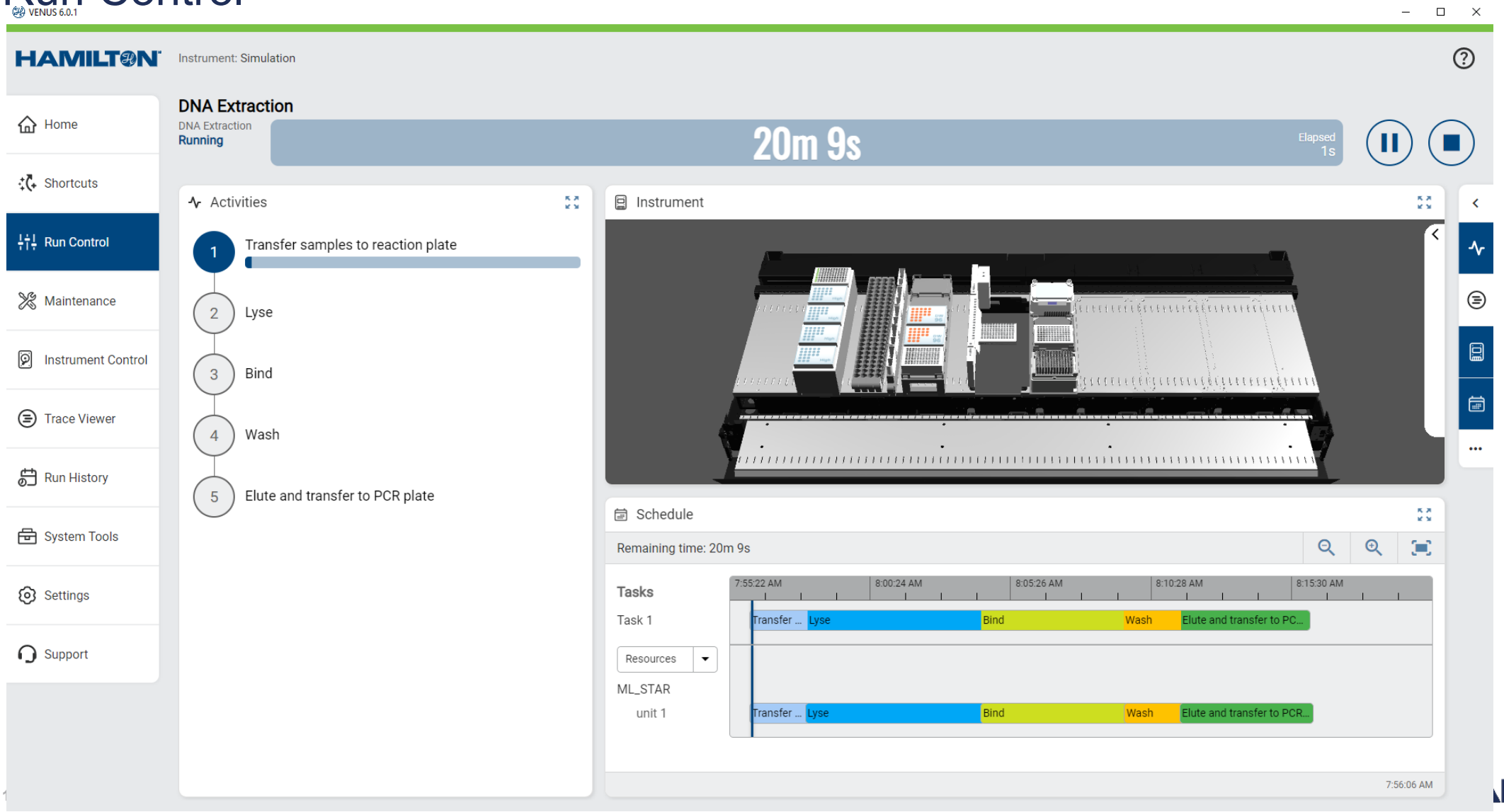
2. *Erenna® SMC® Human TNF-α Immunoassay kit for the quantitative determination of Tumor Necrosis Factor (TNF-α) in human EDTA plasma; MilliporeSigma: Burlington, MA. May 15, 2017. Kit P/N: 30-0571-01-TED.*

3. *SMC® IL-1β High Sensitivity Immunoassay Kit: Immunoassay kit for the quantitative determination of Interleukin 1β (IL-1β) in human EDTA plasma. MilliporeSigma: Burlington, MA. Dec 14, 2017. Kit P/N: 30-0573-01-TED.*

HAMILTON

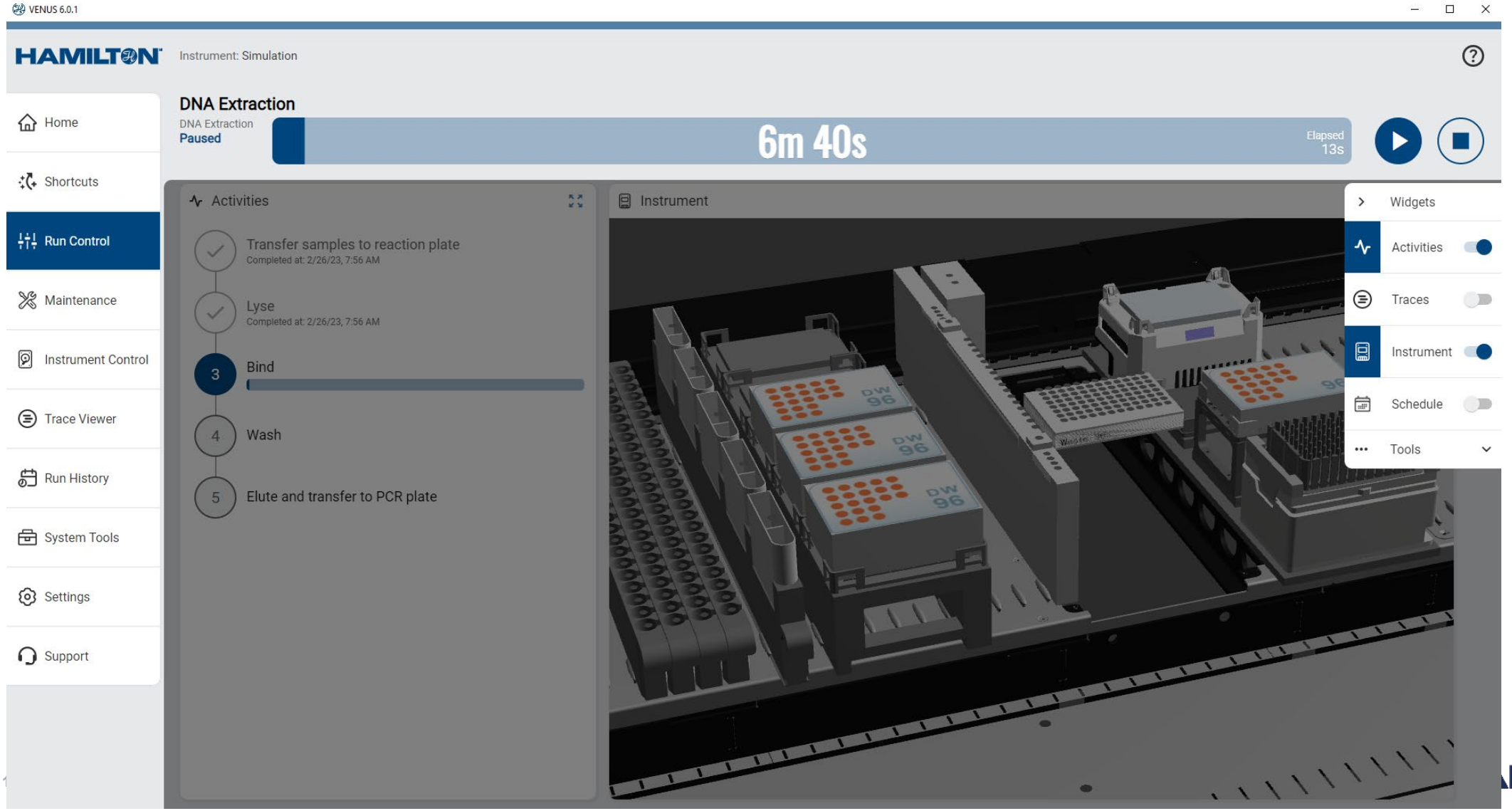
New user interface

Run Control



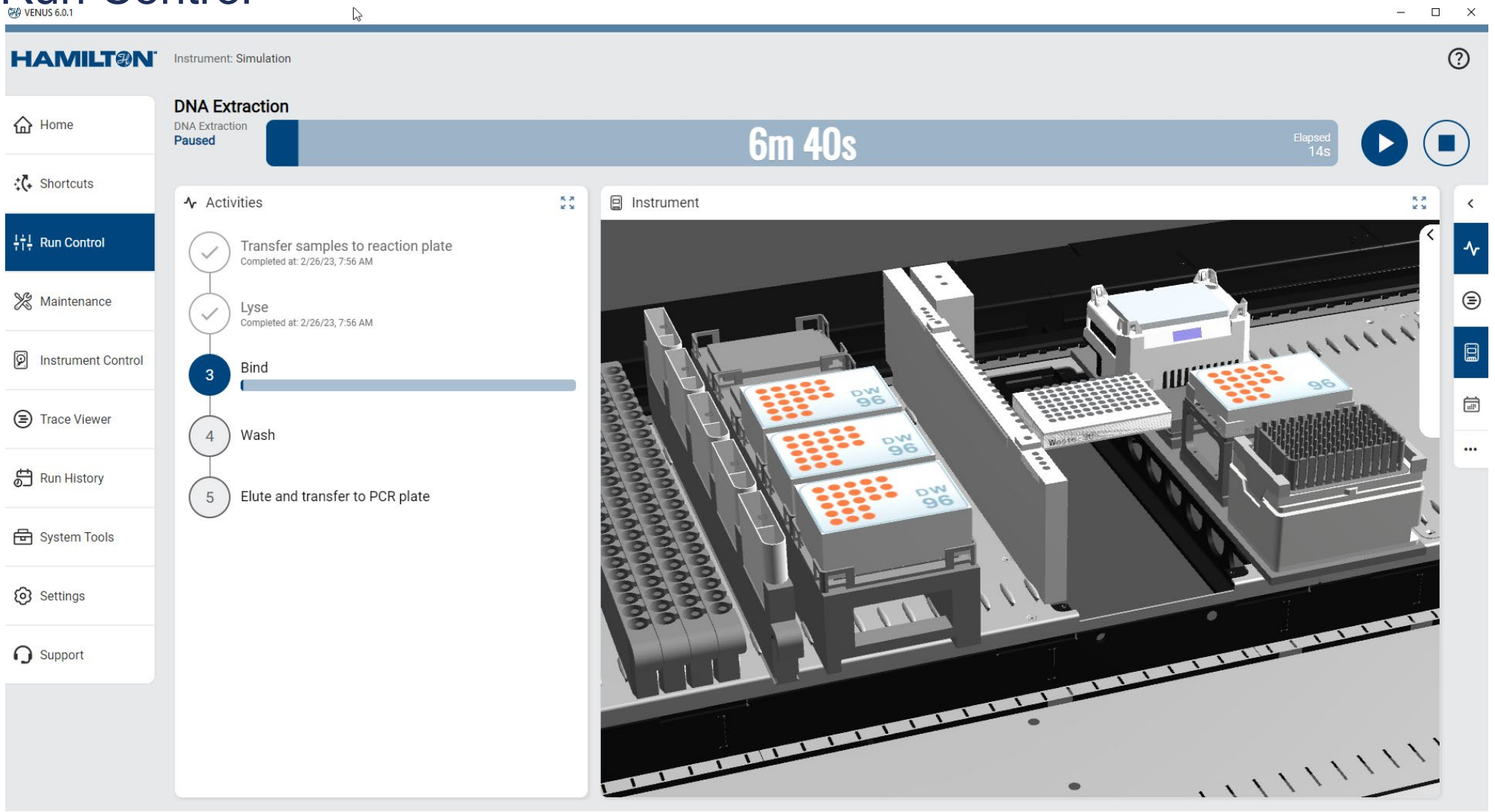
New user interface

Run Control



New user interface

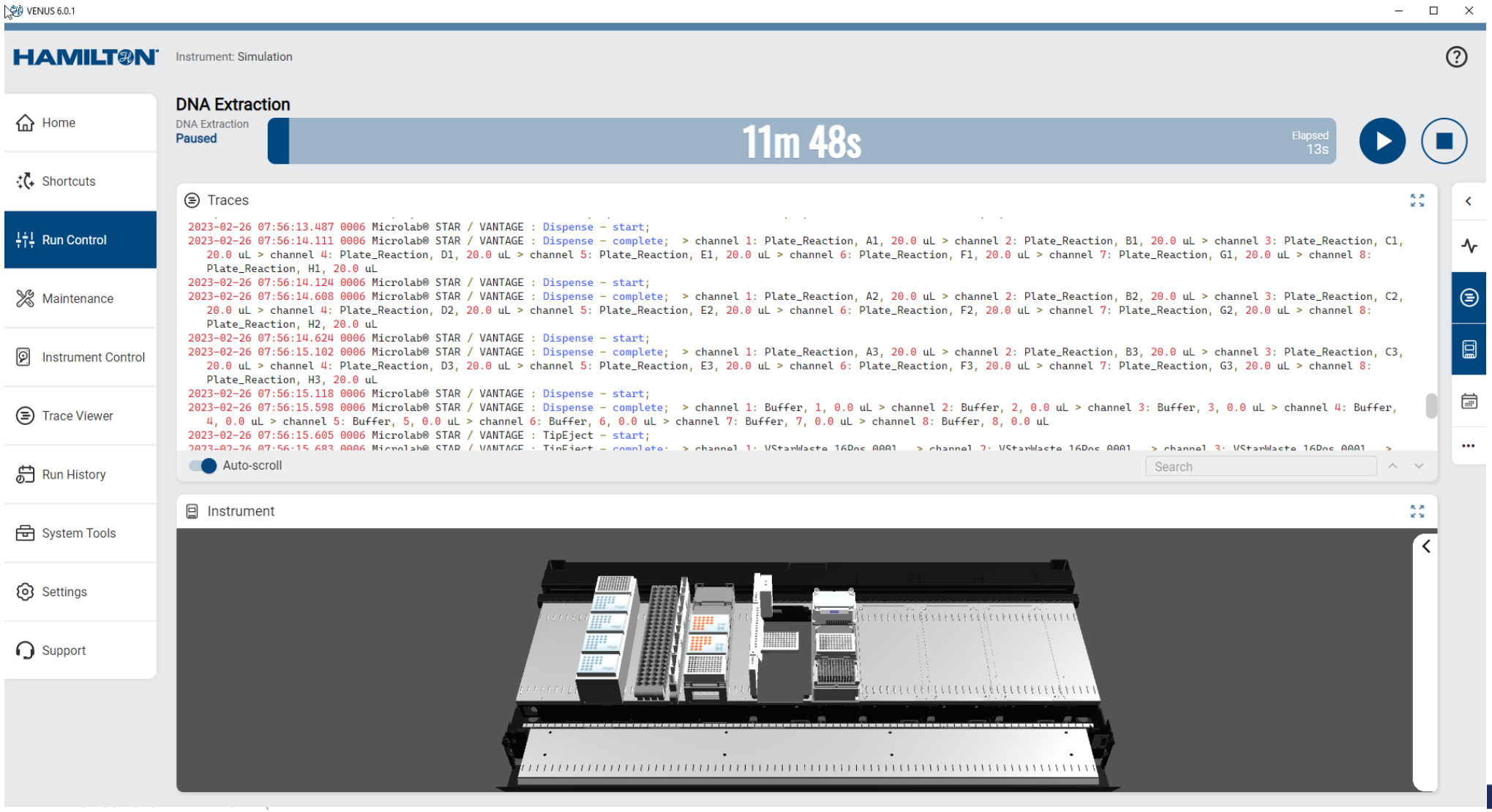
Run Control



HAMILTON

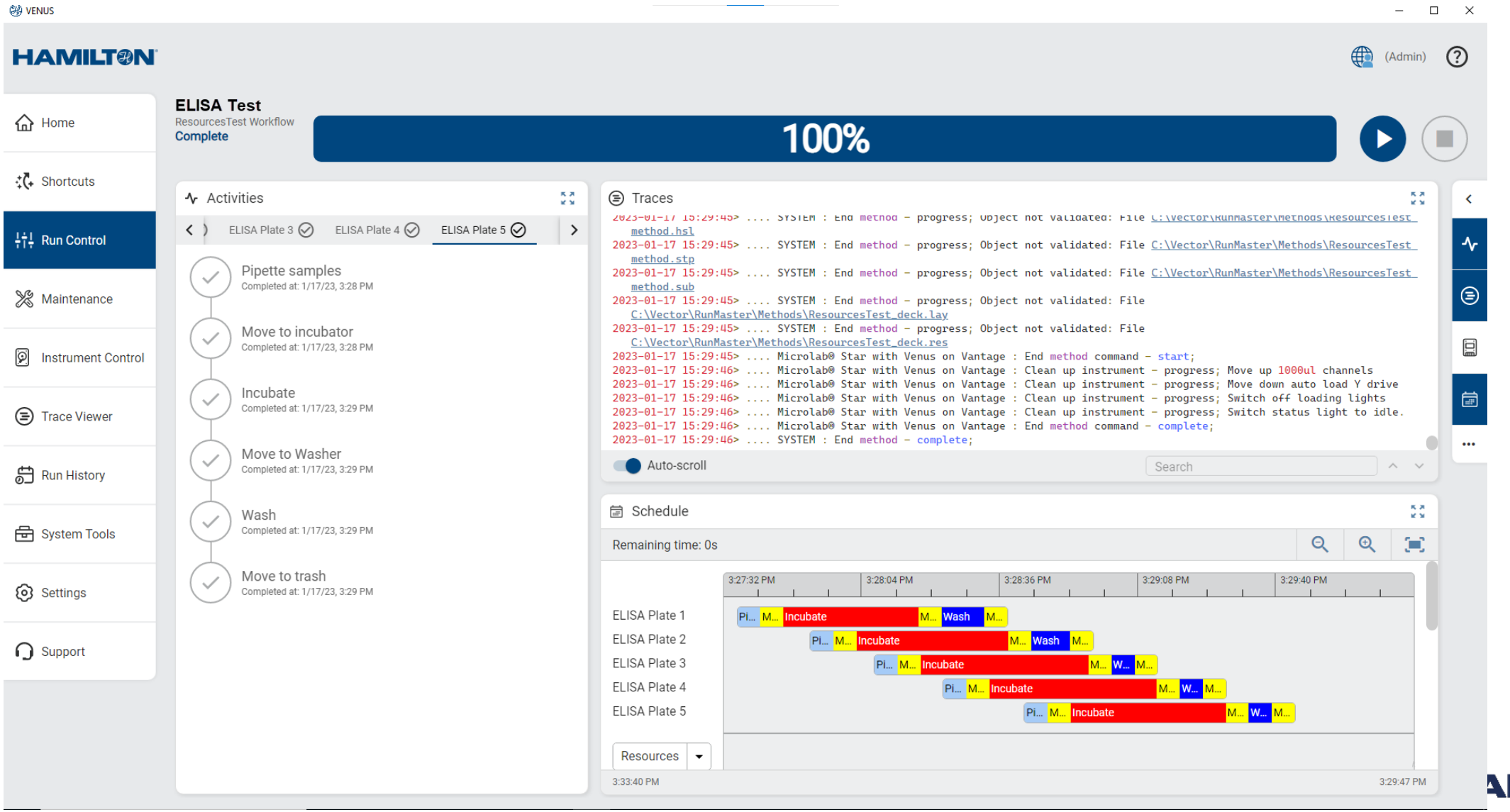
New user interface

Run Control



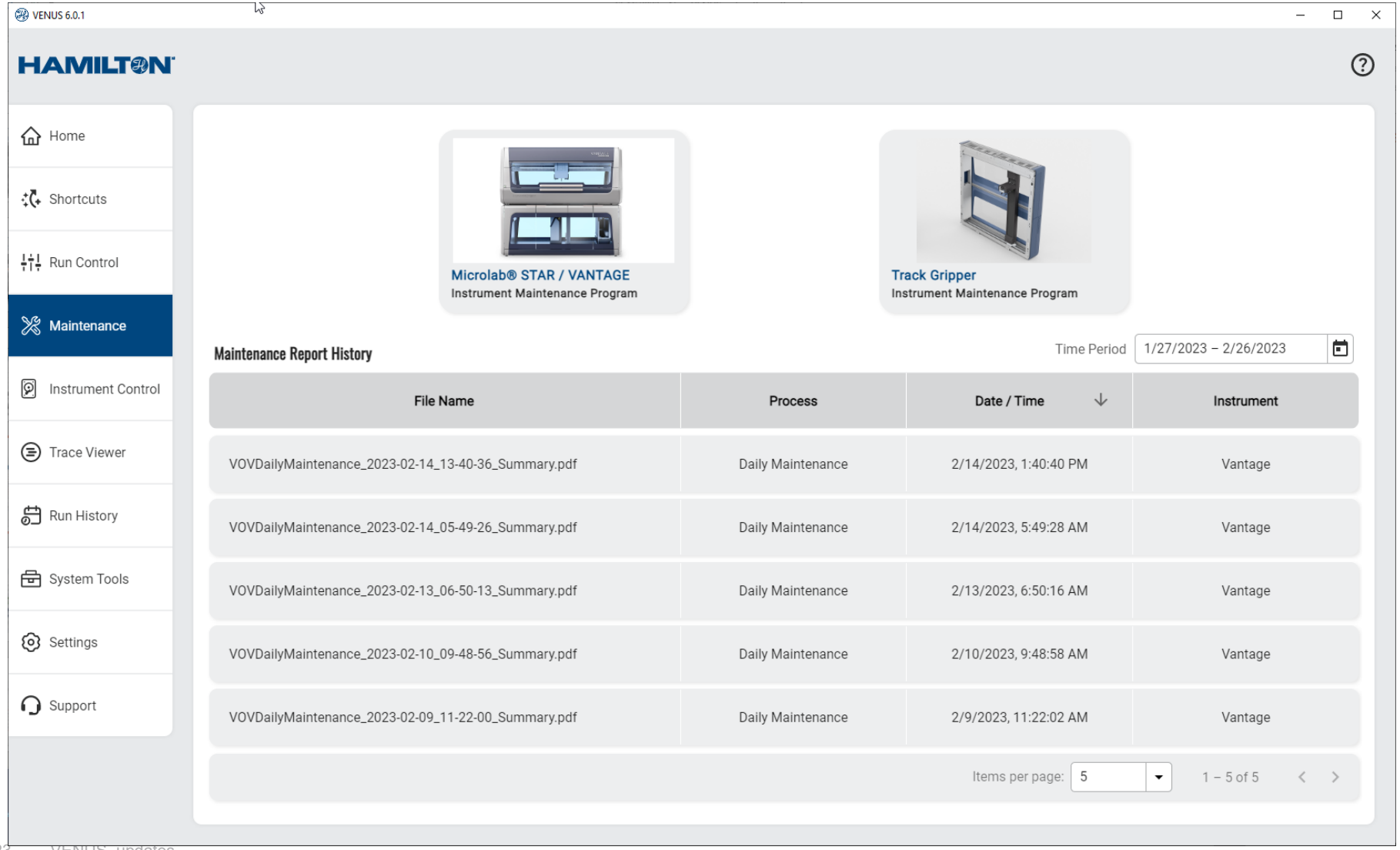
New user interface

Run Control



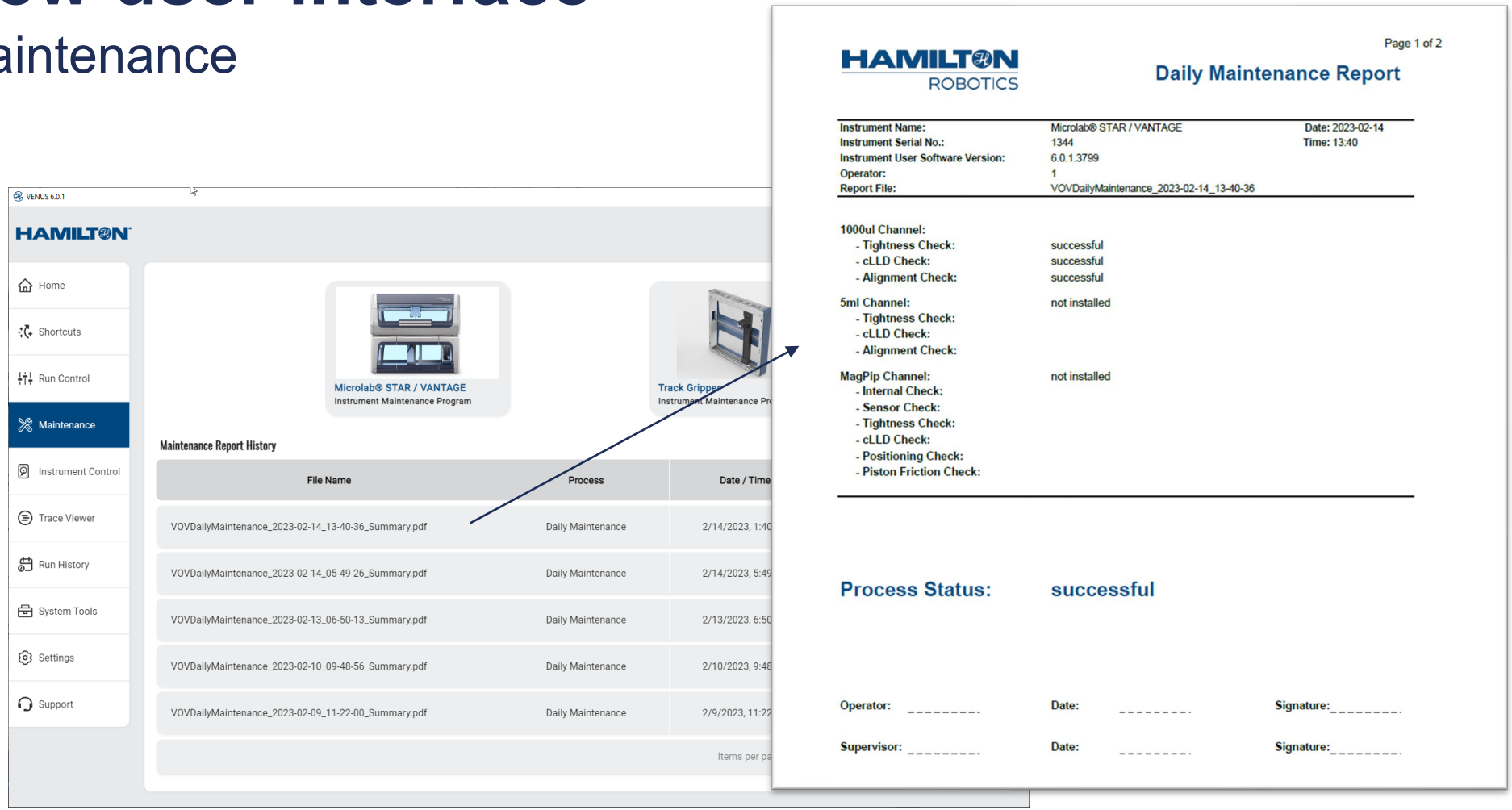
New user interface

Maintenance



New user interface

Maintenance

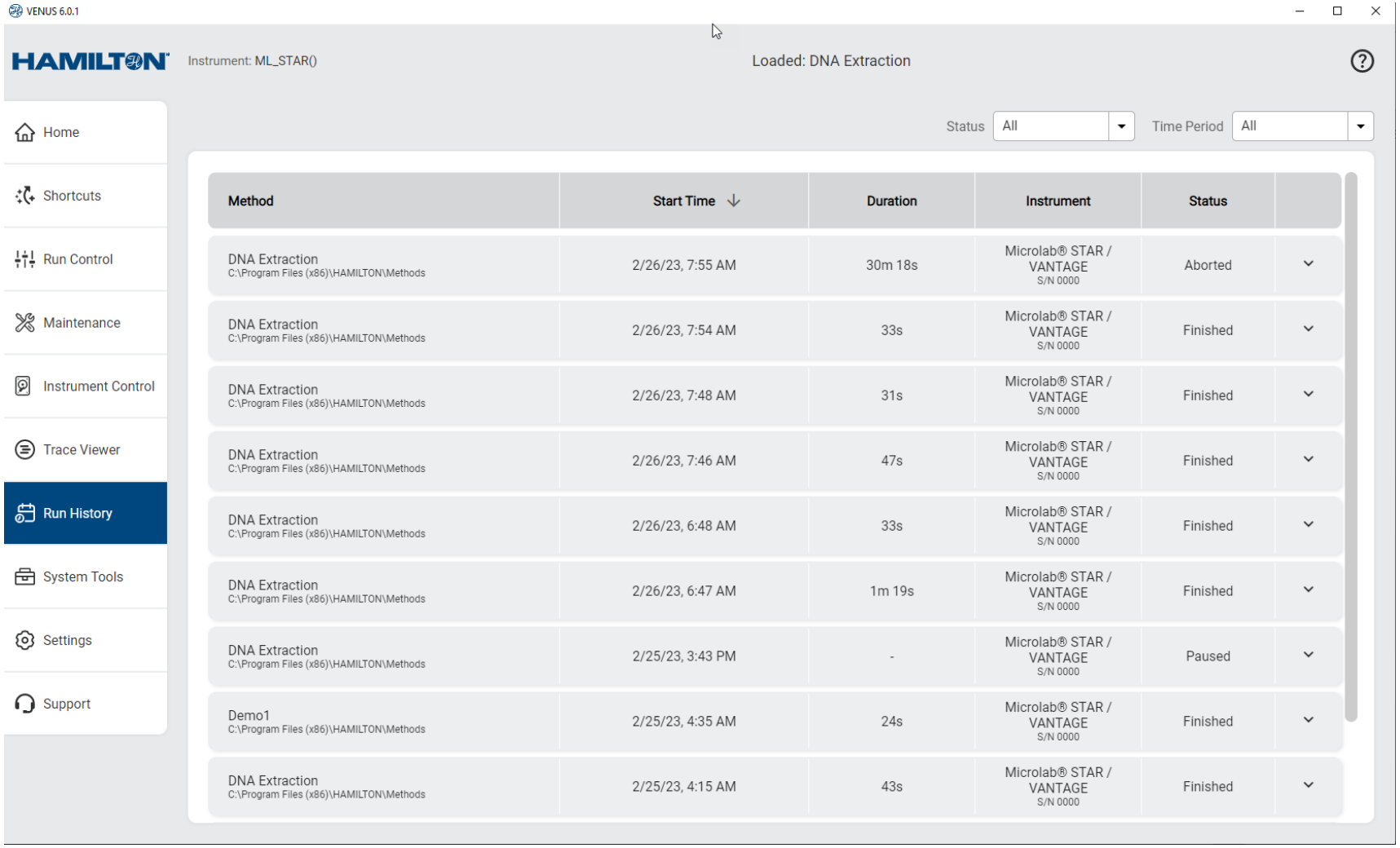


New user interface

Instrument Control

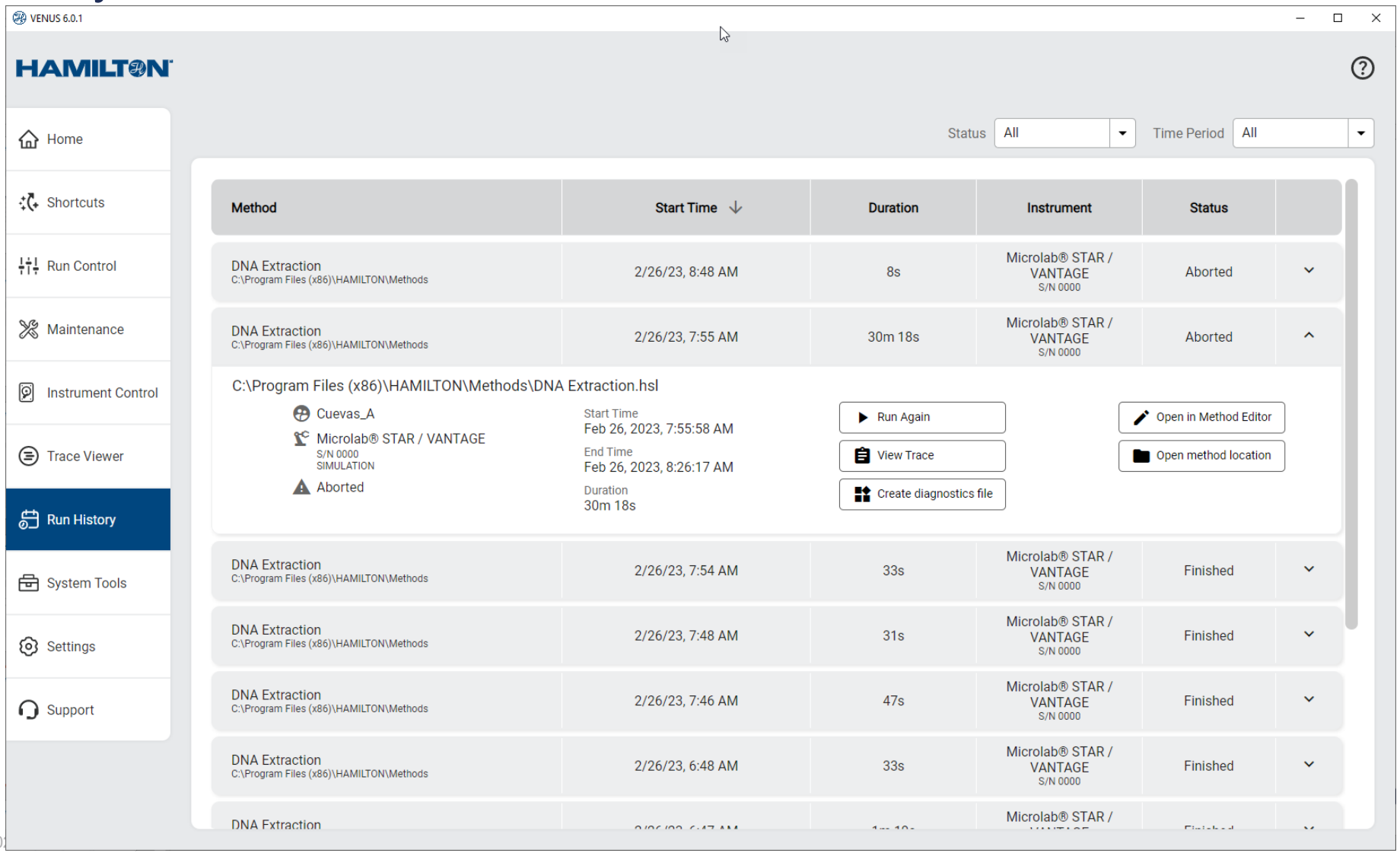
New user interface

Run History



New user interface

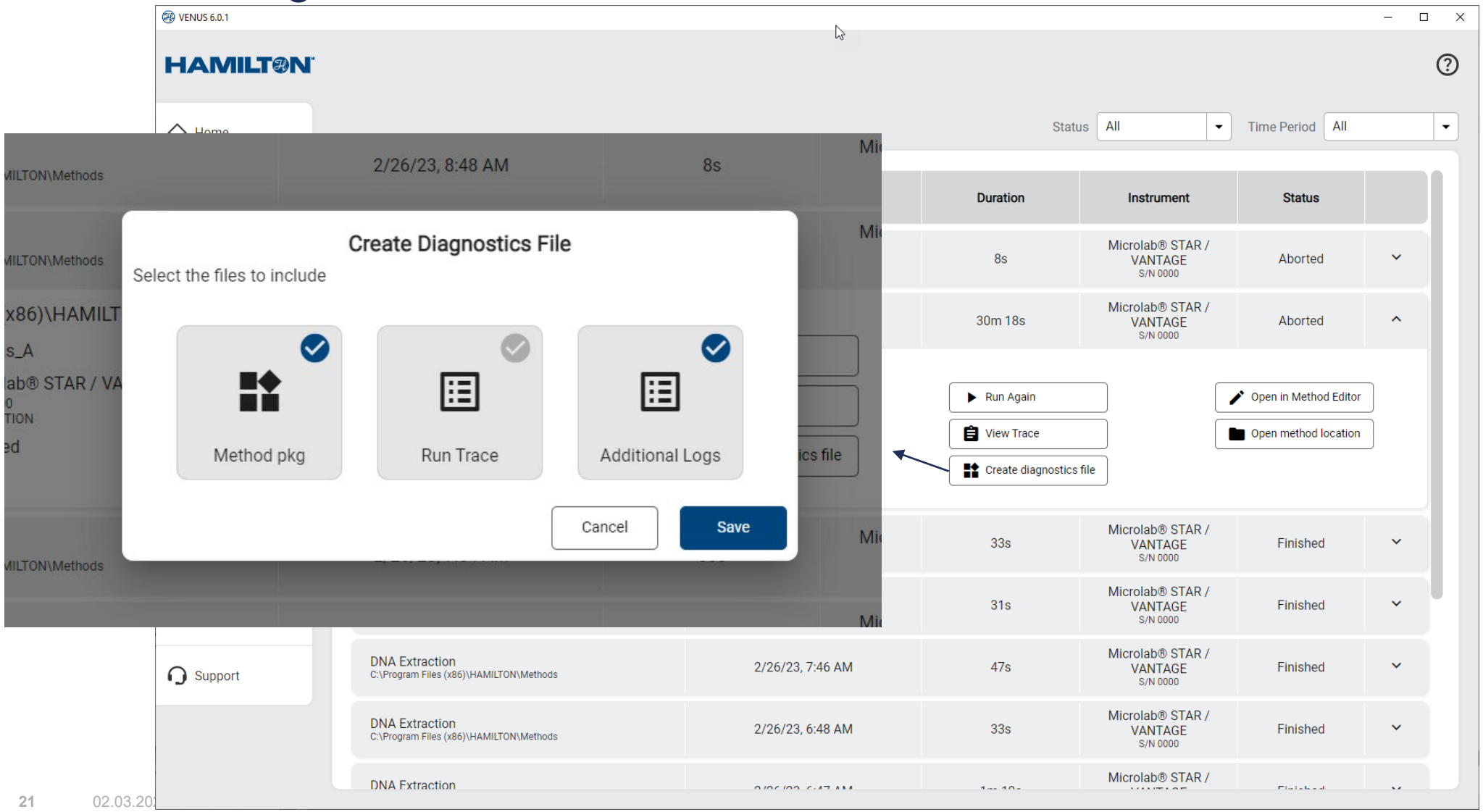
Run History



HAMILTON

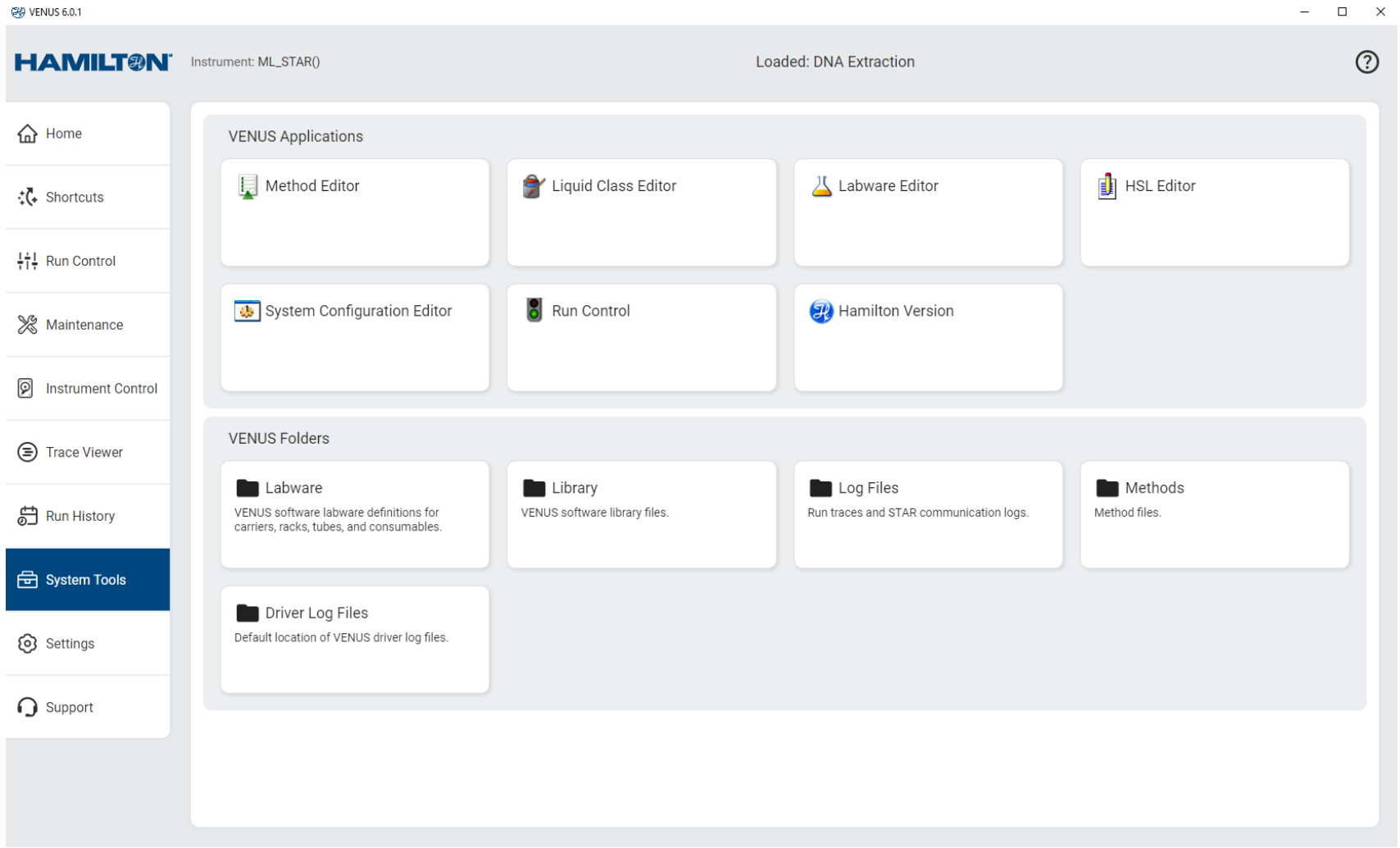
New user interface

One-click diagnostics file



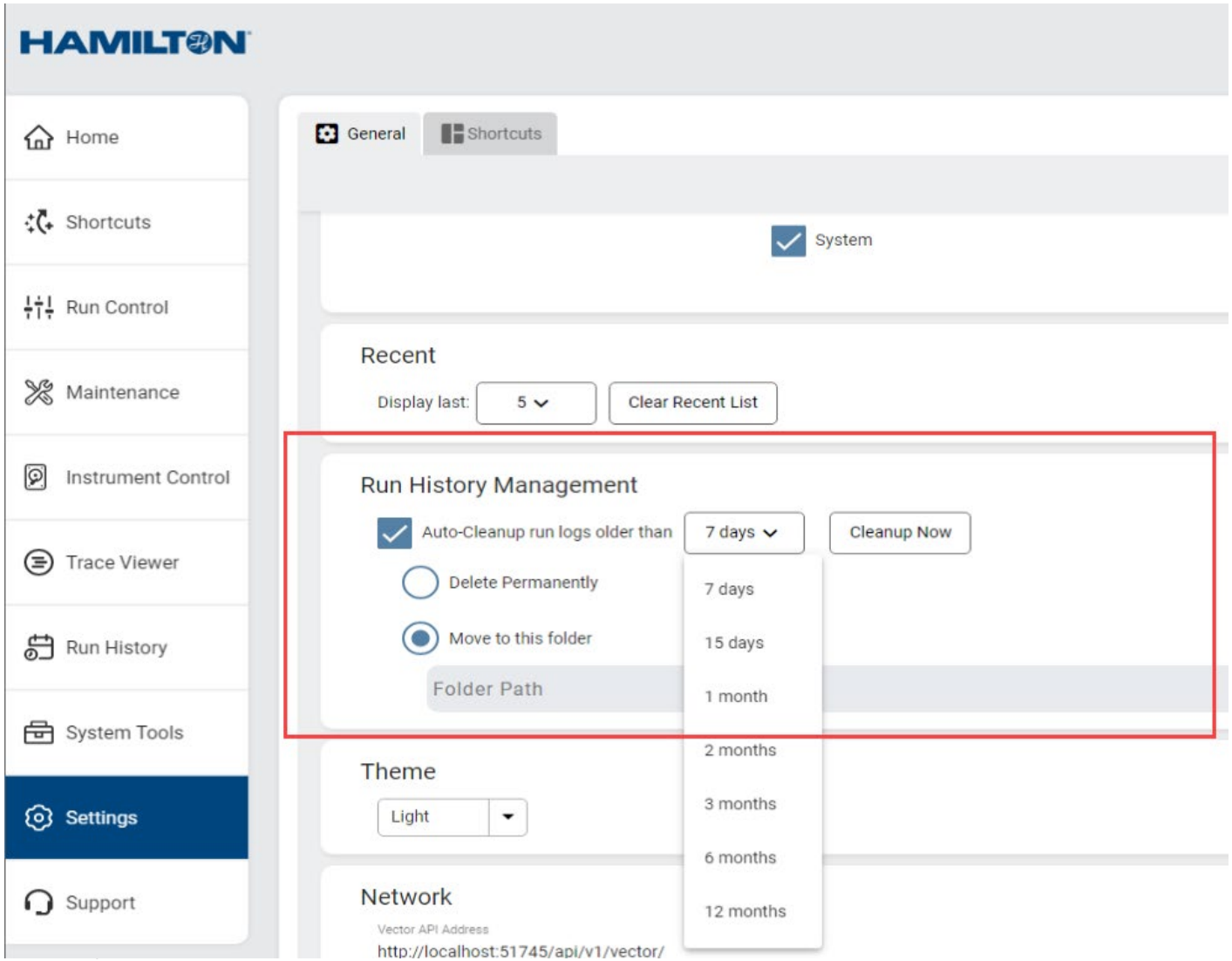
New user interface

System Tools



New user interface

Automatic run history clean up

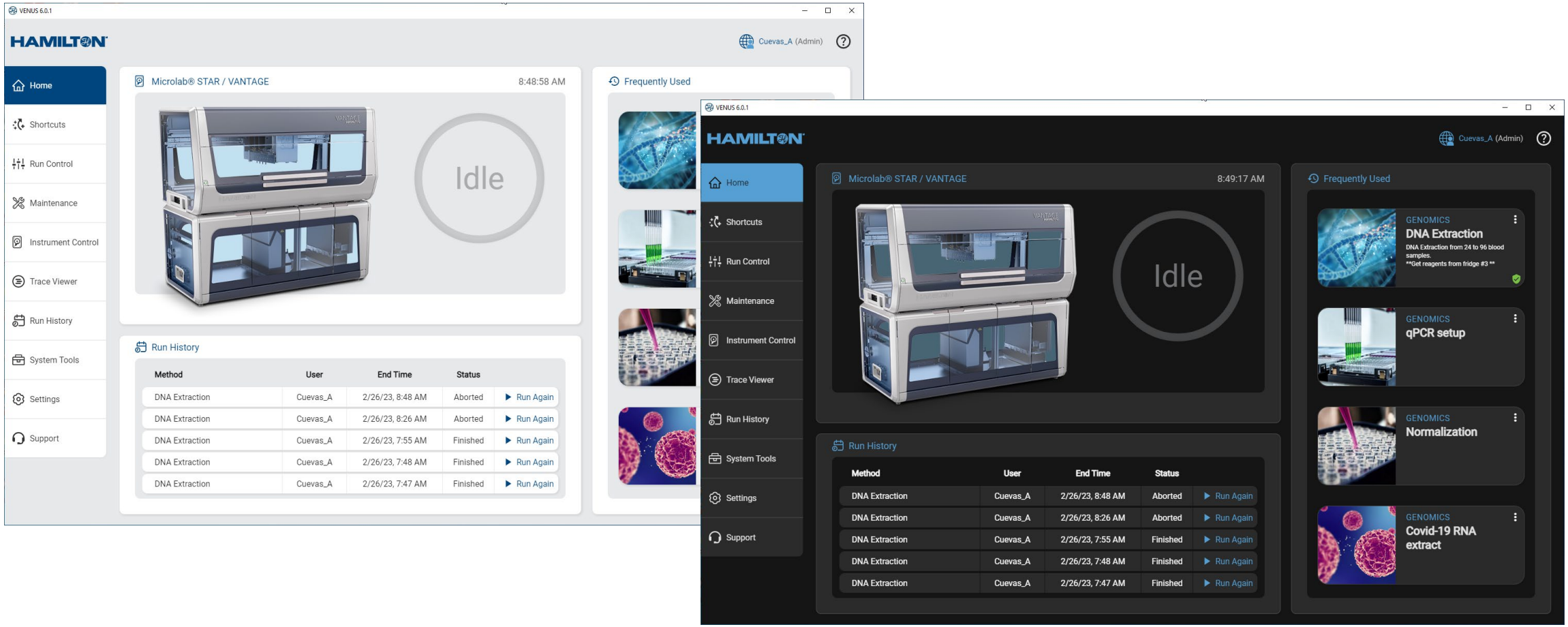


HAMILTON

EASY to customize

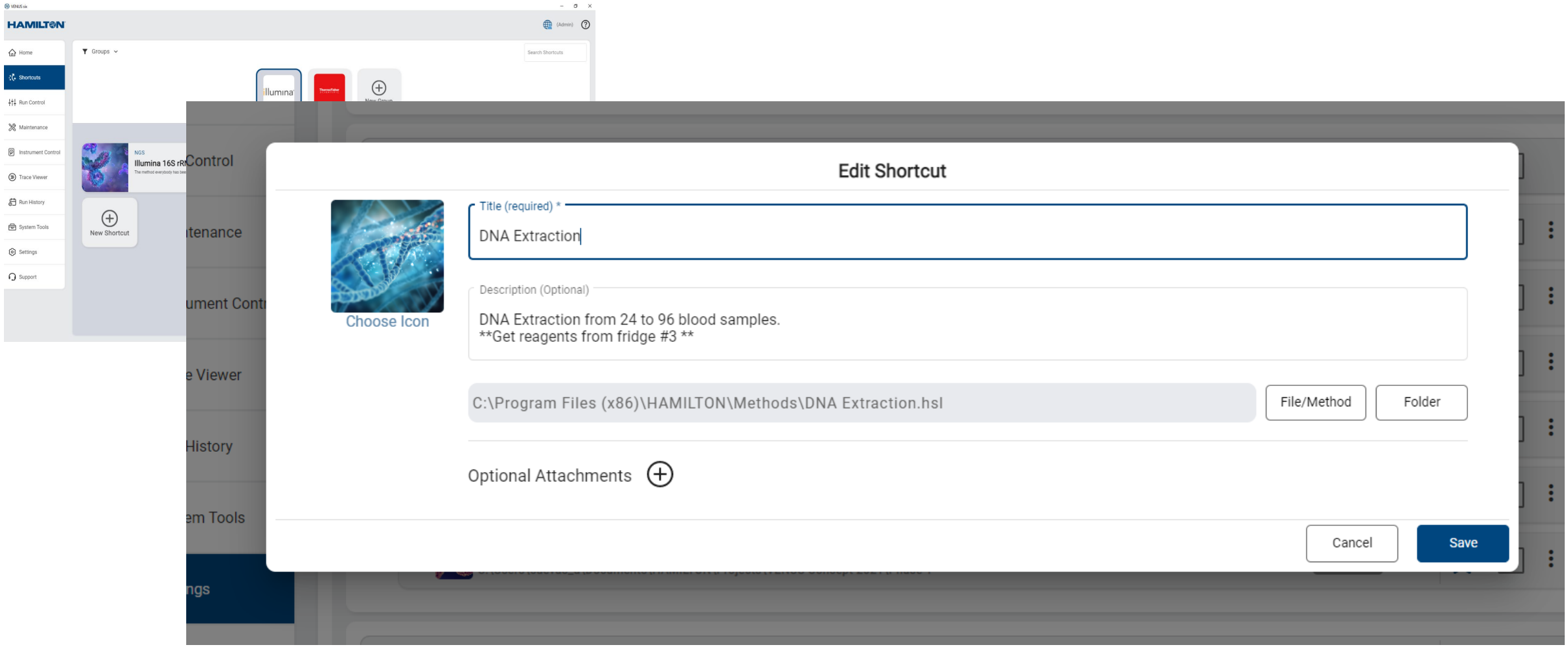
Customize

Dark/light theme



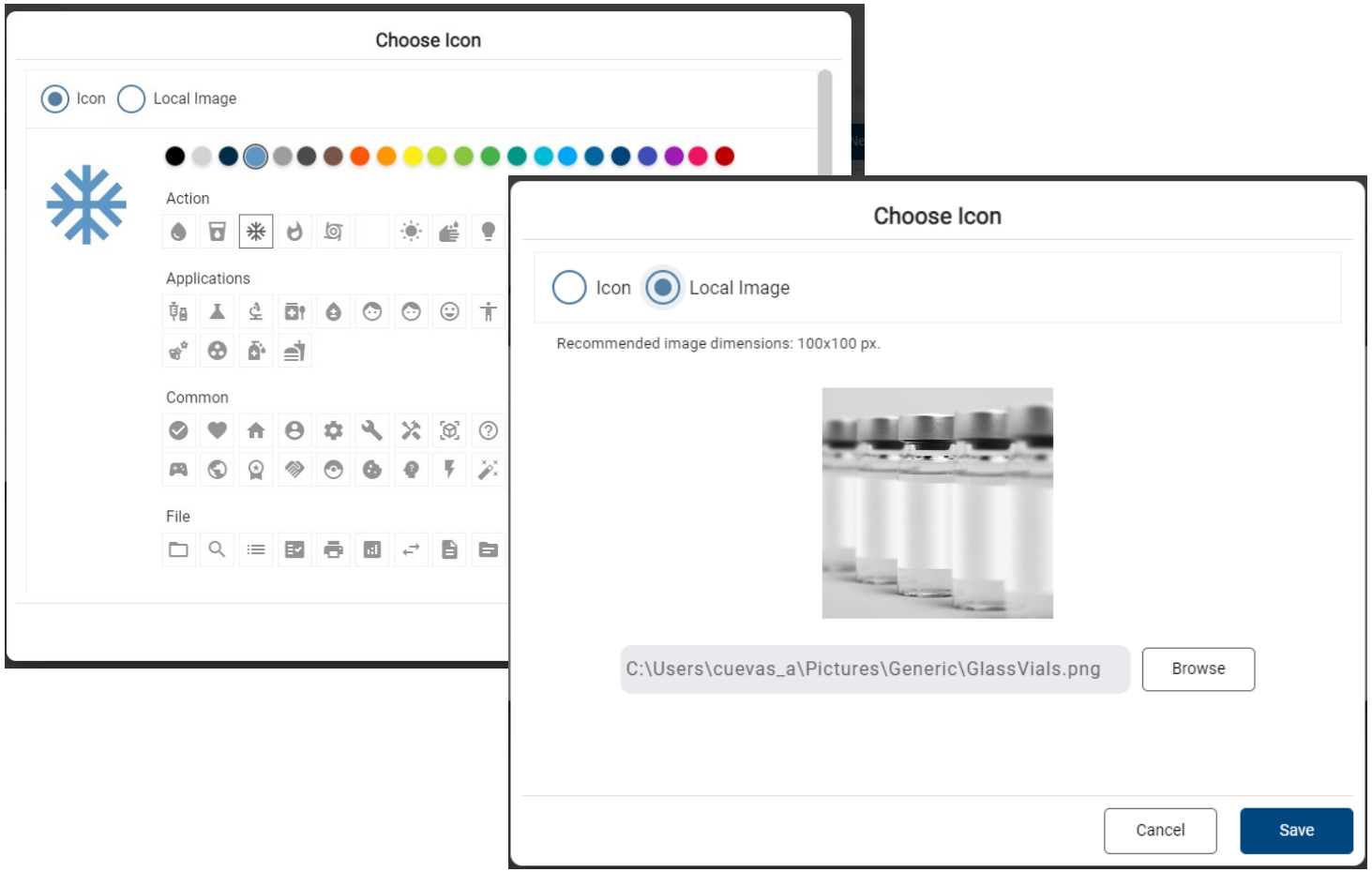
Customize

Custom shortcuts, images and text



Customize

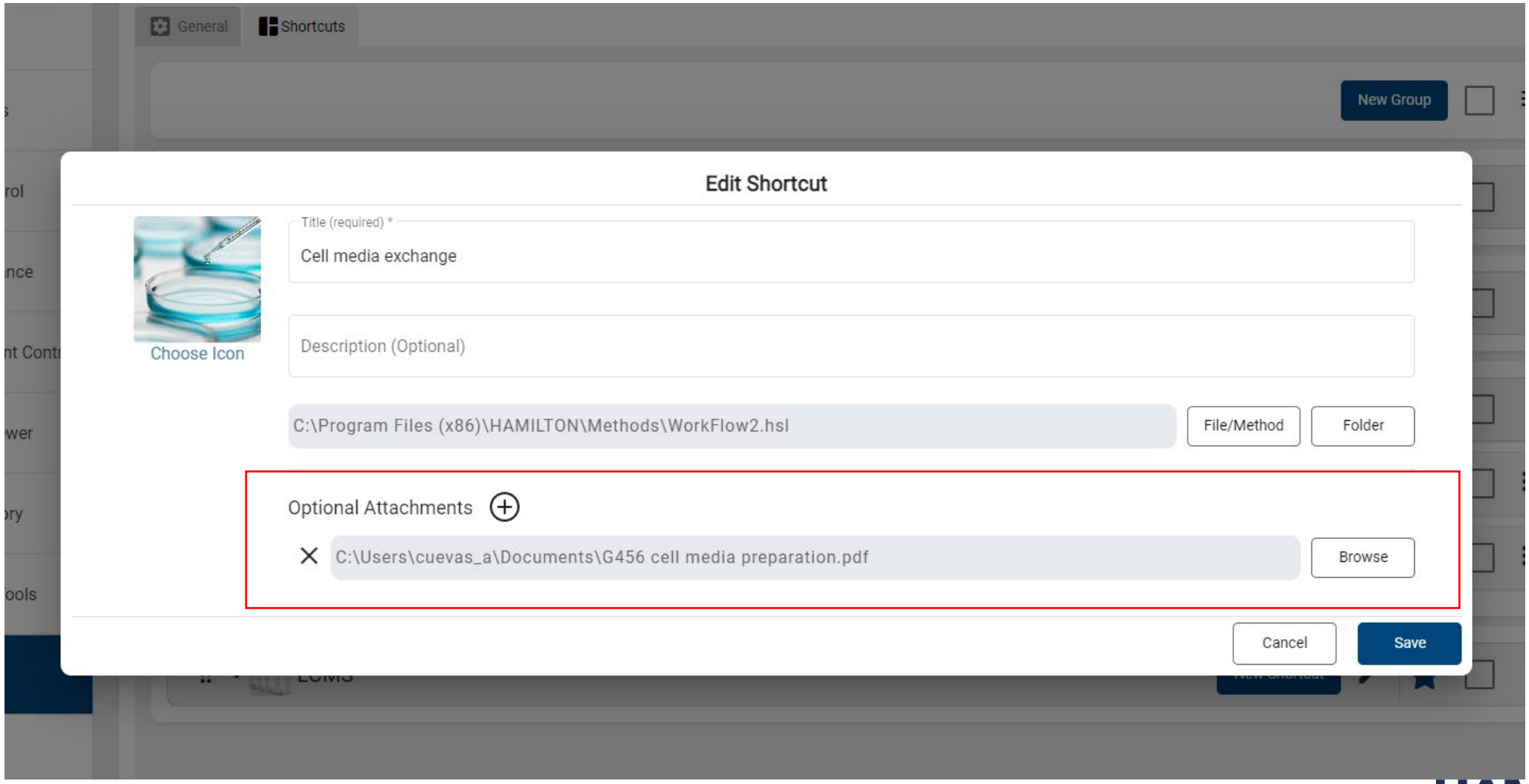
Custom shortcuts, images and text



HAMILTON

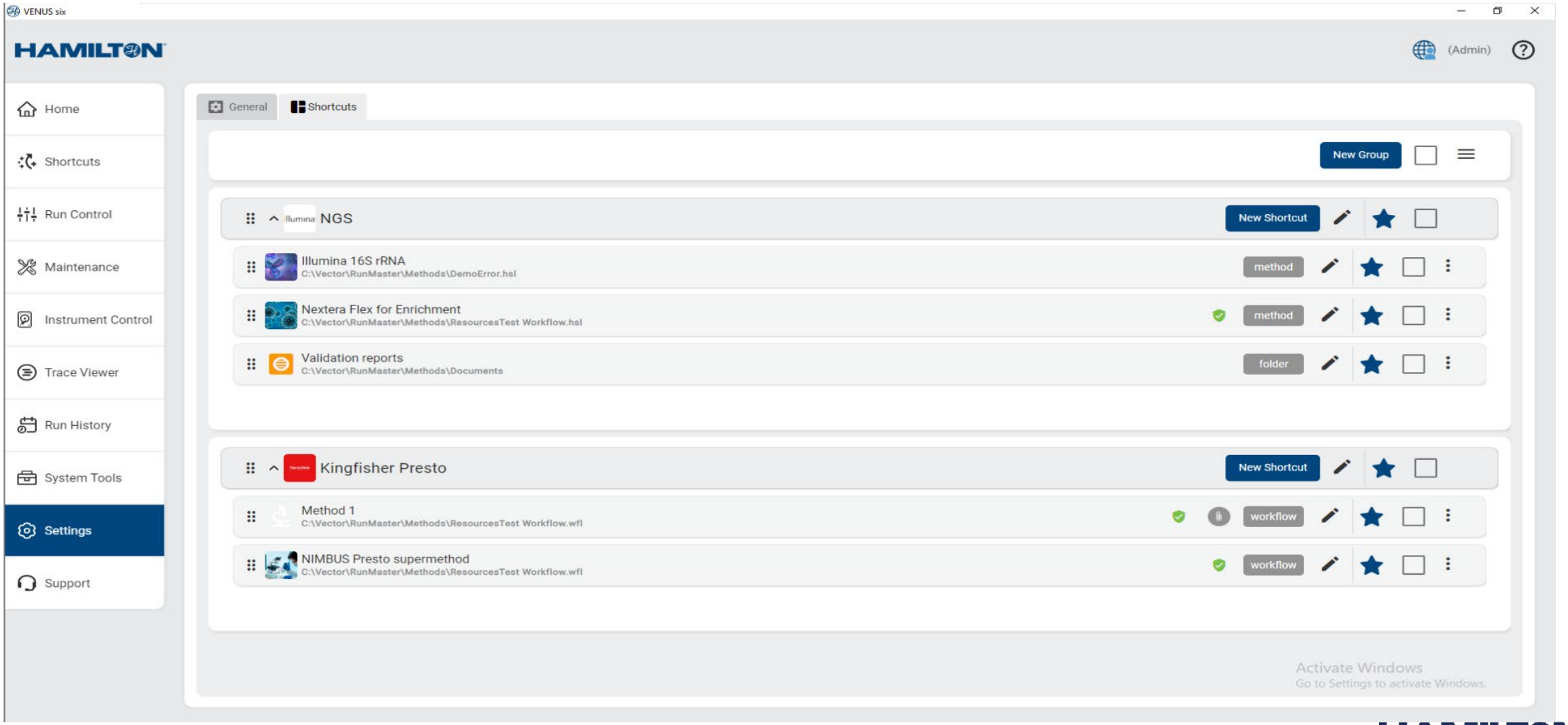
Customize

Attachments



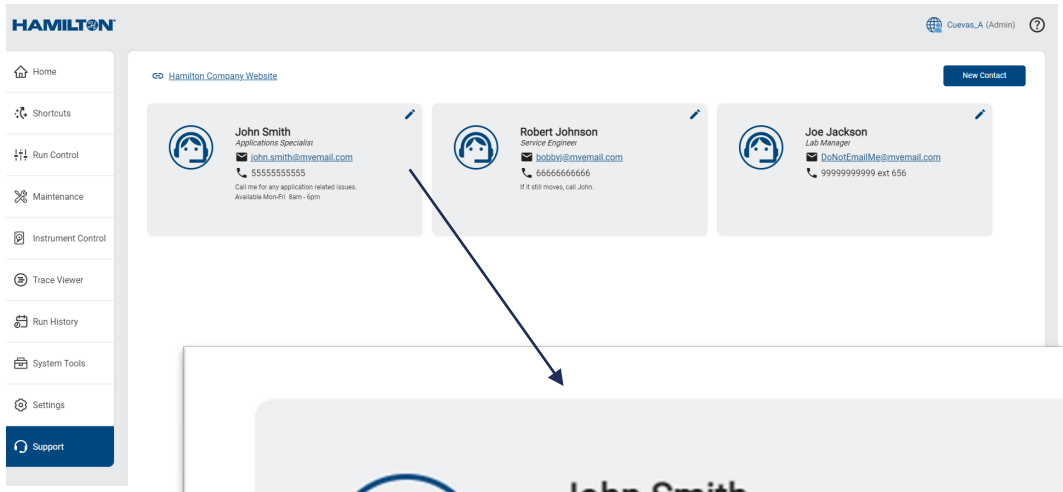
Customize

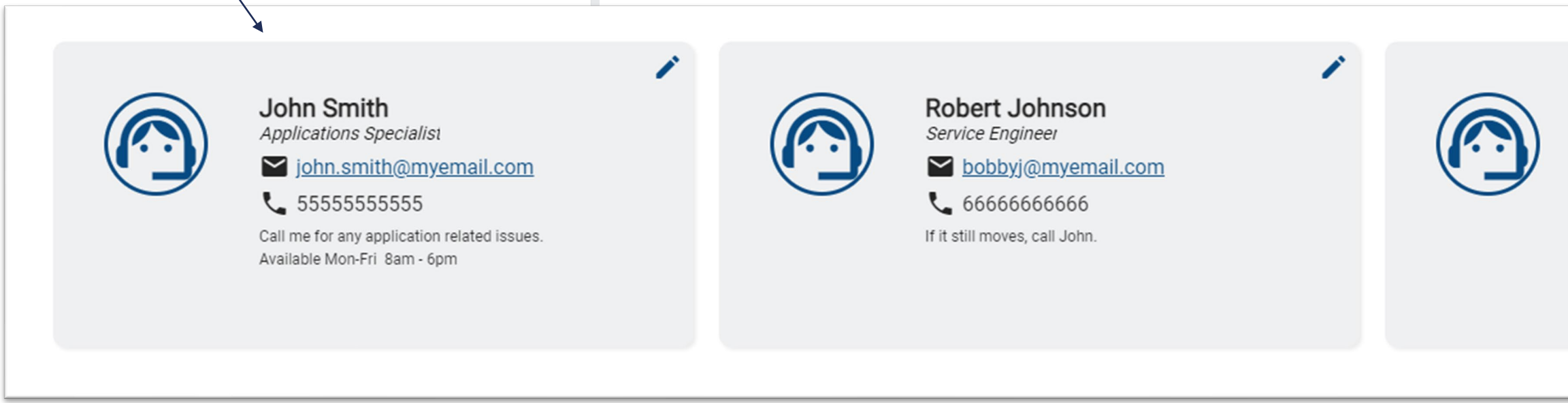
Shortcuts organization and visibility



Customize

Support contact cards





HAMILTON

EASY to connect

Connect

New REST API

VENUS

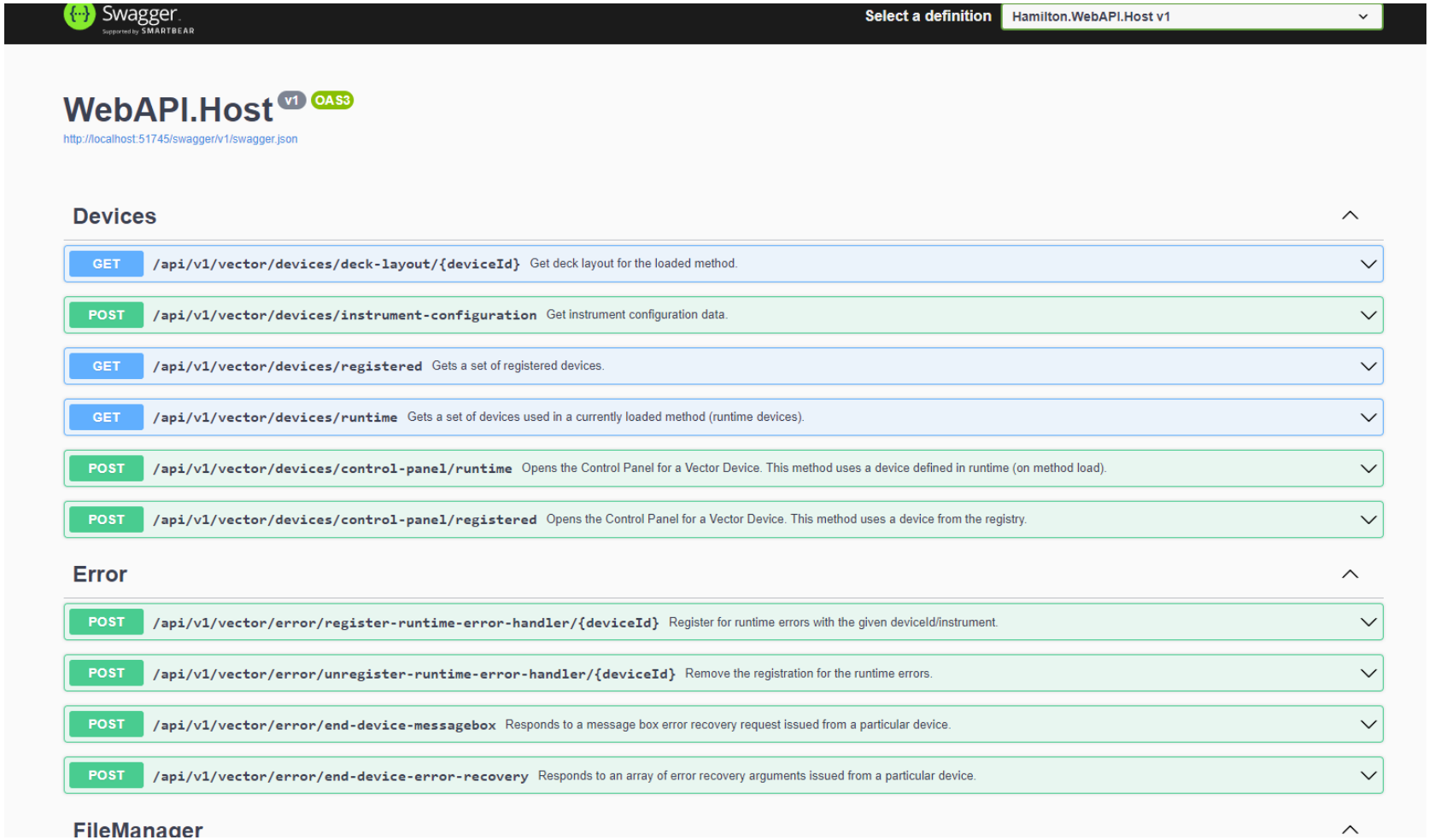
REST API

- Web monitoring
- VENUS Run Control
- LIMS
- OEM software
- Biosero, HRB, Thermo, PAA…

HAMILTON

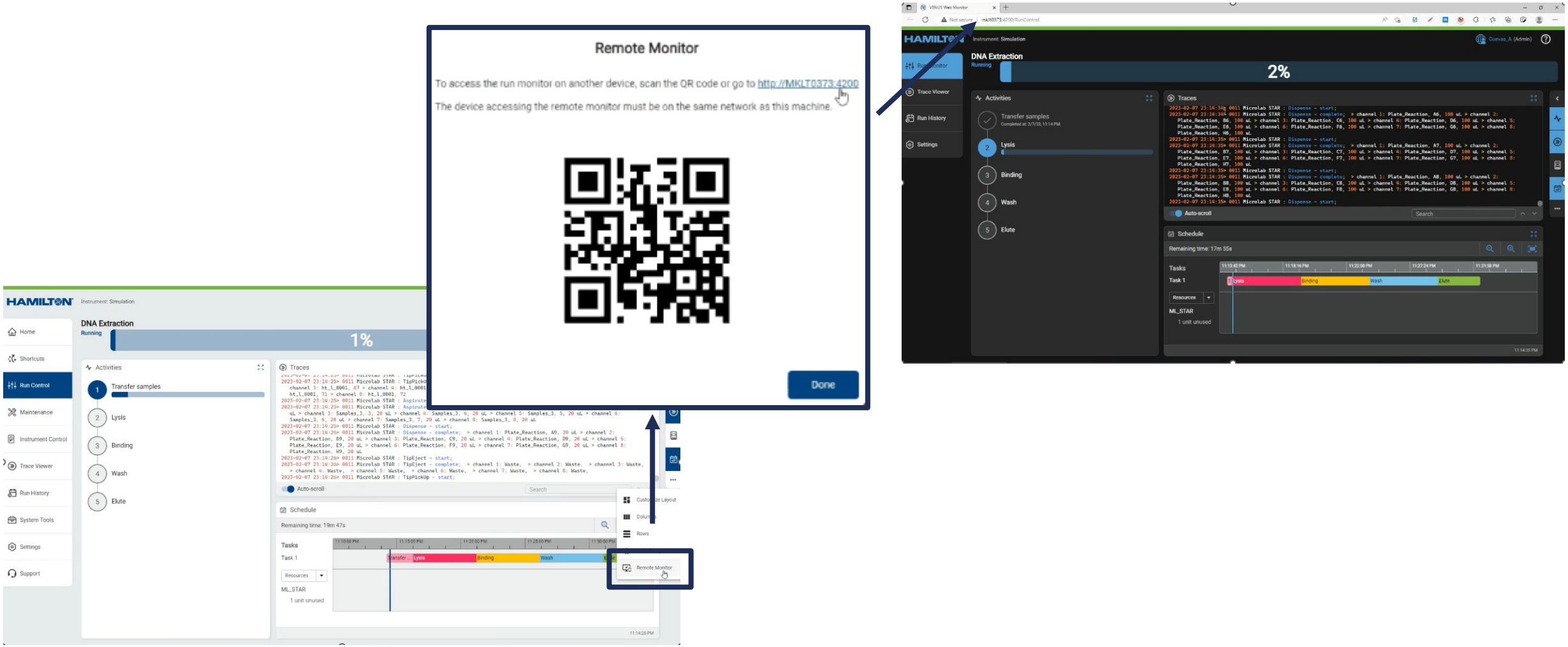
Connect

API


Swagger
Supported by SMARTBEAR
Select a definition
Hamilton.WebAPI.Host v1
WebAPI.Host
v1
OAS3
http://localhost:51745/swagger/v1/swagger.json
Devices
GET /api/v1/vector/devices/deck-layout/{deviceId} Get deck layout for the loaded method.
POST /api/v1/vector/devices/instrument-configuration Get instrument configuration data.
GET /api/v1/vector/devices/registered Gets a set of registered devices.
GET /api/v1/vector/devices/runtime Gets a set of devices used in a currently loaded method (runtime devices).
POST /api/v1/vector/devices/control-panel/runtime Opens the Control Panel for a Vector Device. This method uses a device defined in runtime (on method load).
POST /api/v1/vector/devices/control-panel/registered Opens the Control Panel for a Vector Device. This method uses a device from the registry.
Error
POST /api/v1/vector/error/register-runtime-error-handler/{deviceId} Register for runtime errors with the given deviceId/instrument.
POST /api/v1/vector/error/unregister-runtime-error-handler/{deviceId} Remove the registration for the runtime errors.
POST /api/v1/vector/error/end-device-messagebox Responds to a message box error recovery request issued from a particular device.
POST /api/v1/vector/error/end-device-error-recovery Responds to an array of error recovery arguments issued from a particular device.
FileManager

Connect

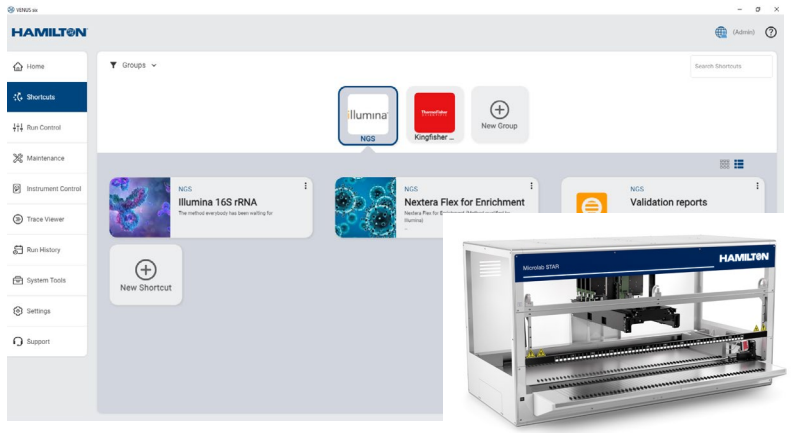
Remote run monitoring

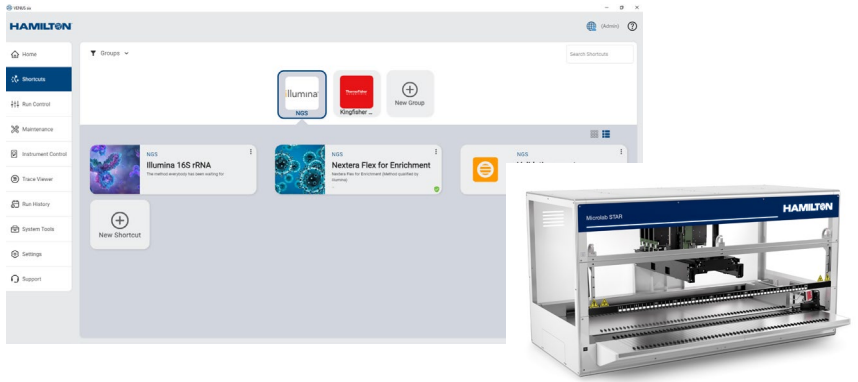


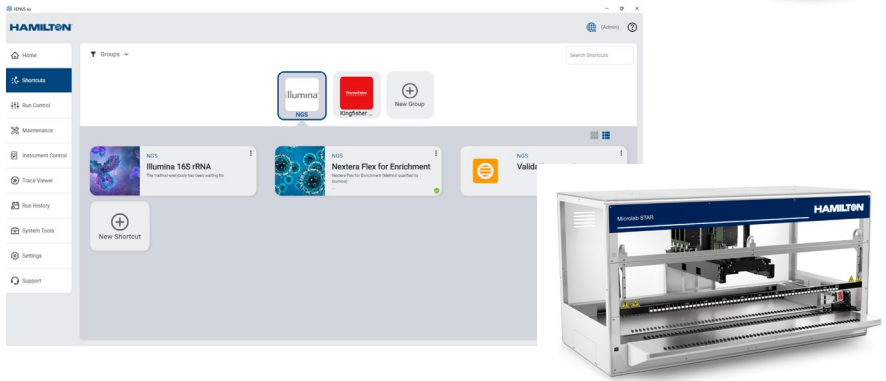
EASY to deploy

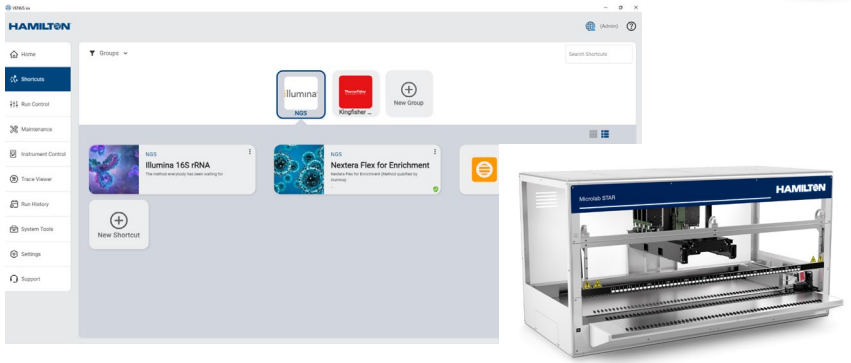
Deploy

Easy export/import to multiple systems









EASY to program

Power Steps

Easy to Program

Transfer Samples

General 1:1 transfers for sample tube distribution, plate copy, sample dilutions and more

Add Reagent

Distribute reagents with single or multi-dispenses

Serial Dilution

Perform serial dilutions in plates and tubes

Hit Picking

Transfer specific samples from a worklist

Replicates

Create replicas of source sample tubes or full plate patterns

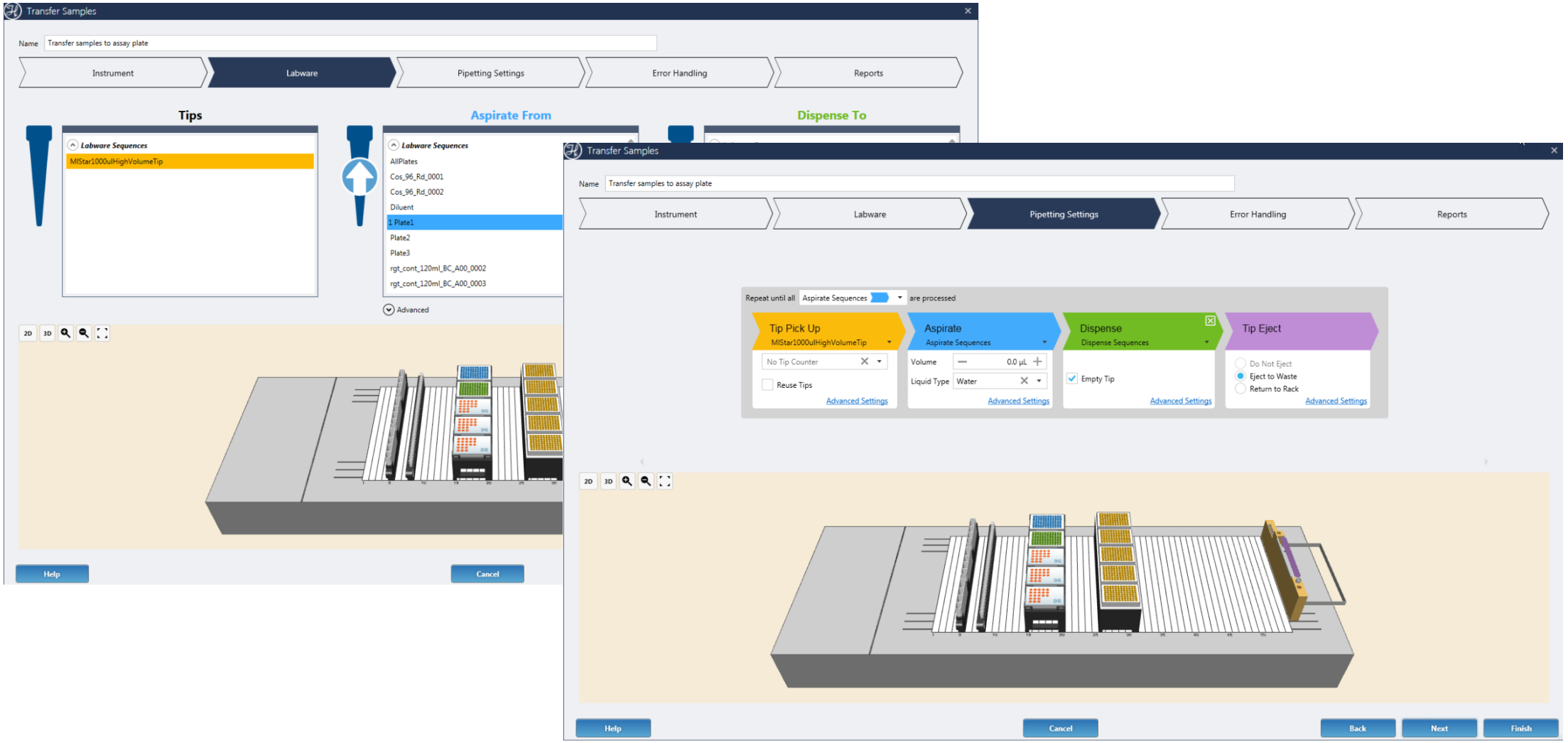
Load and Match

Load carriers and find barcoded samples from a given worklist

HAMILTON

Power Steps

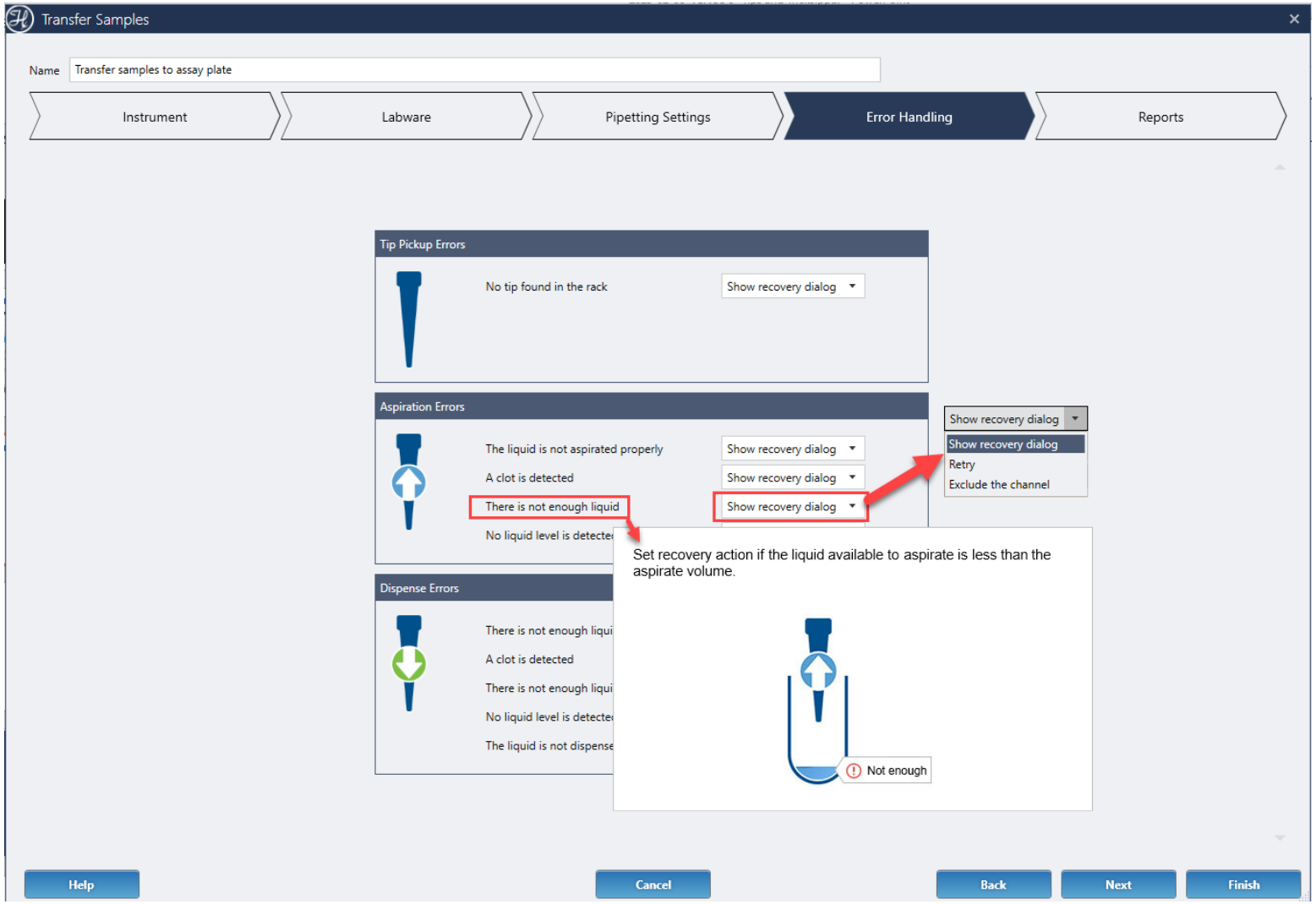
Easy to program



Power Steps

Error handling made easy

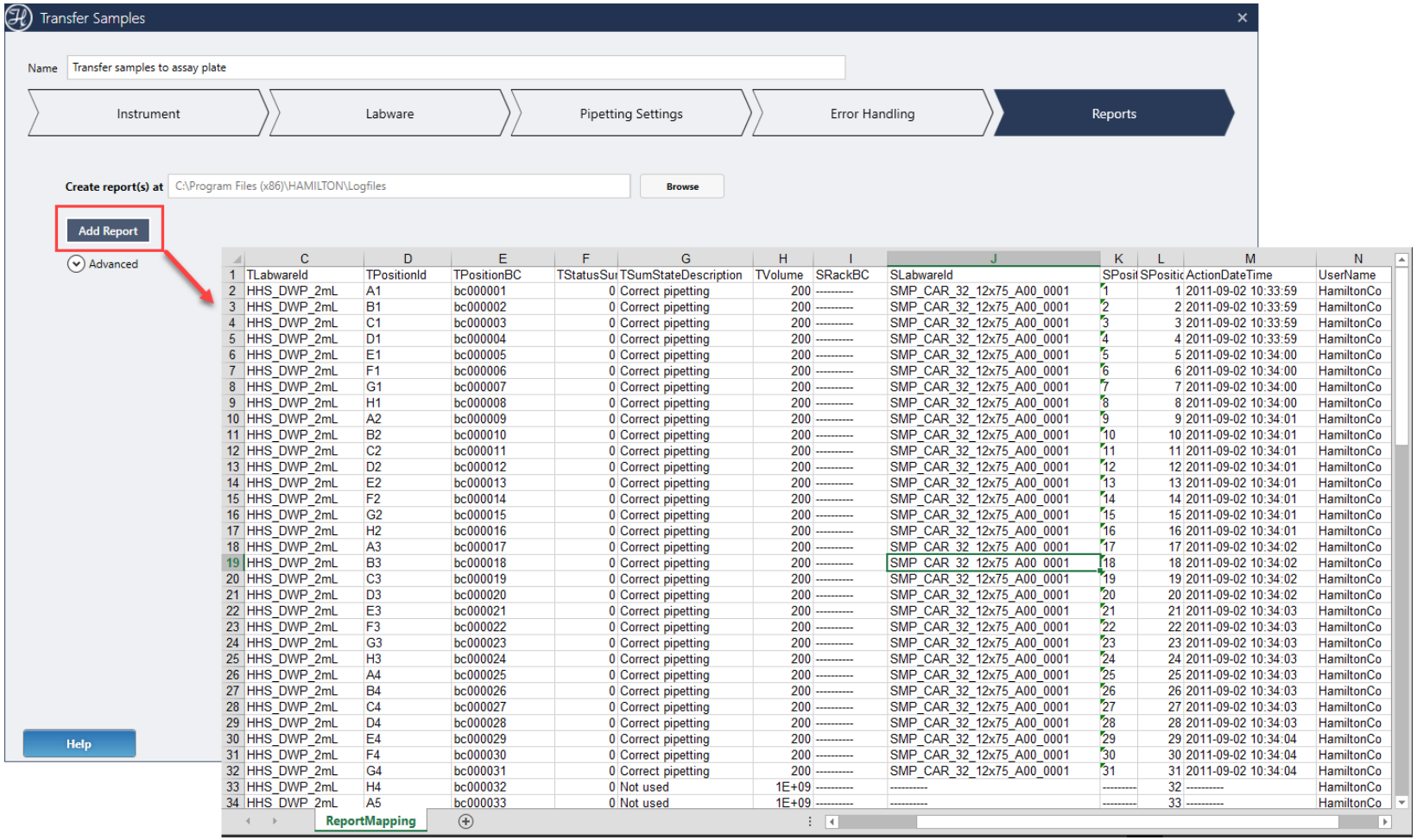
- On-screen help
- Simplified recovery options for new users



Power Steps - Simple but flexible

Optional pipetting report

- Create a full report of the pipetting actions in the step with one click



	C	D	E	F	G	H	I	J	K	L	M	N
1	TLabwareId	TPositionId	TPositionBC	TStatusSu	TSumStateDescription	TVolume	SRackBC	SLabwareId	SPosit	SPositic	ActionDateTime	UserName
2	HHS_DWP_2mL	A1	bc000001	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	1	1	2011-09-02 10:33:59	HamiltonCo
3	HHS_DWP_2mL	B1	bc000002	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	2	2	2011-09-02 10:33:59	HamiltonCo
4	HHS_DWP_2mL	C1	bc000003	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	3	3	2011-09-02 10:33:59	HamiltonCo
5	HHS_DWP_2mL	D1	bc000004	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	4	4	2011-09-02 10:33:59	HamiltonCo
6	HHS_DWP_2mL	E1	bc000005	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	5	5	2011-09-02 10:34:00	HamiltonCo
7	HHS_DWP_2mL	F1	bc000006	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	6	6	2011-09-02 10:34:00	HamiltonCo
8	HHS_DWP_2mL	G1	bc000007	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	7	7	2011-09-02 10:34:00	HamiltonCo
9	HHS_DWP_2mL	H1	bc000008	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	8	8	2011-09-02 10:34:00	HamiltonCo
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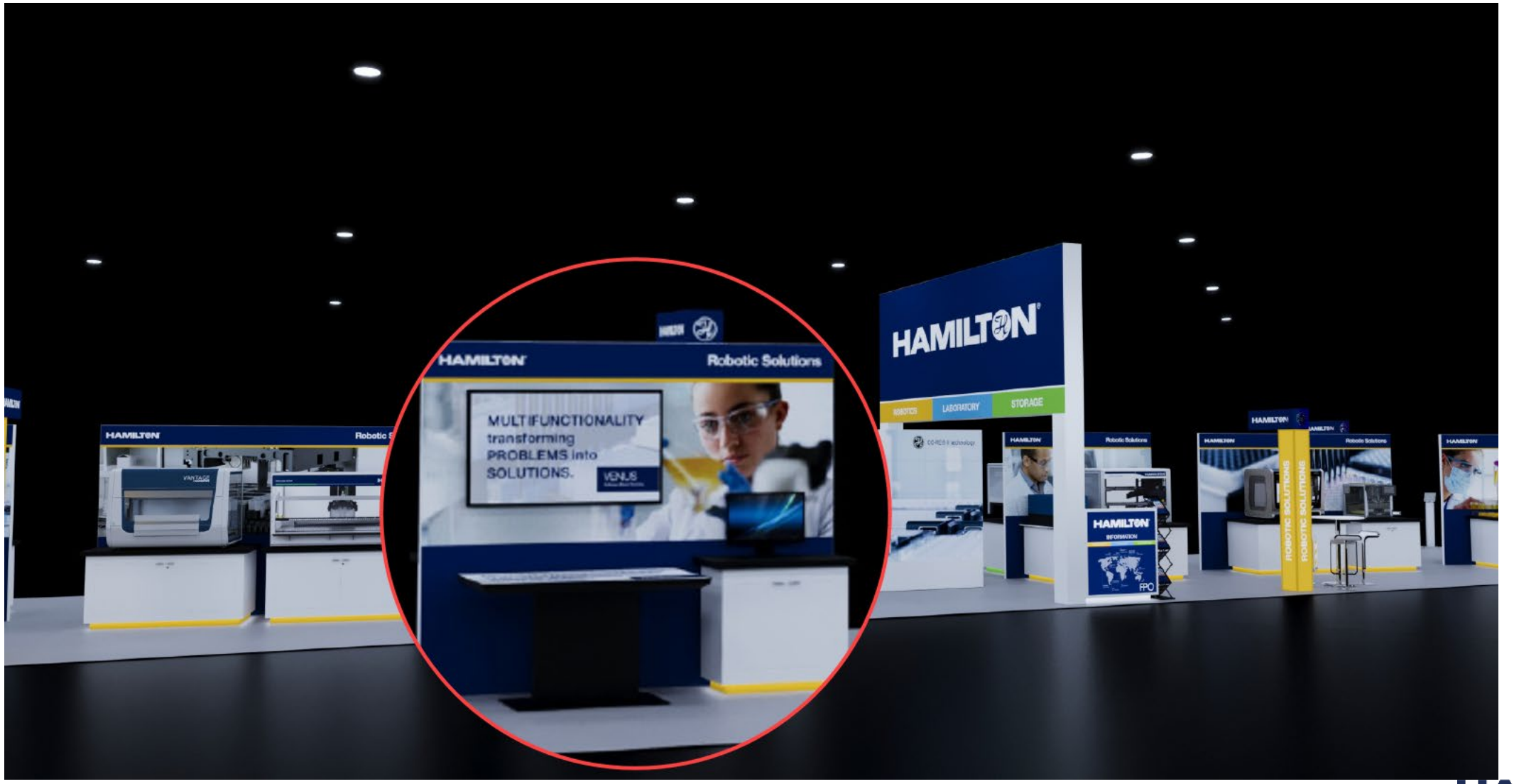
13	HHS_DWP_2mL	D2	bc000012	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	12	12	2011-09-02 10:34:01	HamiltonCo
14	HHS_DWP_2mL	E2	bc000013	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	13	13	2011-09-02 10:34:01	HamiltonCo
15	HHS_DWP_2mL	F2	bc000014	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	14	14	2011-09-02 10:34:01	HamiltonCo
16	HHS_DWP_2mL	G2	bc000015	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	15	15	2011-09-02 10:34:01	HamiltonCo
17	HHS_DWP_2mL	H2	bc000016	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	16	16	2011-09-02 10:34:01	HamiltonCo
18	HHS_DWP_2mL	A3	bc000017	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	17	17	2011-09-02 10:34:02	HamiltonCo
19	HHS_DWP_2mL	B3	bc000018	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	18	18	2011-09-02 10:34:02	HamiltonCo
20	HHS_DWP_2mL	C3	bc000019	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	19	19	2011-09-02 10:34:02	HamiltonCo
21	HHS_DWP_2mL	D3	bc000020	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	20	20	2011-09-02 10:34:02	HamiltonCo
22	HHS_DWP_2mL	E3	bc000021	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	21	21	2011-09-02 10:34:03	HamiltonCo
23	HHS_DWP_2mL	F3	bc000022	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	22	22	2011-09-02 10:34:03	HamiltonCo
24	HHS_DWP_2mL	G3	bc000023	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	23	23	2011-09-02 10:34:03	HamiltonCo
25	HHS_DWP_2mL	H3	bc000024	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	24	24	2011-09-02 10:34:03	HamiltonCo
26	HHS_DWP_2mL	A4	bc000025	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	25	25	2011-09-02 10:34:03	HamiltonCo
27	HHS_DWP_2mL	B4	bc000026	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	26	26	2011-09-02 10:34:03	HamiltonCo
28	HHS_DWP_2mL	C4	bc000027	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	27	27	2011-09-02 10:34:03	HamiltonCo
29	HHS_DWP_2mL	D4	bc000028	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	28	28	2011-09-02 10:34:03	HamiltonCo
30	HHS_DWP_2mL	E4	bc000029	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	29	29	2011-09-02 10:34:04	HamiltonCo
31	HHS_DWP_2mL	F4	bc000030	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	30	30	2011-09-02 10:34:04	HamiltonCo
32	HHS_DWP_2mL	G4	bc000031	0	Correct pipetting	200	---------	SMP_CAR_32_12x75_A00_0001	31	31	2011-09-02 10:34:04	HamiltonCo
33	HHS_DWP_2mL	H4	bc000032	0	Not used	1E+09	---------	---------	---------	32	---------	HamiltonCo
34	HHS_DWP_2mL	A5	bc000033	0	Not used	1E+09	---------	---------	---------	33	---------	HamiltonCo

SLAS 2023 – Booth #1011



VENUS 6.0.1

HAMILTON

Instrument: Simulation

Running: DNA Extraction

- Home
- Shortcuts
- Run Control
- Maintenance
- Instrument Control
- Trace Viewer
- Run History
- System Tools
- Settings
- Support

Microlab® STAR / VANTAGE

7:48:32 AM

1%

Running

DNA Extraction

DNA Extraction

Thank You!

Run History

Method	User	End Time	Status	
DNA Extraction	Cuevas_A	2/26/23, 7:47 AM	Finished	Run Again
DNA Extraction	Cuevas_A	2/26/23, 6:49 AM	Finished	Run Again
DNA Extraction	Cuevas_A	2/26/23, 6:48 AM	Finished	Run Again
DNA Extraction	Cuevas_A	-	Paused	Run Again
Demo1	Cuevas_A	2/25/23, 4:35 AM	Finished	Run Again

Frequently Used

GENOMICS

DNA Extraction

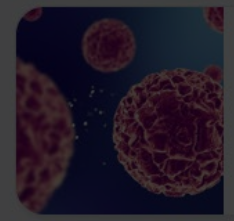
DNA Extraction from 24 to 96 blood samples.
**Get reagents from fridge #3 **

GENOMICS

qPCR setup

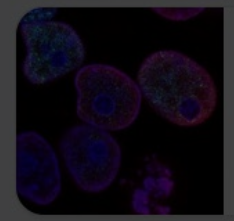
GENOMICS

Normalization



GENOMICS

Covid-19 RNA extract



CELL CULTURE

Cell media exchange

Booth 1011