AVEVA™ Operator Training Simulator 2020

AVEVA Dynamic Simulation (DYNSIM) Roadmap

Current - 6.1 (Mar 2020)

Strategy

- To maintain and improve customer satisfaction with DYNSIM for process dynamic simulation.
- Moving toward a modern infrastructure and improved user experience

Final development stage

- Enhancements for DYNSIM Power
- SQL as optional installation
- java folder as part of DYNSIM
- Installation & launching diagnostic
- Remove dependency on services
- New Search Tool
- AVEVA CALM licensing availability
- Ejector corrections
- Chimney tray enhancements
- Better tower pressurization
- Saving local thermo results in IC

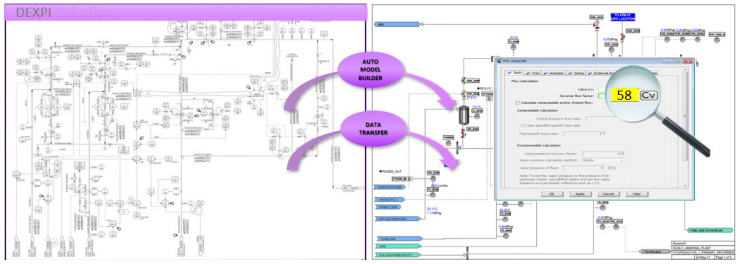
Next - 2020 (Sep 2020)

Strategy

- To maintain and improve customer satisfaction with DYNSIM for process dynamic simulation.
- Use of Aha! to prioritize development ideas
- Integration with Unified Learning

Medium range plan

- Rebranding to AVEVA Dynamic Simulation
- New Search Tool enhancements
- More responsive GUI
- Docking framework improvements
- Option to activate slate propagation
- Notes widget for flowsheet
- LaaS licensing
- Connectivity to AVEVA LMS



Future - 2021 +

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- To maintain and improve customer satisfaction with DYNSIM for process dynamic simulation.
- Use of Aha! to prioritize development ideas
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Long range plans

(Q2 2021)

- Import Intelligent P&IDs into DYNSIM
- Stream with conductance
- Modernized GUI (ribbon bar, themes)
- Learning Monitoring Tool (phase 1)
- Enhanced pipe and header
- Robust VLLE

(Q4 2021)

- Multi-threading calculations
- Scenario enhancements
- Portable web-based instructor station
- Learning Monitoring Tool (phase 2)
- Expand Undo/Redo
- Layering in the GUI

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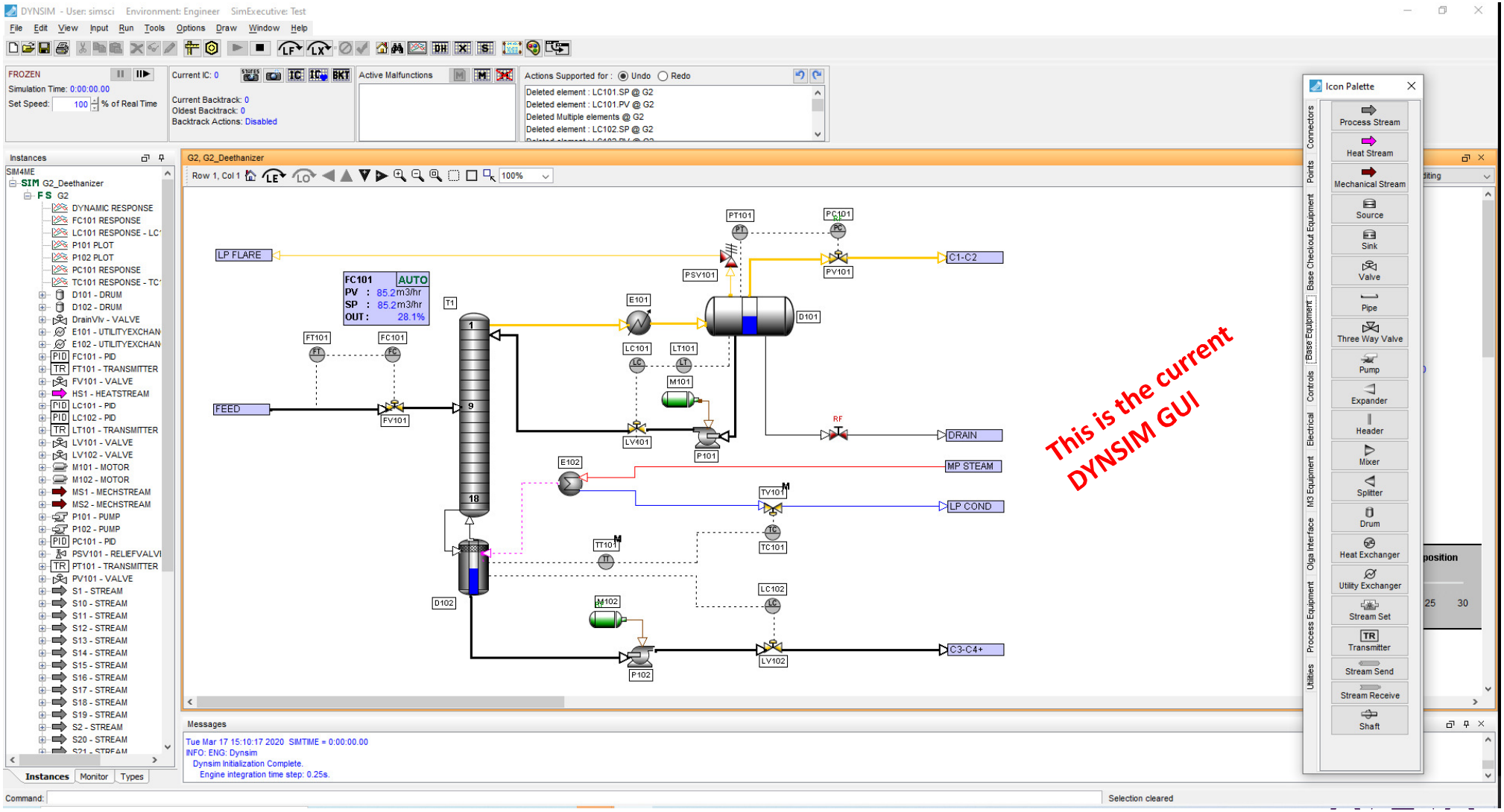
(Q2 2021)

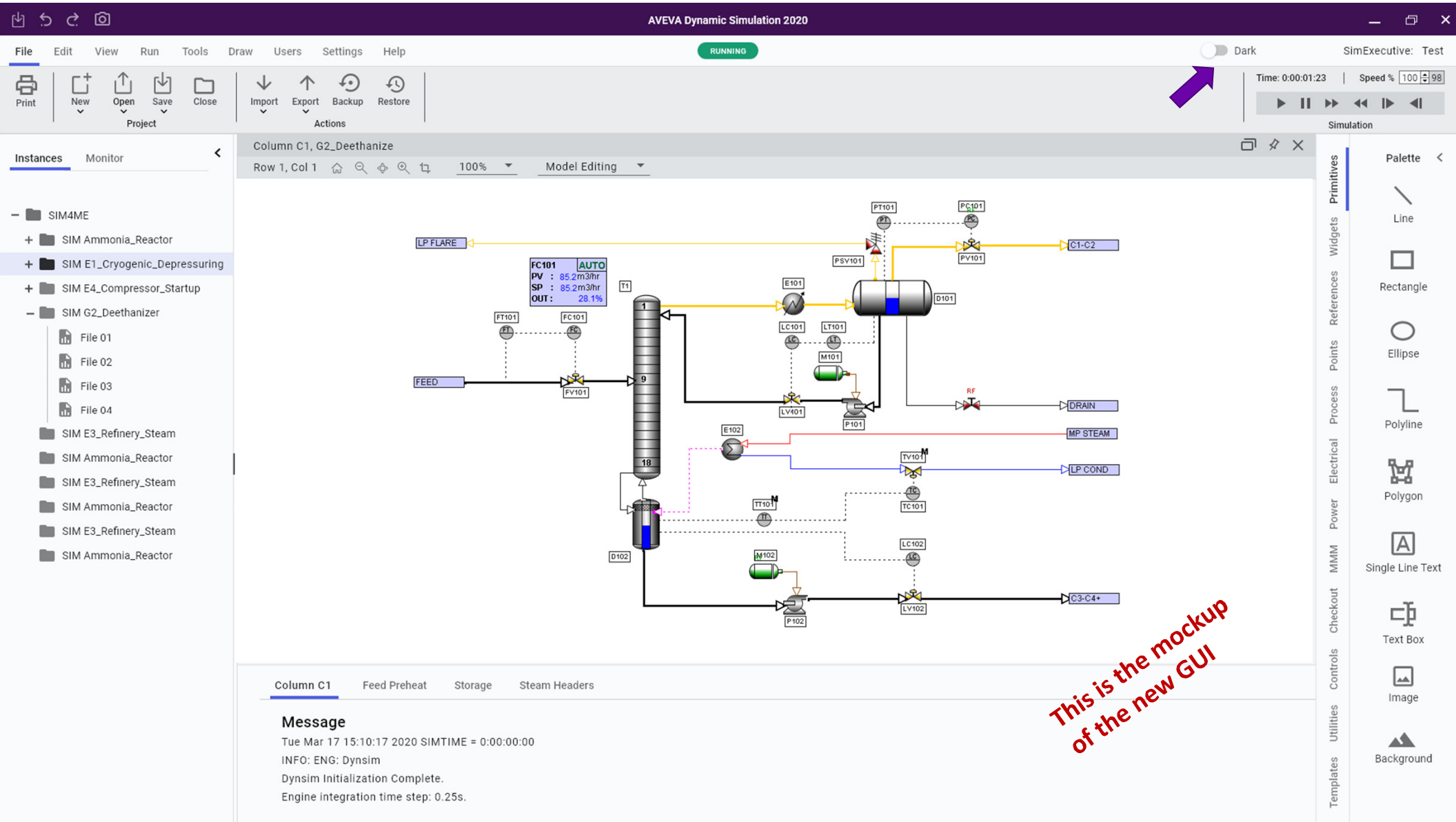
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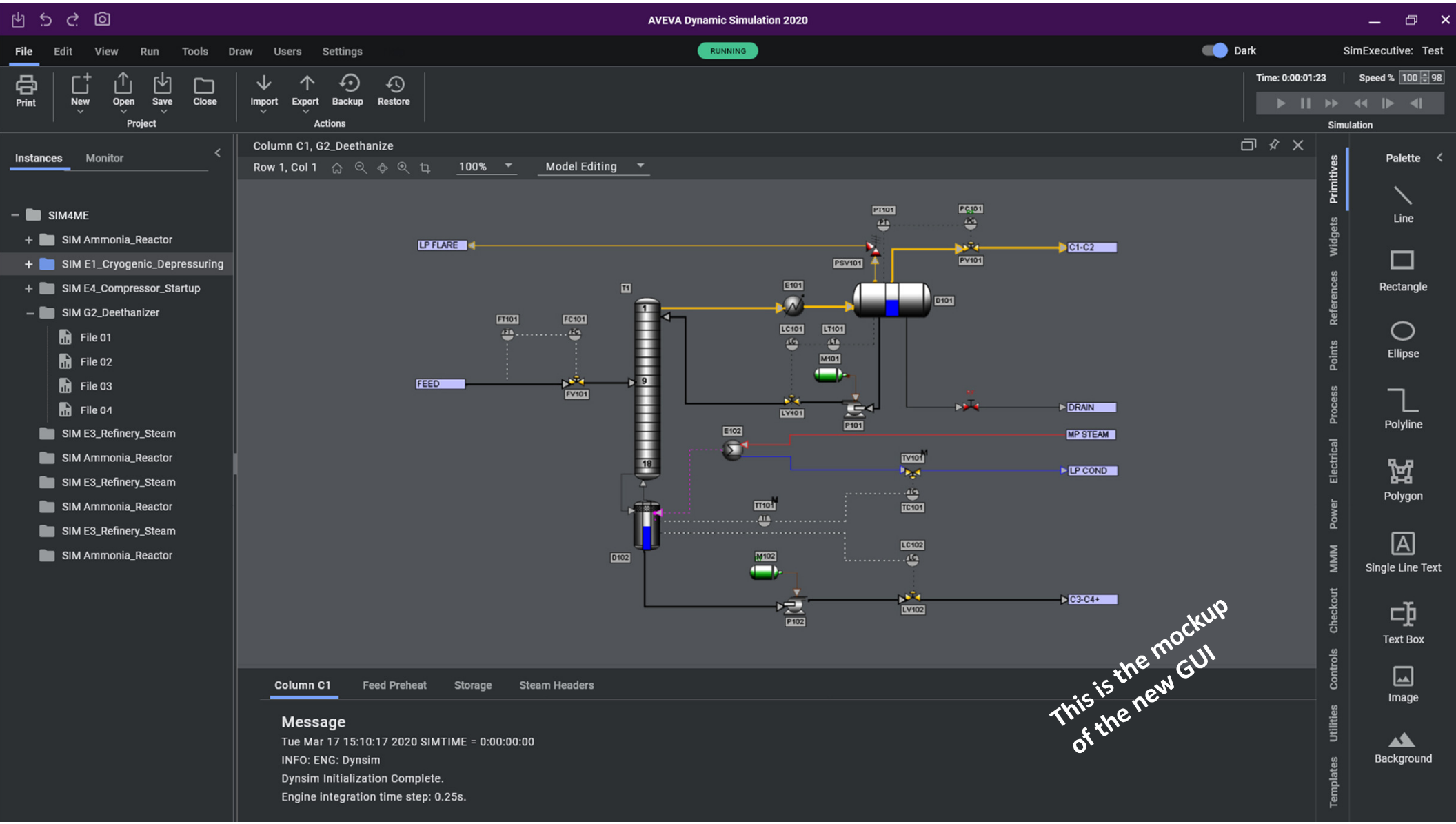
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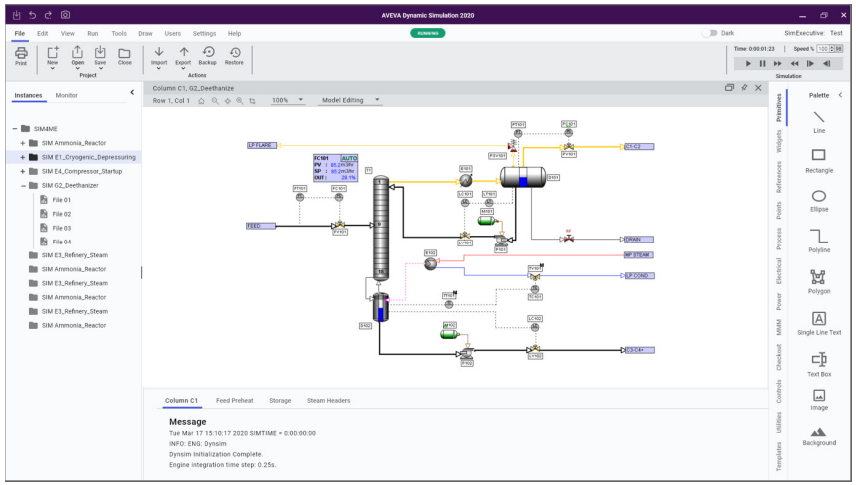

DYNSIM - User: simsci Environment: Engineer SimExecutive: Test
File Edit View Input Run Tools Options Draw Window Help
FROZEN
Simulation Time: 0:00:00.00
Set Speed: 100 % of Real Time
Current IC: 0
Current Backtrack: 0
Oldest Backtrack: 0
Backtrack Actions: Disabled
Active Malfunctions
Actions Supported for : Undo Redo
Deleted element : LC101.SP @ G2
Deleted element : LC101.PV @ G2
Deleted Multiple elements @ G2
Deleted element : LC102.SP @ G2
Instances
SIM4ME
SIM G2_Deethanizer
FS G2
DYNAMIC RESPONSE
FC101 RESPONSE
LC101 RESPONSE - LC
P101 PLOT
P102 PLOT
PC101 RESPONSE
TC101 RESPONSE - TC
D101 - DRUM
D102 - DRUM
DrainVlv - VALVE
E101 - UTILITYEXCHAN
E102 - UTILITYEXCHAN
FC101 - PID
FT101 - TRANSMITTER
FV101 - VALVE
HS1 - HEATSTREAM
LC101 - PID
LC102 - PID
LT101 - TRANSMITTER
LV101 - VALVE
LV102 - VALVE
M101 - MOTOR
M102 - MOTOR
MS1 - MECHSTREAM
MS2 - MECHSTREAM
P101 - PUMP
P102 - PUMP
PC101 - PID
PSV101 - RELIEFVALVI
PT101 - TRANSMITTER
PV101 - VALVE
S1 - STREAM
S10 - STREAM
S11 - STREAM
S12 - STREAM
S13 - STREAM
S14 - STREAM
S15 - STREAM
S16 - STREAM
S17 - STREAM
S18 - STREAM
S19 - STREAM
S2 - STREAM
S20 - STREAM
Instances Monitor Types
G2, G2_Deethanizer
Row 1, Col 1
100%
LP FLARE
PT101
PC101
PSV101
PV101
C1-C2
FC101 AUTO
PV : 85.2 m3/hr
SP : 85.2 m3/hr
OUT : 28.1%
T1
E101
D101
FT101
FC101
LC101
LT101
M101
FEED
FV101
LV101
P101
RF
DRAIN
E102
MP STEAM
TV101
LP COND
TC101
TT101
LC102
D102
M102
P102
LV102
C3-C4+
This is the current DYNSIM GUI
Icon Palette
Connectors
Points
Base Checkout Equipment
Base Equipment
Controls
Electrical
M3 Equipment
Olga Interface
Process Equipment
Utilities
Process Stream
Heat Stream
Mechanical Stream
Source
Sink
Valve
Pipe
Three Way Valve
Pump
Expander
Header
Mixer
Splitter
Drum
Heat Exchanger
Utility Exchanger
Stream Set
Transmitter
Stream Send
Stream Receive
Shaft
Messages
Tue Mar 17 15:10:17 2020 SIMTIME = 0:00:00.00
INFO: ENG: Dynsim
Dynsim Initialization Complete.
Engine integration time step: 0.25s.
Command:
Selection cleared

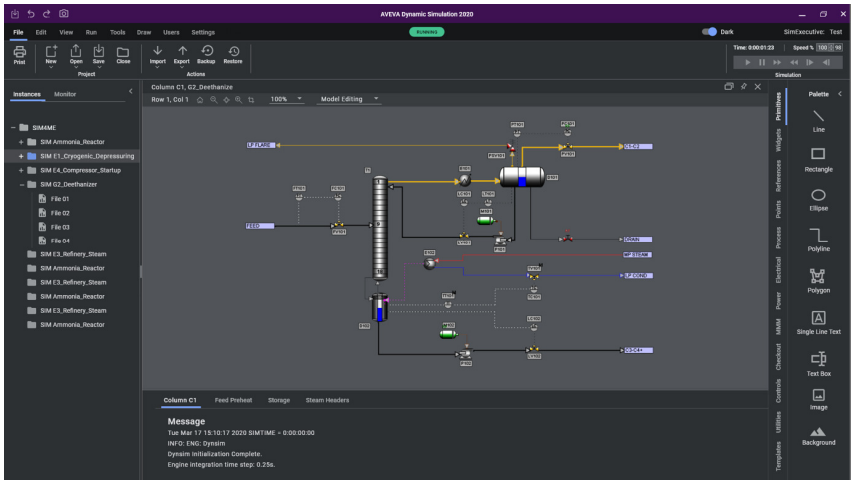

AVEVA Dynamic Simulation 2020
File
Edit
View
Run
Tools
Draw
Users
Settings
Help
RUNNING
Dark
SimExecutive: Test
Print
New
Open
Save
Close
Project
Import
Export
Backup
Restore
Actions
Time: 0:00:01:23
Speed %
Simulation
Instances
Monitor
SIM4ME
SIM Ammonia_Reactor
SIM E1_Cryogenic_Depressuring
SIM E4_Compressor_Startup
SIM G2_Deethanizer
File 01
File 02
File 03
File 04
SIM E3_Refinery_Steam
SIM Ammonia_Reactor
SIM E3_Refinery_Steam
SIM Ammonia_Reactor
SIM E3_Refinery_Steam
SIM Ammonia_Reactor
Column C1, G2_Deethanize
Row 1, Col 1
100%
Model Editing
LP FLARE
FC101
AUTO
PV : 85.2m3/hr
SP : 85.2m3/hr
OUT : 28.1%
FEED
PT101
PC101
PSV101
PV101
C1-C2
E101
D101
LC101
LT101
M101
P101
LV401
DRAIN
E102
MP STEAM
TV101
LP COND
TC101
TT101
D102
LC102
M102
P102
LV102
C3-C4+
Column C1
Feed Preheat
Storage
Steam Headers
Message
Tue Mar 17 15:10:17 2020 SIMTIME = 0:00:00:00
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This is the mockup of the new GUI
Palette
Primitives
Widgets
References
Points
Process
Electrical
Power
MMM
Checkout
Controls
Utilities
Templates
Line
Rectangle
Ellipse
Polyline
Polygon
Single Line Text
Text Box
Image
Background


AVEVA Dynamic Simulation 2020
File
Edit
View
Run
Tools
Draw
Users
Settings
RUNNING
Dark
SimExecutive: Test
Print
New
Open
Save
Close
Project
Import
Export
Backup
Restore
Actions
Time: 0:00:01:23
Speed %
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File 01
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Column C1, G2_Deethanize
Row 1, Col 1
100%
Model Editing
LP FLARE
PT101
PC101
PSV101
PV101
C1-C2
T1
E101
D101
FT101
FC101
LC101
LT101
M101
FEED
FV101
LY101
P101
DRAIN
E102
MP STEAM
TV101
LP COND
TC101
TT101
D102
LC102
M102
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Palette
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Rectangle
Ellipse
Polyline
Polygon
Single Line Text
Text Box
Image
Background

Questions

Which theme would you use as default for your work (light or dark)?





Please answer using the chat

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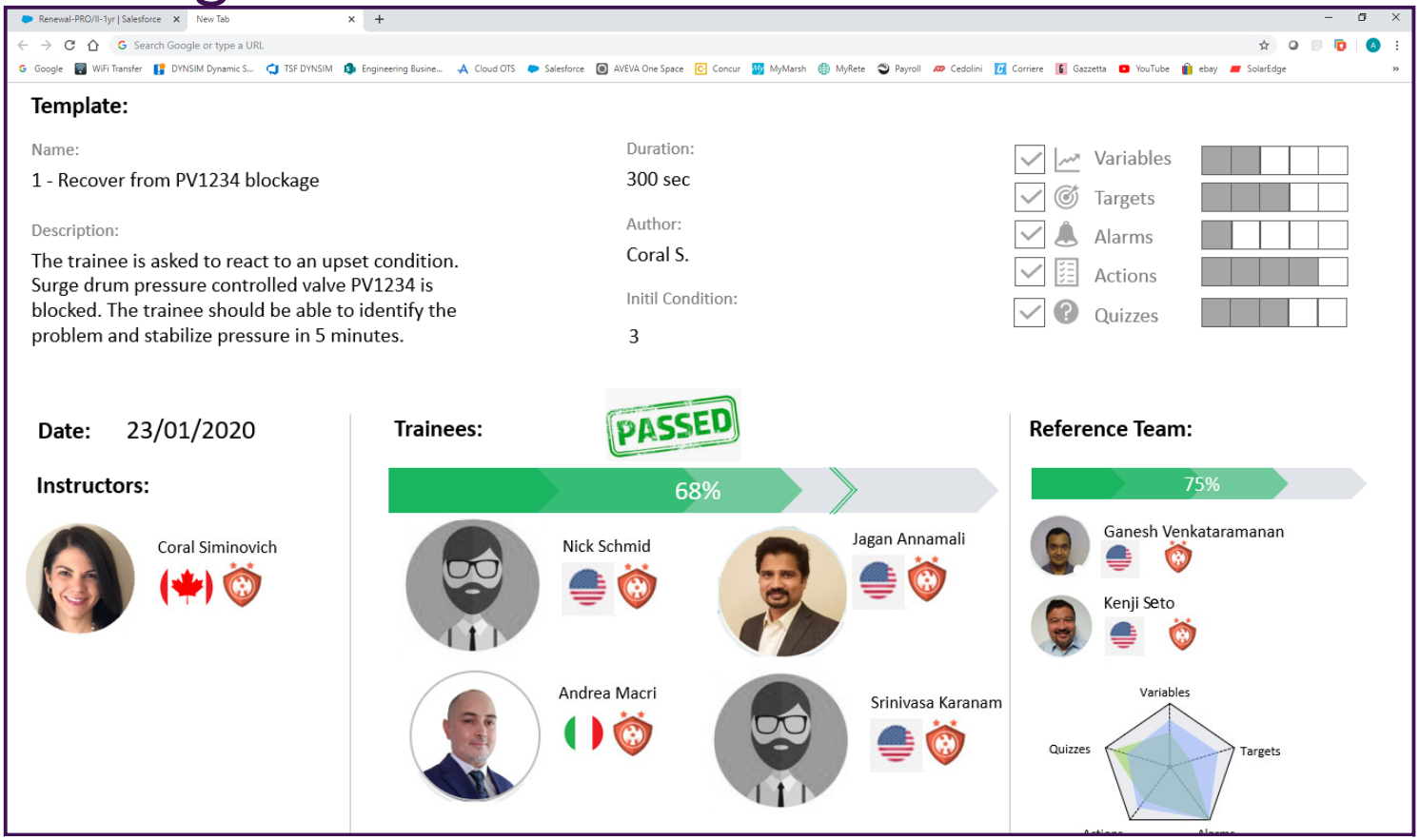
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Learning Monitoring Tool

Definition of the exercise is coming from the LMT template



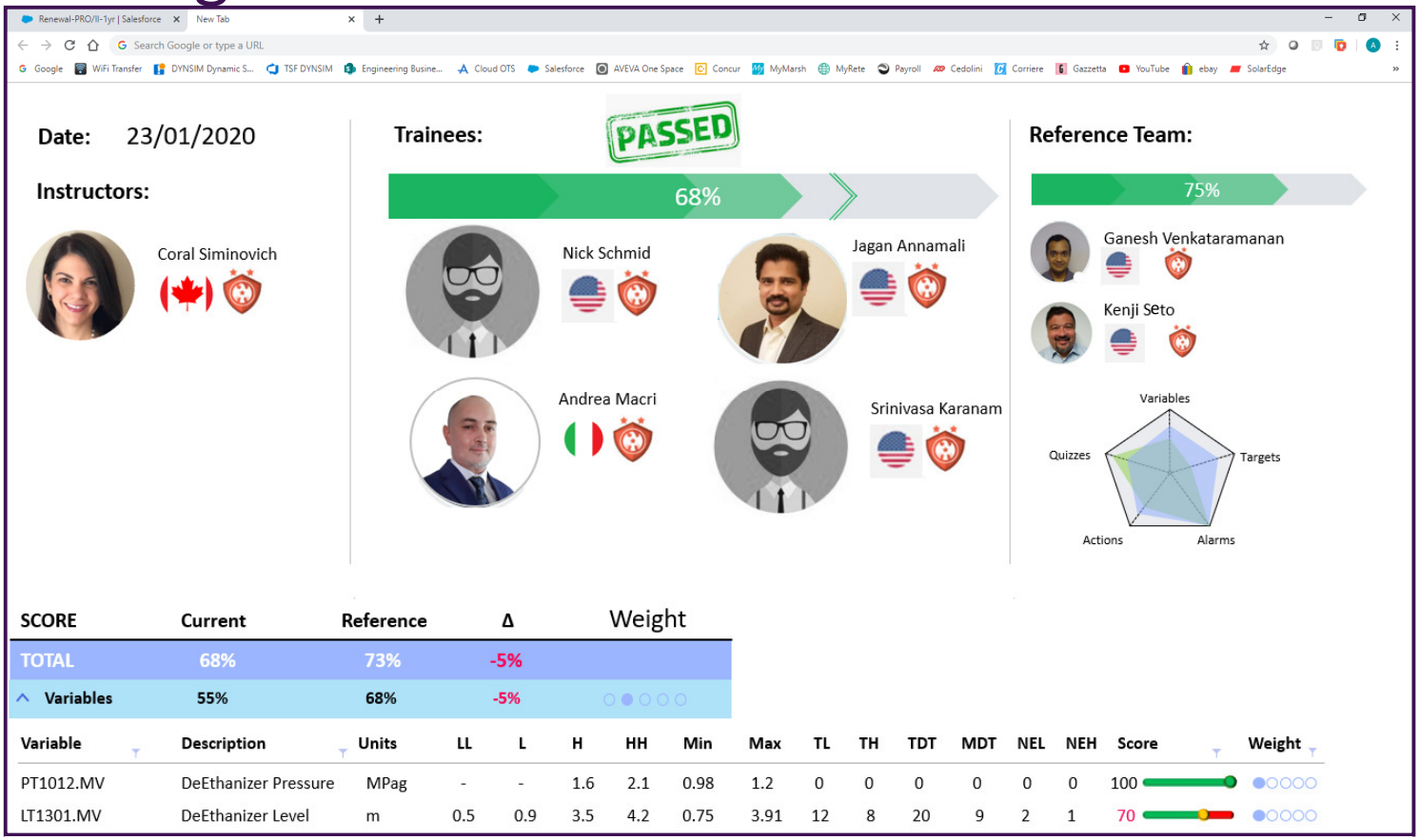
This is the mockup of the new LMT

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Learning Monitoring Tool

This section includes the information regarding date, instructors, trainees, score, passed criteria and ghost (reference team) for the exercise

This is the mockup of the new LMT



SCORE	Current	Reference	Δ	Weight
TOTAL	68%	73%	-5%	
Variables	55%	68%	-5%	

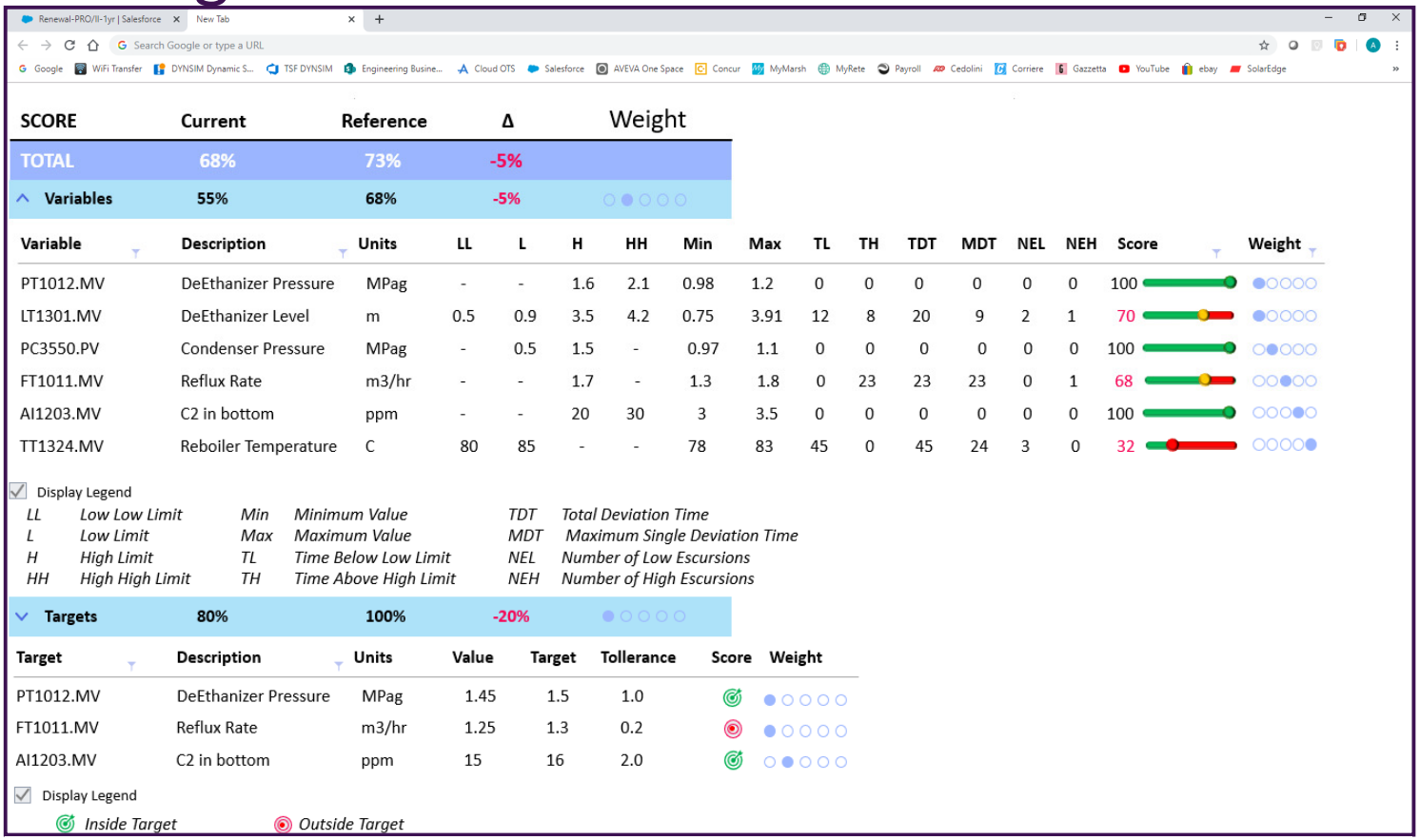
Variable	Description	Units	LL	L	H	HH	Min	Max	TL	TH	TDT	MDT	NEL	NEH	Score	Weight
PT1012.MV	DeEthanizer Pressure	MPag	-	-	1.6	2.1	0.98	1.2	0	0	0	0	0	0	100	
LT1301.MV	DeEthanizer Level	m	0.5	0.9	3.5	4.2	0.75	3.91	12	8	20	9	2	1	70	

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Learning Monitoring Tool

Table with results divided by scoring method. The user can expand to see more details. The table is not editable. The only action is to display/hide the legend

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SCORE	Current	Reference	Δ	Weight
TOTAL	68%	73%	-5%	
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Variable	Description	Units	LL	L	H	HH	Min	Max	TL	TH	TDT	MDT	NEL	NEH	Score	Weight
PT1012.MV	DeEthanizer Pressure	MPag	-	-	1.6	2.1	0.98	1.2	0	0	0	0	0	0	100	
LT1301.MV	DeEthanizer Level	m	0.5	0.9	3.5	4.2	0.75	3.91	12	8	20	9	2	1	70	
PC3550.PV	Condenser Pressure	MPag	-	0.5	1.5	-	0.97	1.1	0	0	0	0	0	0	100	
FT1011.MV	Reflux Rate	m3/hr	-	-	1.7	-	1.3	1.8	0	23	23	23	0	1	68	
AI1203.MV	C2 in bottom	ppm	-	-	20	30	3	3.5	0	0	0	0	0	0	100	
TT1324.MV	Reboiler Temperature	C	80	85	-	-	78	83	45	0	45	24	3	0	32	

Display Legend

LL	*Low Low Limit*	*Min*	*Minimum Value*	*TDT*	*Total Deviation Time*
L	*Low Limit*	*Max*	*Maximum Value*	*MDT*	*Maximum Single Deviation Time*
H	*High Limit*	*TL*	*Time Below Low Limit*	*NEL*	*Number of Low Escursions*
HH	*High High Limit*	*TH*	*Time Above High Limit*	*NEH*	*Number of High Escursions*

Targets	80%	100%	-20%

Target	Description	Units	Value	Target	Tollerance	Score	Weight
PT1012.MV	DeEthanizer Pressure	MPag	1.45	1.5	1.0		
FT1011.MV	Reflux Rate	m3/hr	1.25	1.3	0.2		
AI1203.MV	C2 in bottom	ppm	15	16	2.0		

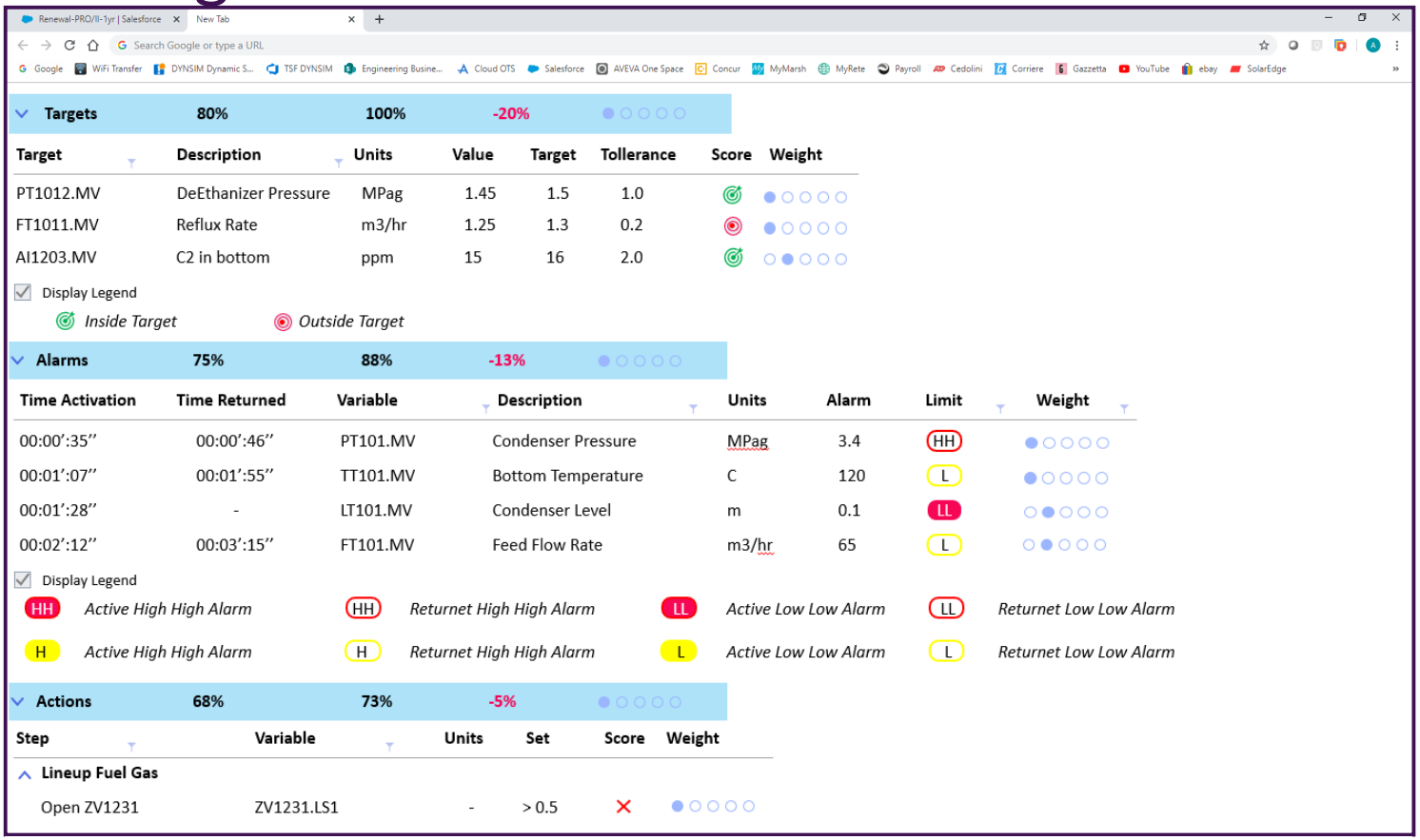
Display Legend

Inside Target *Outside Target*

Learning Monitoring Tool

Example of Targets and Alarms summary

This is the mockup of the new LMT



Targets 80% 100% -20%

Target	Description	Units	Value	Target	Tollerance	Score	Weight
PT1012.MV	DeEthanizer Pressure	MPag	1.45	1.5	1.0		
FT1011.MV	Reflux Rate	m3/hr	1.25	1.3	0.2		
AI1203.MV	C2 in bottom	ppm	15	16	2.0		

Display Legend

Inside Target *Outside Target*

Alarms 75% 88% -13%

Time Activation	Time Returned	Variable	Description	Units	Alarm	Limit	Weight
00:00':35''	00:00':46''	PT101.MV	Condenser Pressure	MPag	3.4	HH	
00:01':07''	00:01':55''	TT101.MV	Bottom Temperature	C	120	L	
00:01':28''	-	LT101.MV	Condenser Level	m	0.1	LL	
00:02':12''	00:03':15''	FT101.MV	Feed Flow Rate	m3/hr	65	L	

Display Legend

HH *Active High High Alarm* HH *Returnet High High Alarm* LL *Active Low Low Alarm* LL *Returnet Low Low Alarm*

H *Active High High Alarm* H *Returnet High High Alarm* L *Active Low Low Alarm* L *Returnet Low Low Alarm*

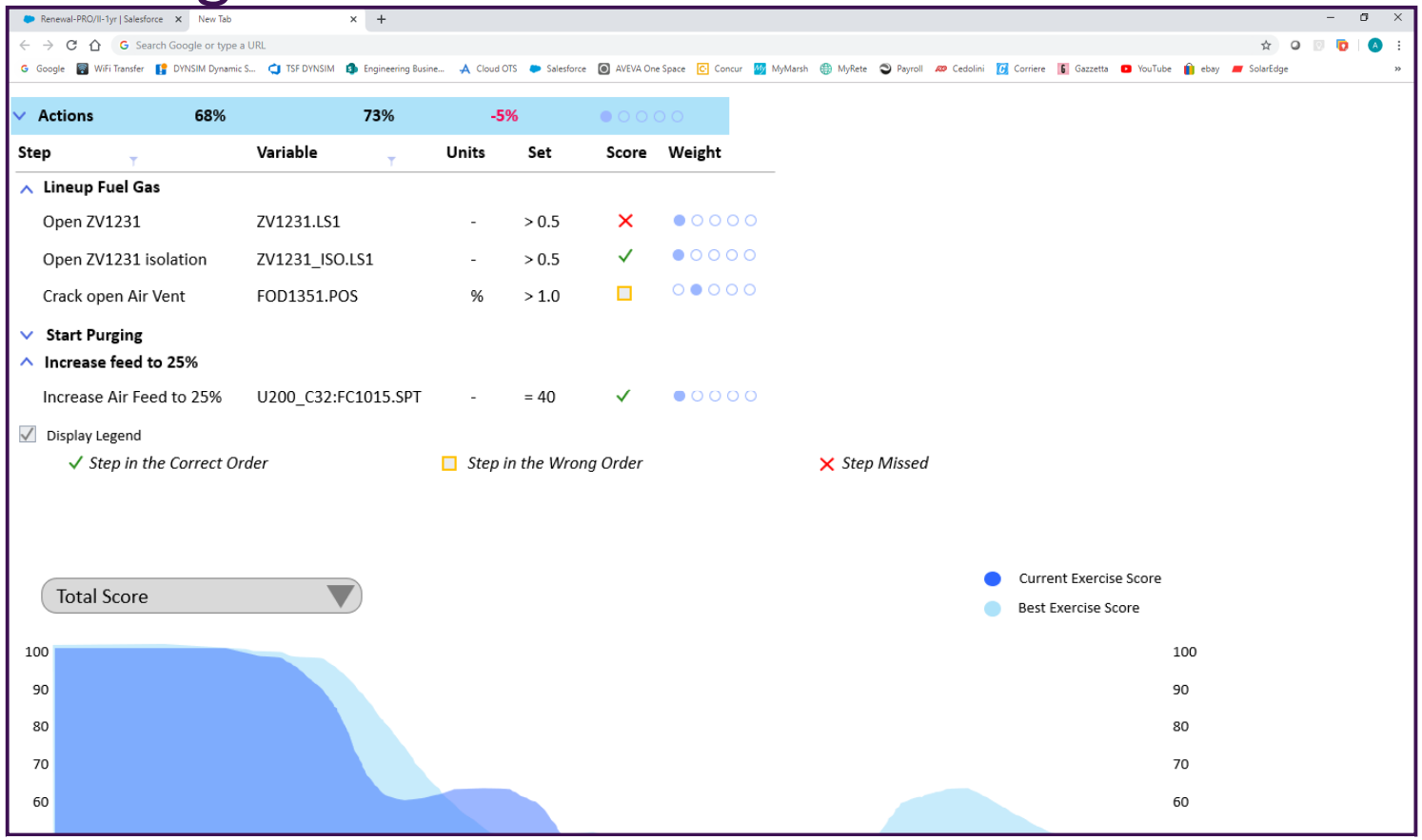
Actions 68% 73% -5%

Step	Variable	Units	Set	Score	Weight
Lineup Fuel Gas					
Open ZV1231	ZV1231.LS1	-	> 0.5	✕	

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Learning Monitoring Tool

Example of Actions summary



This is the mockup of the new LMT

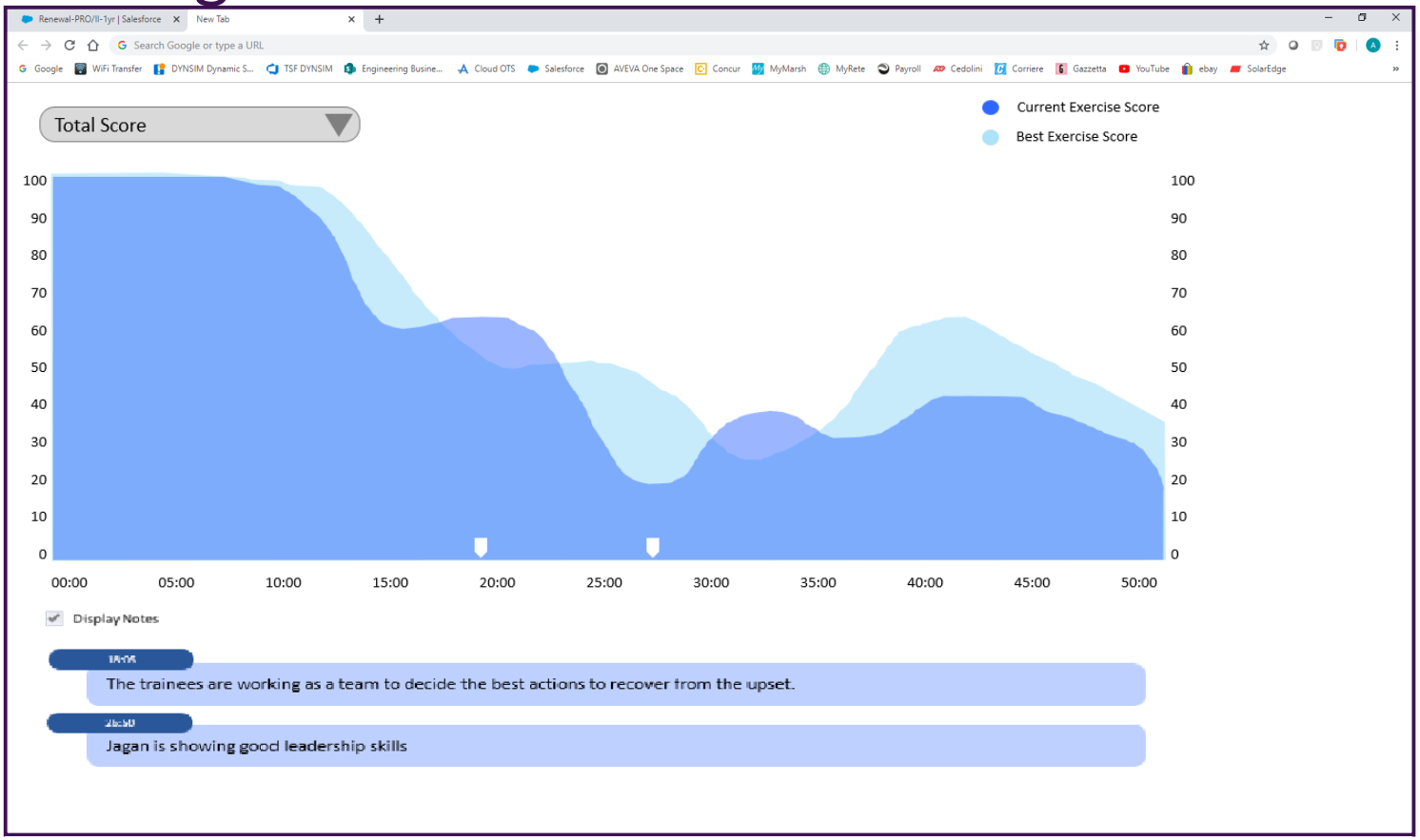
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Learning Monitoring Tool

Score plot. Current score versus reference score from ghost team

Notes entered by the instructor during the exercise

This is the mockup of the new LMT



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Learning Monitoring Tool

Individual trends for the variables used in the exercise



This is the mockup of the new LMT

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Questions

Which simulation parameters would you consider as key performance indicators for evaluating a trainee (e.g. Variables within a range, how fast a goal is reached, number of alarms)?

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Portable Instructor Station



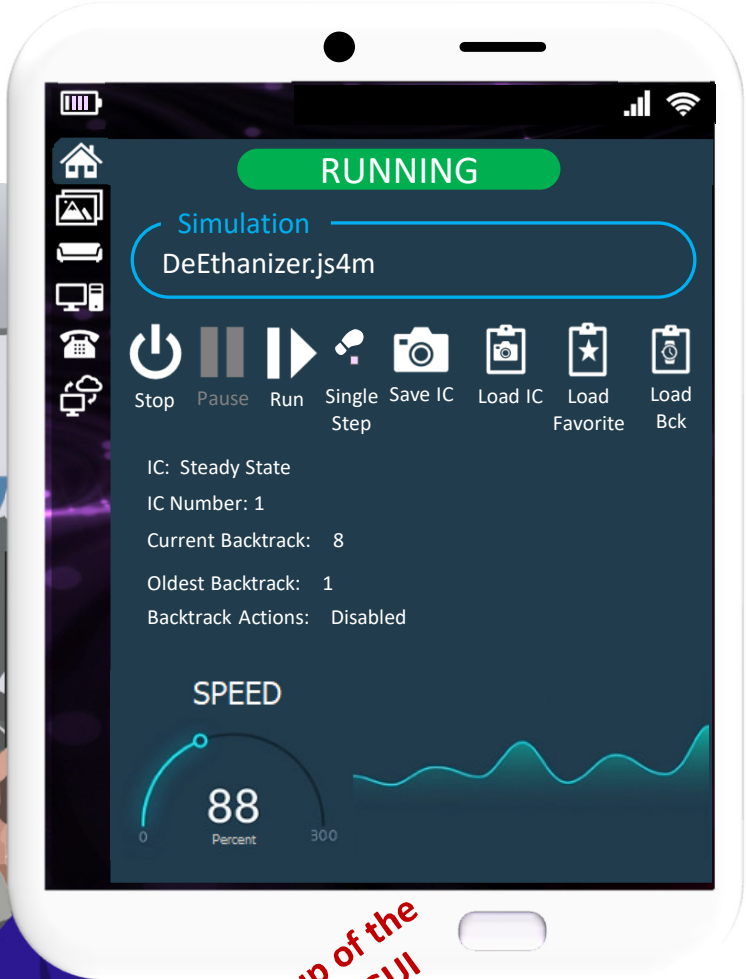
Problems Statement:

- The Instructor Station is located in a separate console from the operator station.
- The instructor has to leave the simulation unattended in case he wants to join the trainees
- The current GUI is often considered too complex for the instructor (too many functions)

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Portable Instructor Station





Mockup of the Portable GUI

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Questions

Which ones of the current instructor functions would you like to have in the portable instructor station interface?

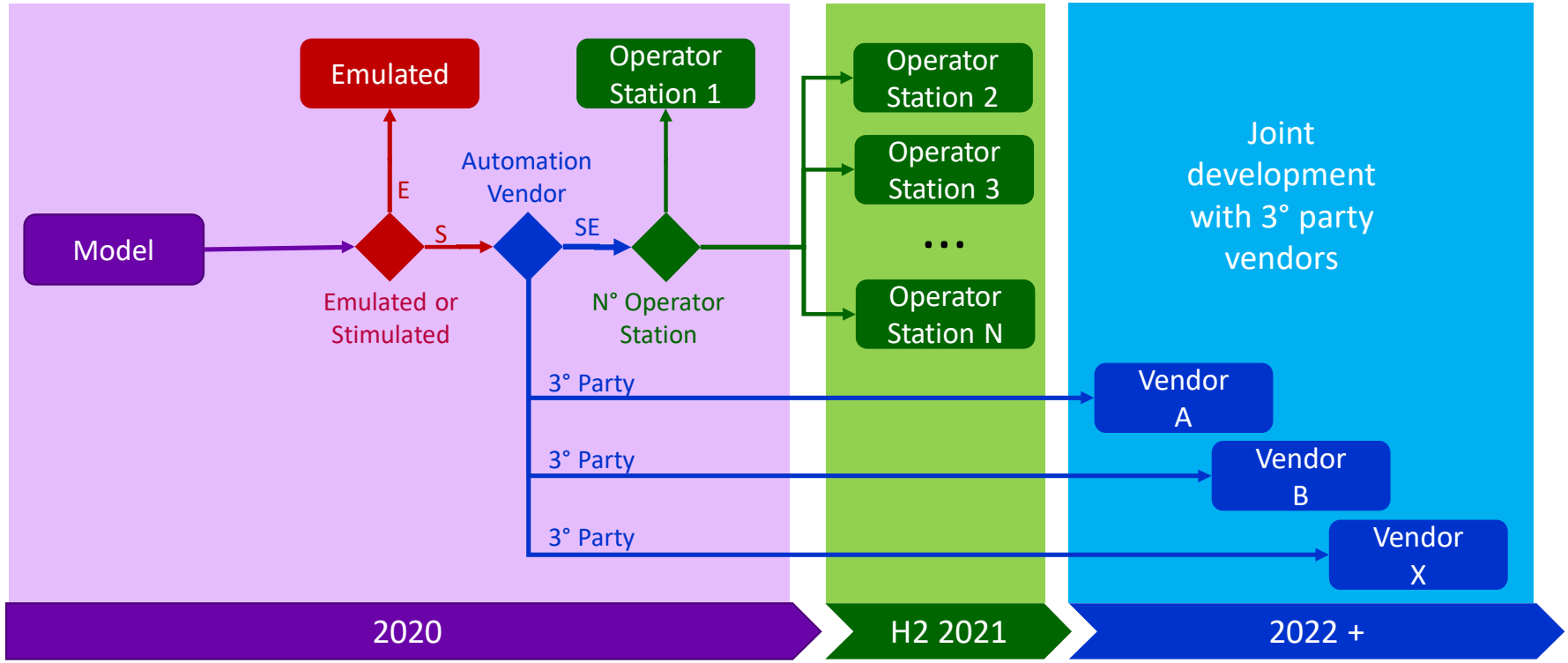
1) Select and Launch simulation
2) Recall Initial Condition
3) Save Initial condition
4) Recall Favourite Initial Condition
5) Recall Backtrack
6) Run/Freeze Simulaton
7) Select and View Speed
8) Start/Pause/Stop Scenario
9) Activate / Deactivate malfunction
10) Start Performance Monitoring
11) View Performance Monitoring status
12) View and navigate flowsheets
13) Trends and plots
14) Point monitor
15) Simulation messages and warnings
16) All of the above

Please type the numbers in the chat

AVEVA

Cloud Readiness for OTS

What can be deployed on AVEVA Cloud?



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Question

What would be your preferred strategy for buying or migrating to the Cloud your OTS?

Option	Could			Hybrid			On-Premise
	1	2	3	4	5	6	7
On-Premise				Full OTS System	Full OTS System	Full OTS System	Full OTS System
Cloud	Full OTS System		Full OTS System	Full OTS System		Full OTS System	
		Multiple smaller OTS	Multiple smaller OTS		Multiple smaller OTS	Multiple smaller OTS	

Please answer using the chat

AVEVA

QA and Discussions

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Aha Requests for AVEVA Dynamic Simulation

Idea	Votes	Status
Always On Top function in trend is useful	5	Implemented
Show/Modify dynamic values in the Search Window	3	Implemented
Improve stream automatic routing	2	Considered
Retain message monitor text after crash	2	Implemented
Replace Yellow as default color for trending	2	In the Roadmap
Enable spreadsheet calculation	2	Implemented
Allow change Reciprocating Compressor KJR	2	In the Roadmap
Export the whole flowsheet in 1 page	1	Submitted
Remove lower bound on time step	1	In the Roadmap
Improve calc speed of LKP	1	Transferred

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Topics for round table discussions

1. **DIGITAL TWIN**:
   a) What is for you a plant digital twin?
   b) What would you use it for?

2. **Hybrid OTS** (AVEVA Dynamic Simulation + AVEVA Process Simulation)
   a) How important is for you?
   b) Would you accept developing part of the model in AVEVA Process Simulation and then plug it in AVEVA Dynamic Simulation to upgrade it to an OTS?

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AVEVA™

AVEVA™ Pipeline Training Simulator 2020

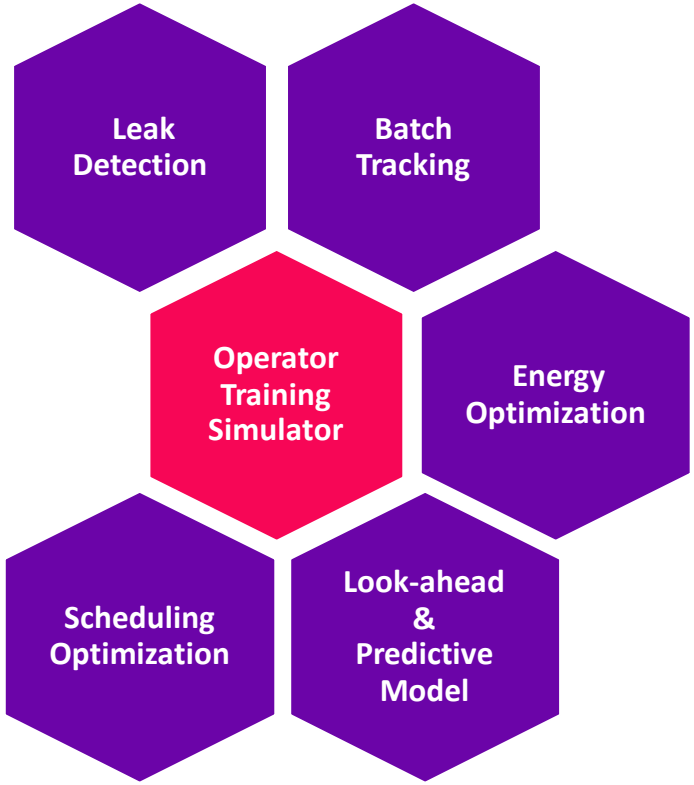
Pipeline Simulation Product Introduction *(What is it?)*

Overall Functionality

SIMSUITE

- High Fidelity Hydraulic Pipeline Model
- Gas, Liquids & Two-phase
- Steady State & Transient Conditions
- Compatible with all SCADA technologies

Product Applications



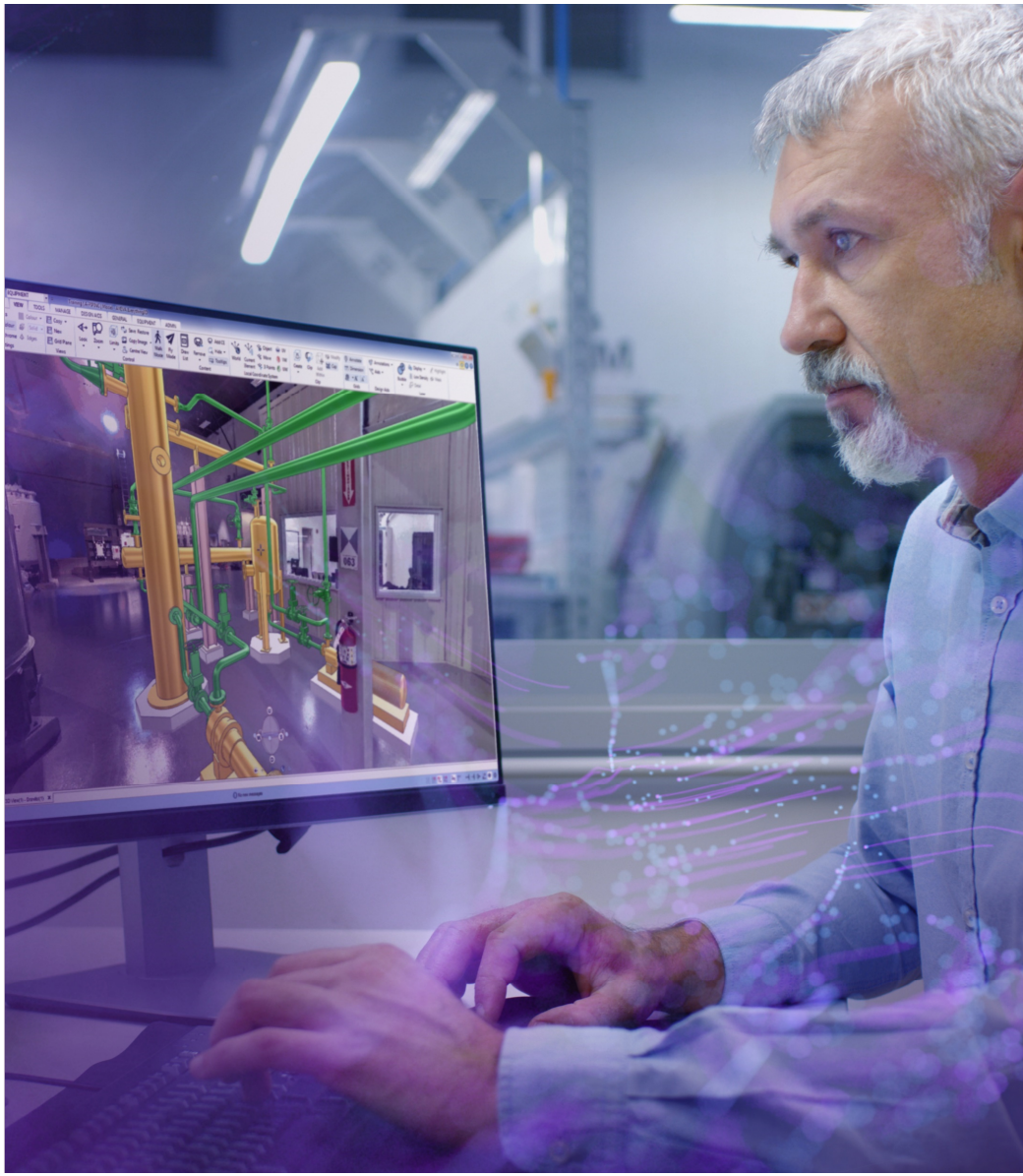
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AVEVA™ Pipeline Training Simulator

Main Components and Features

- Operator HMI
- SCADA System
- Virtual Pipeline & Control System
- Applications:
  - Instructor Station
  - Qualification Information System (QIS)
  - Scenario Navigator
  - Scenario Composer
  - Logic Template Editor
- **DYNSIM Integration \ PLC Simulation**
- Advanced Applications – Leak Detection

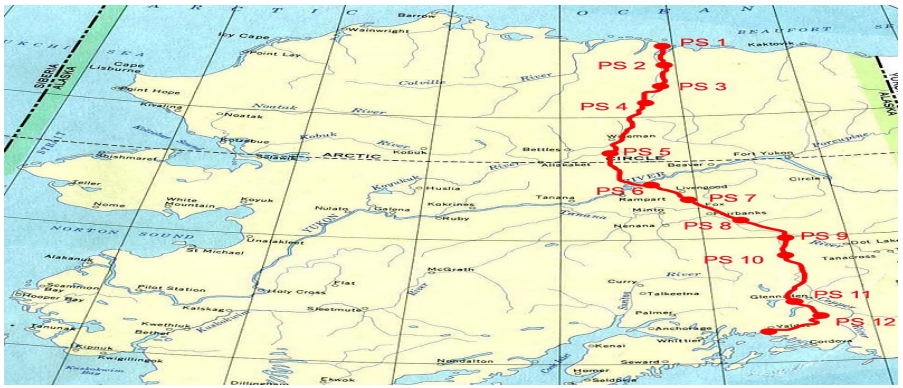


AVEVA Pipeline Operator Training

Customized Training Simulator

Alaska is one of the most environmentally sensitive areas in North America

- Alyeska Pipeline (operator of the Trans-Alaska Pipeline) uses SimSuite OTS to train their operators
- High fidelity hydraulic simulation of pipeline
- Replica logic of control system for most realistic behavior
- Power simulation of pump station generation facilities



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Trans-Alaska Pipeline

Description: 800 miles in length running from North Slope of Alyeska to Valdez Marine Terminal (USA)

Pipeline has transported 17 billion barrels of heated crude oil

Universal Trainer

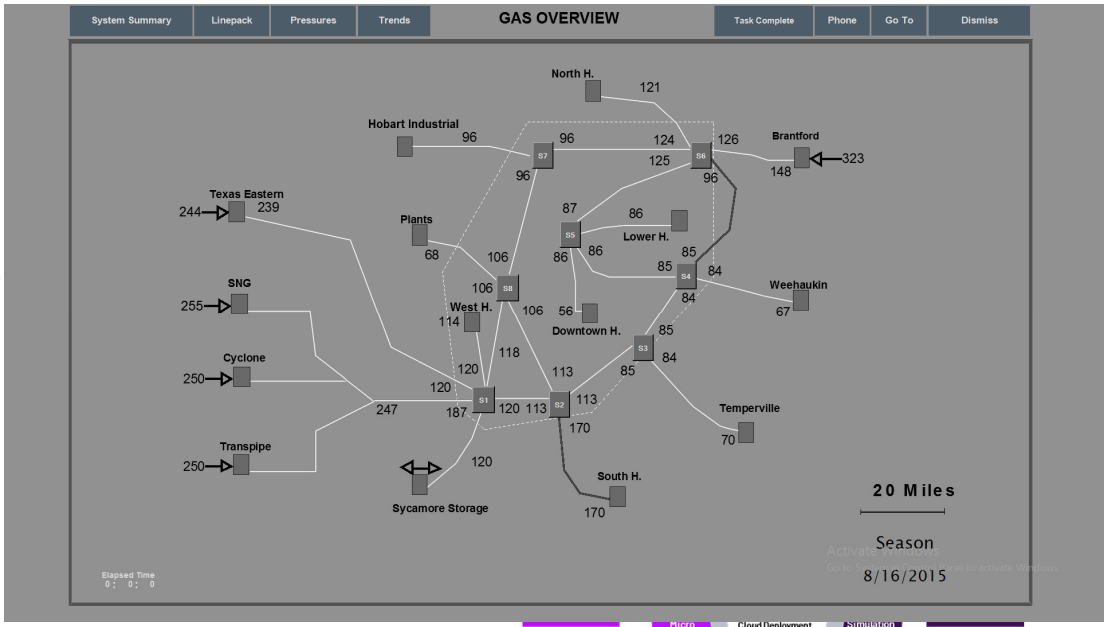
Generic Pipeline Operator Training

Major Features

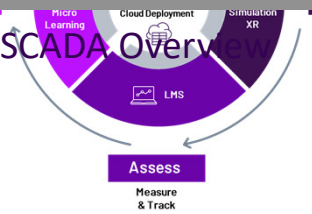
- Pre-packaged, generic training simulator
- 3 Pipelines – Products, Crude, & Gas (Preconfigured)
- Full functionality of customized trainer including complete OASyS SCADA interface

Value Proposition

- ✓ Low cost, entry level solution
- ✓ Helps end-users meet DOT reqs. for operator qualification
- ✓ Delivered quickly on a single virtual machine
- ✓ Cloud enable offering, subscription base *(March 2021)*
- ✓ Combined with Unified Learning Offering *(March 2021)*



Gas Distribution Network SCADA Overview



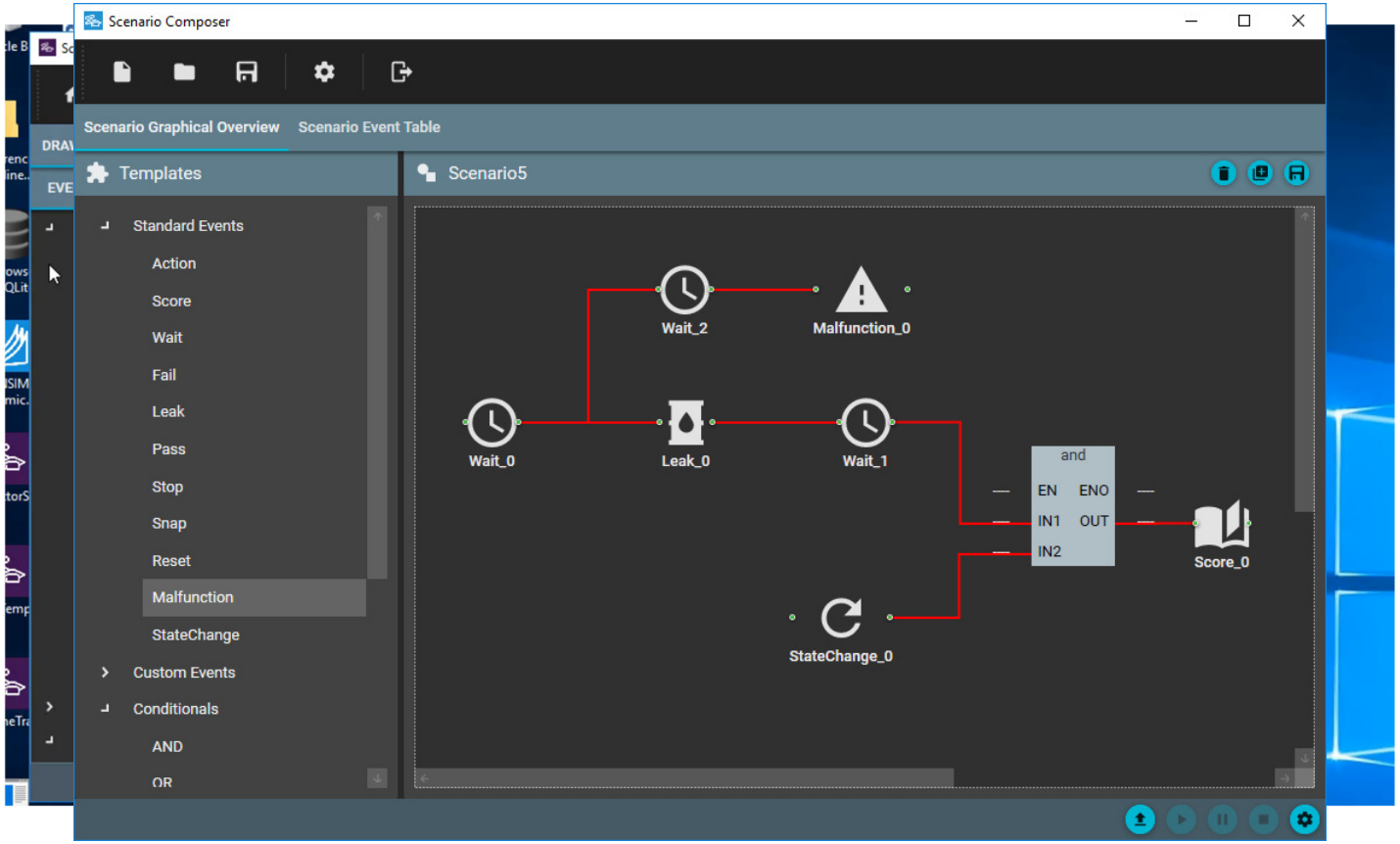
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Scenario Building

Scenario Composer

- Graphical scenario building interface
- Create parallel or branched event streams on a single flowsheet
- Hierarchical scenario building with scenarios as custom events
- Conditional logic for event flow control or gating score changes
- Embedded simulation launch control for scenario testing



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Questions

What additional events do you need for the Scenario Composer?

Current Events:

1) Action: Set a model or logic value
2) Pass\Fail: Pass or Fail the Trainee
3) Leak: Insert a leak in a section of pipe
4) Malfunction: Set a model malfunction
5) Message: Send a live message to a trainee
6) Snap/Reset: Snap or Reset to a saved model condition.
7) Score: Add or remove grade points
8) State Change: Check that model value has changed.
9) Widget: Add a button for external actions
10) Wait: Add a timer between Events
11) Pulse: Set a value for a length of time (Future)

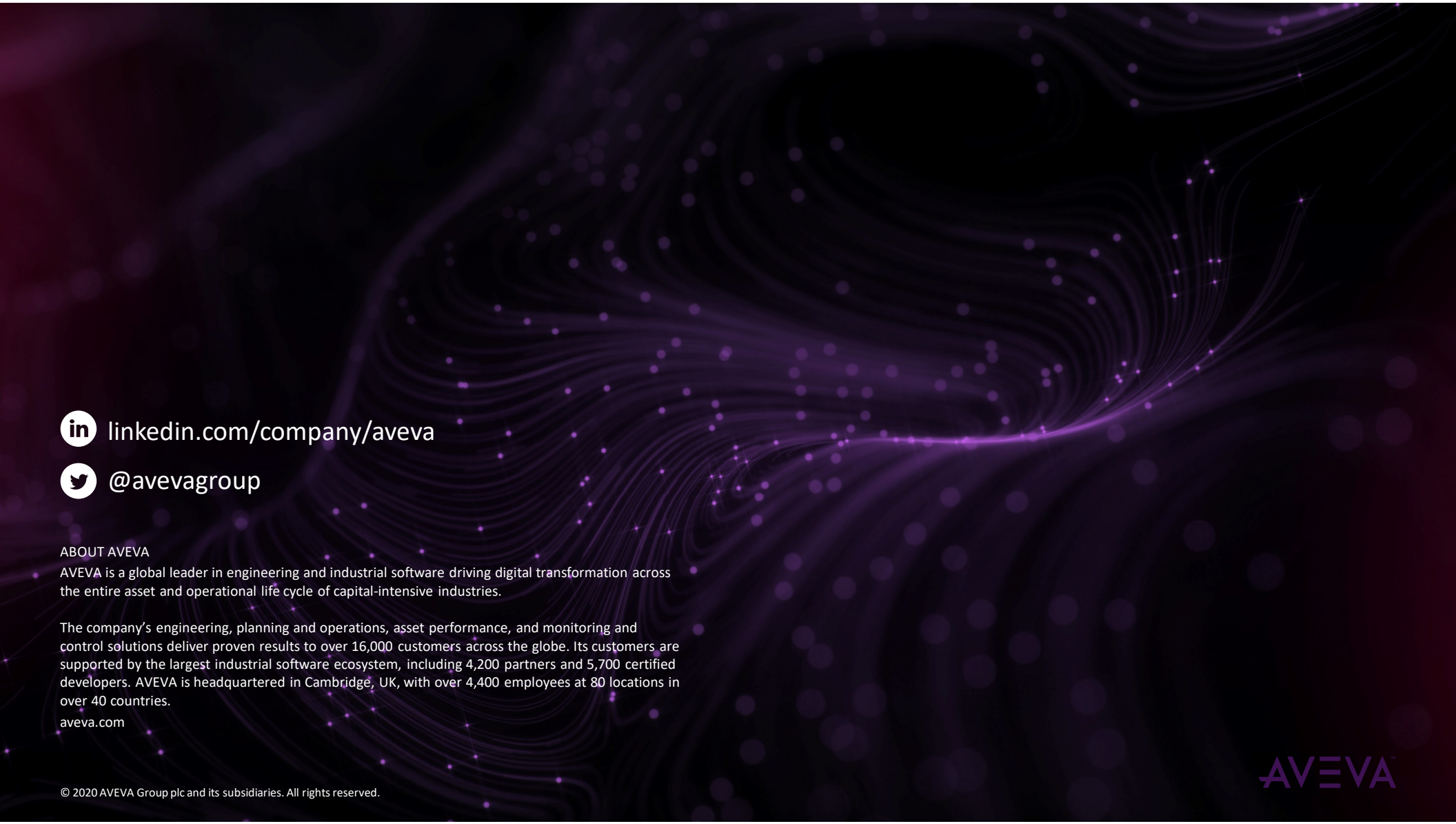
Please answer using the chat

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ABOUT AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries.

The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

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