Plug-in Architecture & Parallel Tasks in LabVIEW for Building Expandable Applications

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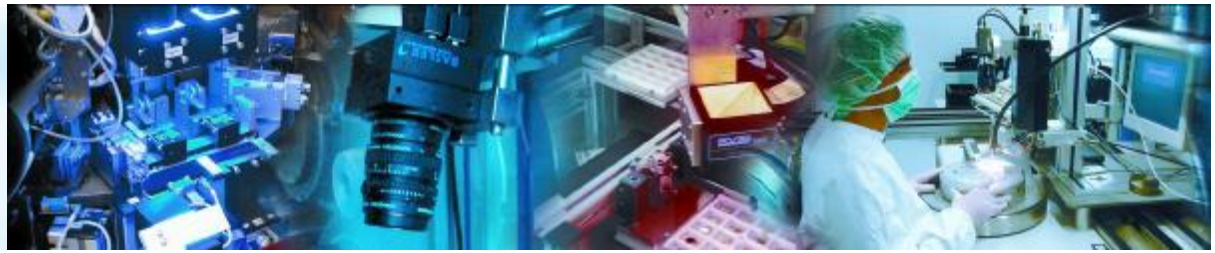


QUALIMATEST, the company

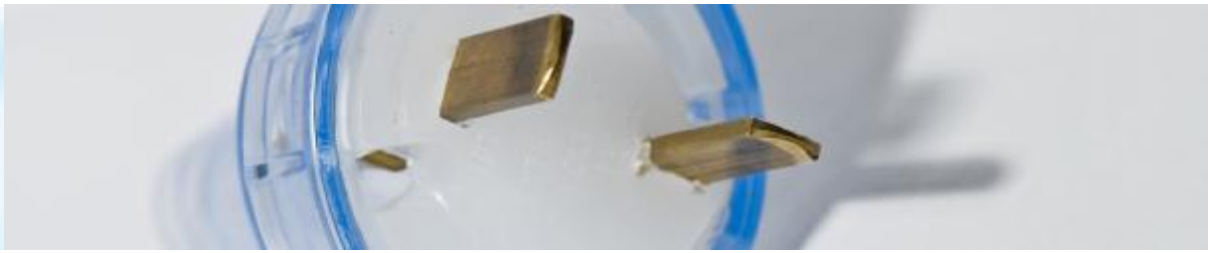
- Vision systems and automation integrator
- 20 years of experience
- NI Select Integrator
- LabVIEW development staff

Presentation Summary

- Plug-in concept
- Customer Application Example
- Plug-in: How?
- Our feedback from experience

Usual challenges to overcome

- Cope with specification changes during project
- Supporting hardware evolution and diversity
- Managing deployment and versioning

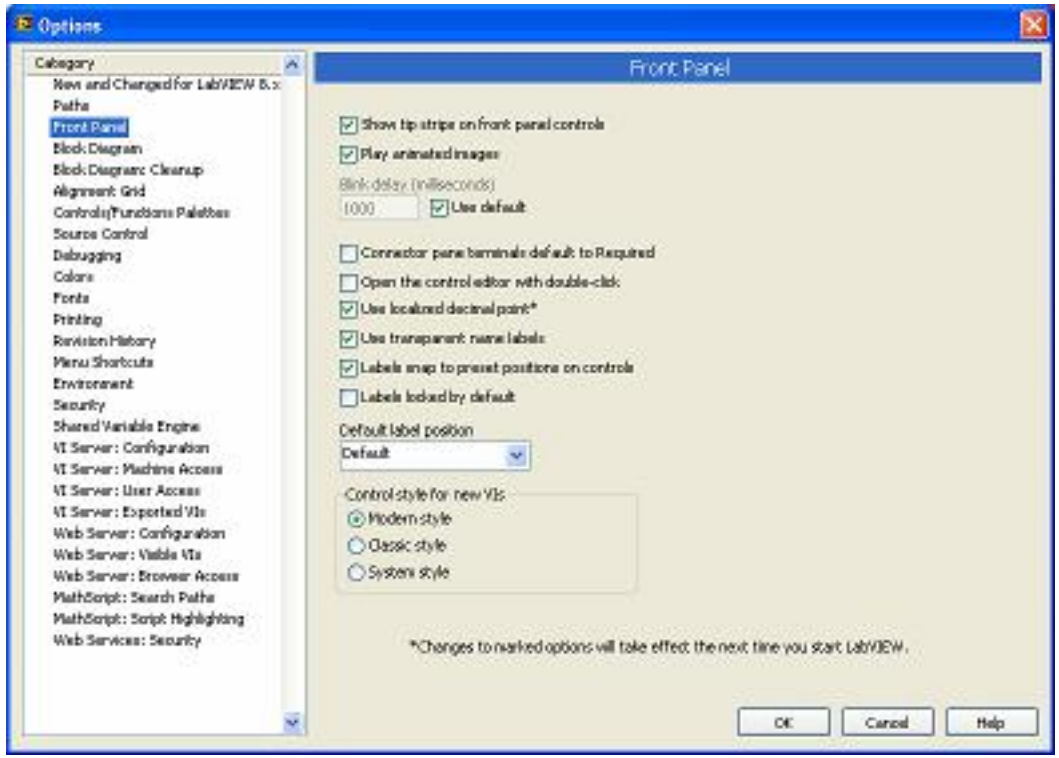


Plug-in, what is it?

A plug-in is a program that interacts with a host application to provide a specific functionality.

Plug-in Architecture & Parallel Tasks in LabVIEW

Plug-ins are everywhere!



Plug-in Architecture & Parallel Tasks in LabVIEW

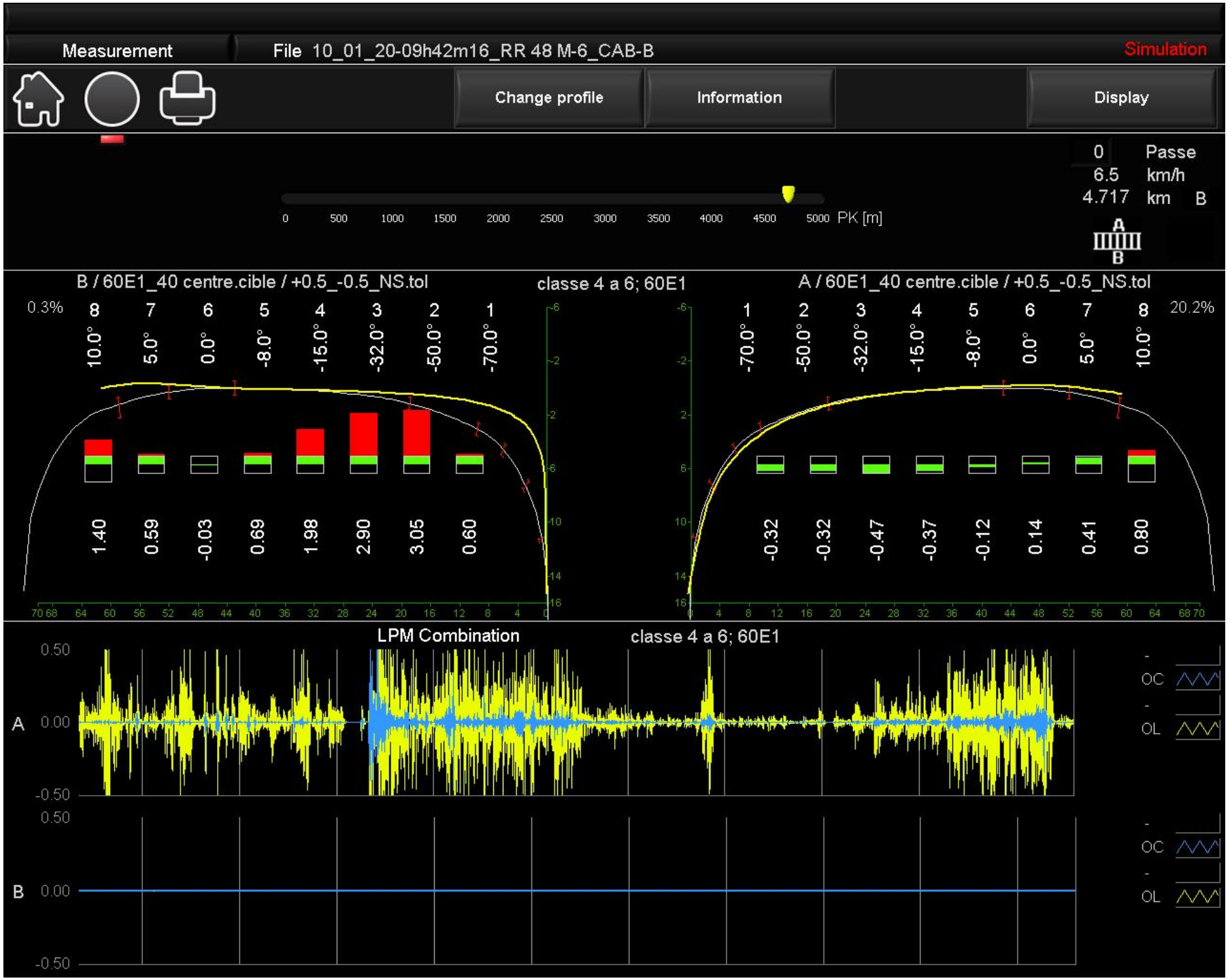
Customer Application Example

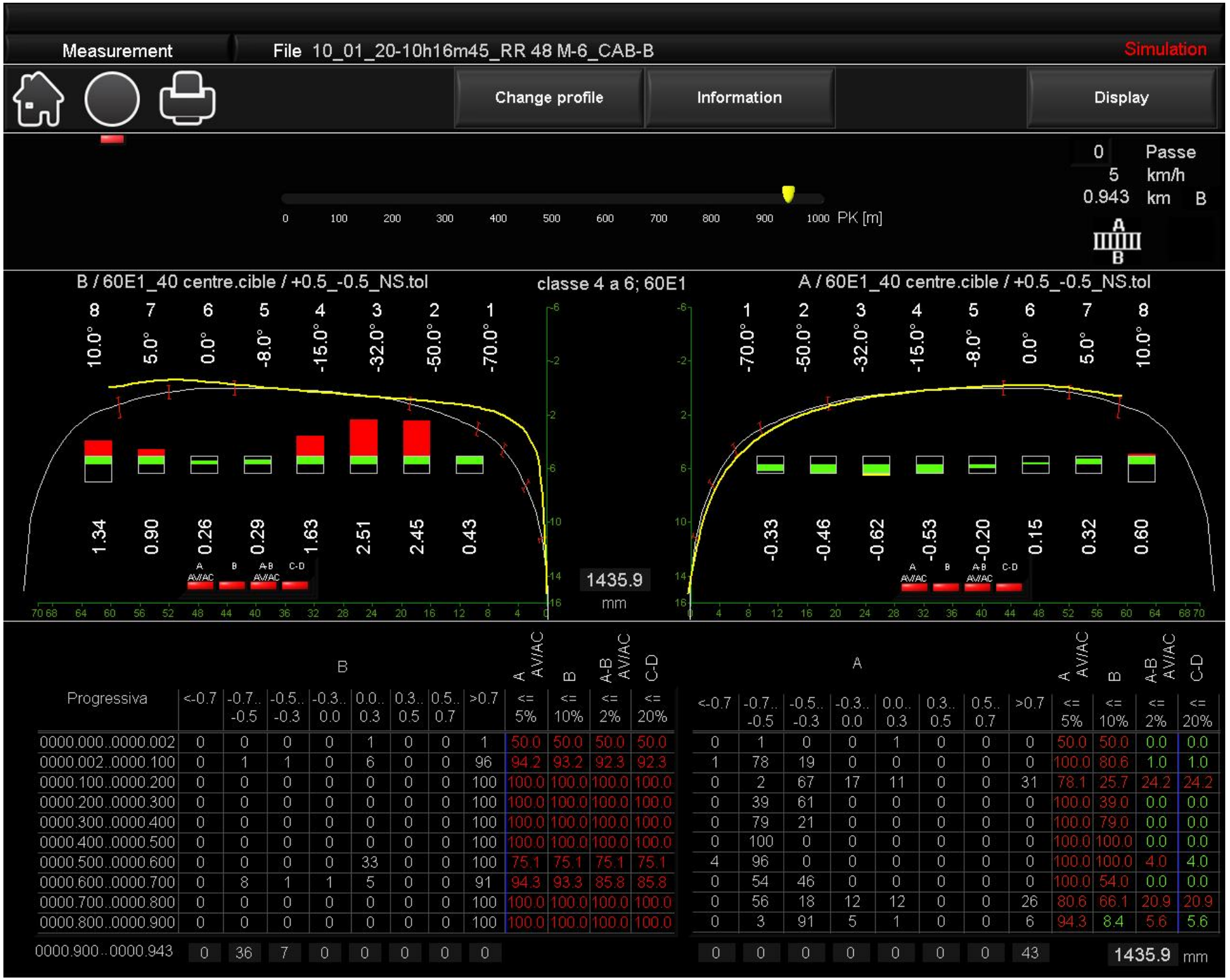
Customer Application Examples

- Project for different final customers
  - Specific user interfaces
  - Various hardware configurations
  - Different calculation methods
  - Deployment


Measurement
File 10_01_20-09h42m16_RR 48 M-6_CAB-B
Simulation
Change profile
Information
Display
1 Passe
5.5 km/h
6.206 km B
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 PK [m]
A
B
B / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
classe 4 a 6; 60E1
A / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
0.3%
26.5%
8 7 6 5 4 3 2 1
10.0° 5.0° 0.0° -8.0° -15.0° -32.0° -50.0° -70.0°
1.34 0.53 -0.05 0.70 1.98 2.91 3.19 0.65
1 2 3 4 5 6 7 8
-70.0° -50.0° -32.0° -15.0° -8.0° 0.0° 5.0° 10.0°
-0.32 -0.31 -0.47 -0.37 -0.10 0.13 0.41 0.81
B / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
classe 4 a 6; 60E1
A / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
10.0° 5.0° 0.0° -8.0° -15.0° -32.0° -50.0° -70.0°
1.37 0.57 0.04 0.69 1.98 2.90 3.08 0.62
-70.0° -50.0° -32.0° -15.0° -8.0° 0.0° 5.0° 10.0°
0.32 0.32 0.47 0.37 0.11 0.14 0.41 0.81


Measurement
File 10_01_20-09h42m16_RR 48 M-6_CAB-B
Simulation
Change profile
Information
Display
1 Passe
5.5 km/h
6.288 km B
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 PK [m]
A
B
B / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
classe 4 a 6; 60E1
A / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
0.3%
26.5%
8 7 6 5 4 3 2 1
10.0° 5.0° 0.0° -8.0° -15.0° -32.0° -50.0° -70.0°
0.80 0.40 0.15 -0.11 0.57 1.49 2.80 0.47
-70.0° -50.0° -32.0° -15.0° -8.0° 0.0° 5.0° 10.0°
-0.46 -0.51 -0.48 -0.41 -0.26 0.25 0.35 0.51
B / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
classe 4 a 6; 60E1
A / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
8 7 6 5 4 3 2 1
1 2 3 4 5 6 7 8
4.0
0.0
-4.0
70.0

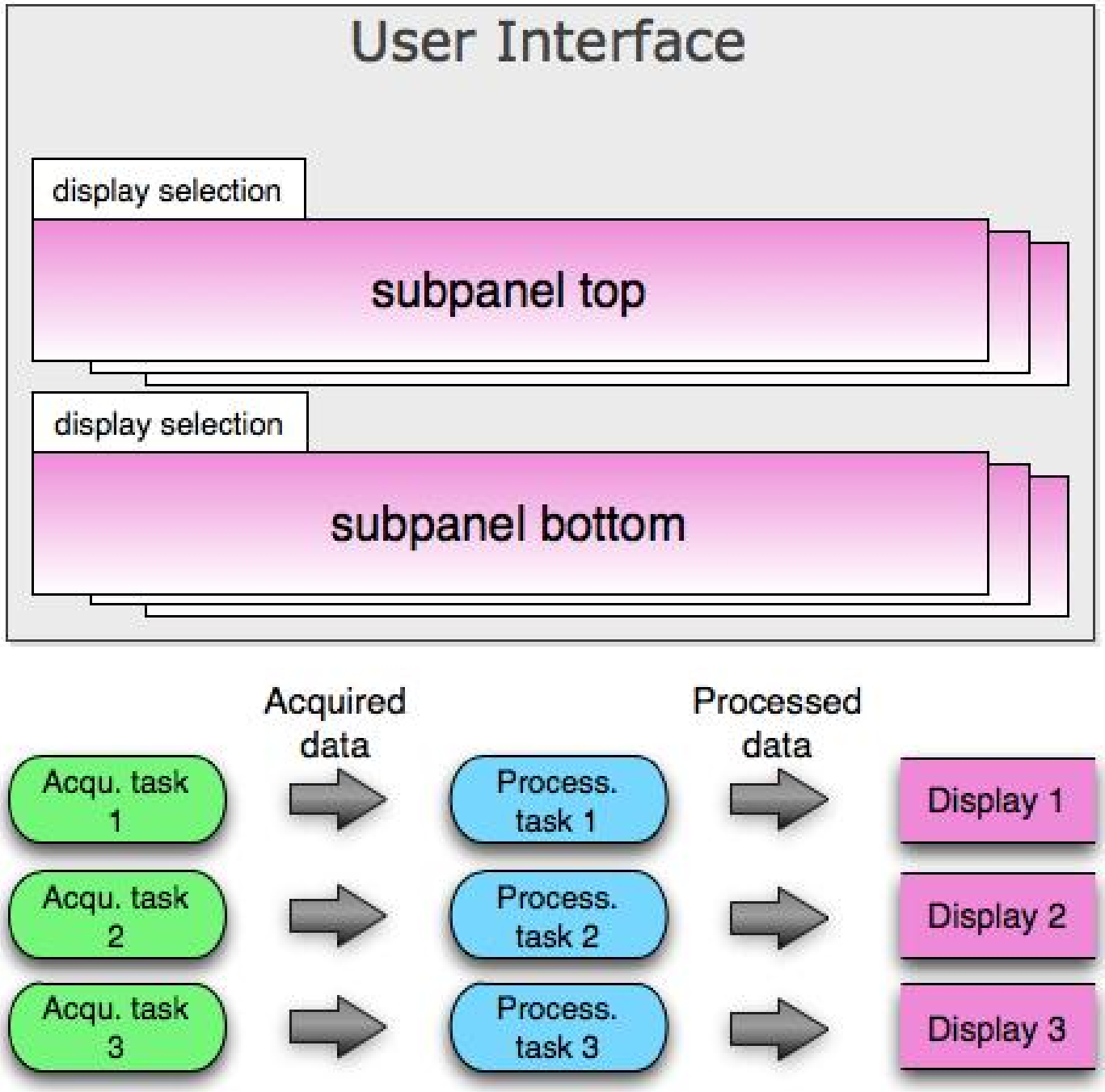

Measurement
File 10_01_20-09h42m16_RR 48 M-6_CAB-B
Simulation
Change profile
Information
Display
0 Passe
6.5 km/h
4.717 km B
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 PK [m]
A
B
B / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
classe 4 a 6; 60E1
A / 60E1_40 centre.cible / +0.5_-0.5_NS.tol
0.3%
20.2%
8 7 6 5 4 3 2 1
10.0° 5.0° 0.0° -8.0° -15.0° -32.0° -50.0° -70.0°
1.40 0.59 -0.03 0.69 1.98 2.90 3.05 0.60
-70.0° -50.0° -32.0° -15.0° -8.0° 0.0° 5.0° 10.0°
-0.32 -0.32 -0.47 -0.37 -0.12 0.14 0.41 0.80
LPM Combination
classe 4 a 6; 60E1
A
B
0.50
0.00
-0.50
OC
OL

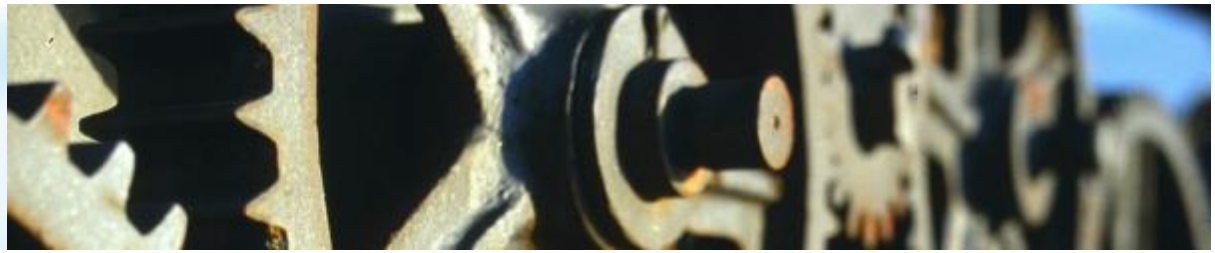


Progressiva	B <-0.7	-0.7..-0.5	-0.5..-0.3	-0.3..0.0	0.0..0.3	0.3..0.5	0.5..0.7	>0.7	A AV/AC <= 5%	B <= 10%	A-B AV/AC <= 2%	C-D <= 20%	A <-0.7	-0.7..-0.5	-0.5..-0.3	-0.3..0.0	0.0..0.3	0.3..0.5	0.5..0.7	>0.7	A AV/AC <= 5%	B <= 10%	A-B AV/AC <= 2%	C-D <= 20%
0000.000..0000.002	0	0	0	0	1	0	0	1	50.0	50.0	50.0	50.0	0	1	0	0	1	0	0	0	50.0	50.0	0.0	0.0
0000.002..0000.100	0	1	1	0	6	0	0	96	94.2	93.2	92.3	92.3	1	78	19	0	0	0	0	0	100.0	80.6	1.0	1.0
0000.100..0000.200	0	0	0	0	0	0	0	100	100.0	100.0	100.0	100.0	0	2	67	17	11	0	0	31	78.1	25.7	24.2	24.2
0000.200..0000.300	0	0	0	0	0	0	0	100	100.0	100.0	100.0	100.0	0	39	61	0	0	0	0	0	100.0	39.0	0.0	0.0
0000.300..0000.400	0	0	0	0	0	0	0	100	100.0	100.0	100.0	100.0	0	79	21	0	0	0	0	0	100.0	79.0	0.0	0.0
0000.400..0000.500	0	0	0	0	0	0	0	100	100.0	100.0	100.0	100.0	0	100	0	0	0	0	0	0	100.0	100.0	0.0	0.0
0000.500..0000.600	0	0	0	0	33	0	0	100	75.1	75.1	75.1	75.1	4	96	0	0	0	0	0	0	100.0	100.0	4.0	4.0
0000.600..0000.700	0	8	1	1	5	0	0	91	94.3	93.3	85.8	85.8	0	54	46	0	0	0	0	0	100.0	54.0	0.0	0.0
0000.700..0000.800	0	0	0	0	0	0	0	100	100.0	100.0	100.0	100.0	0	56	18	12	12	0	0	26	80.6	66.1	20.9	20.9
0000.800..0000.900	0	0	0	0	0	0	0	100	100.0	100.0	100.0	100.0	0	3	91	5	1	0	0	6	94.3	8.4	5.6	5.6
0000.900..0000.943	0	36	7	0	0	0	0	0					0	0	0	0	0	0	0	43				

1435.9 mm

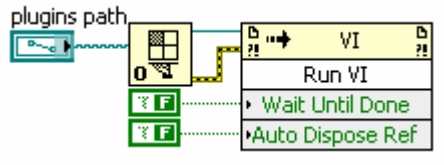

HIGH
A + B
A
B
A + B
MPL
Spectral
A + B
LOW
A + B
A
B
MPL
Spectral
A + B

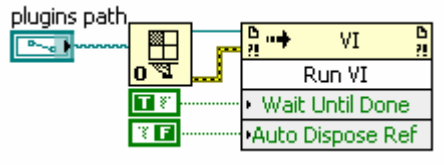

User Interface
display selection
subpanel top
display selection
subpanel bottom
Acquired data
Processed data
Acqu. task 1
Acqu. task 2
Acqu. task 3
Process. task 1
Process. task 2
Process. task 3
Display 1
Display 2
Display 3

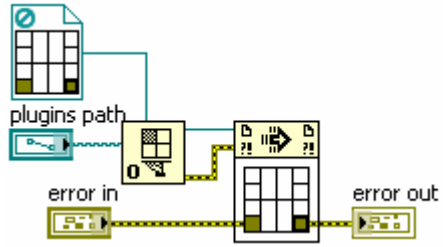


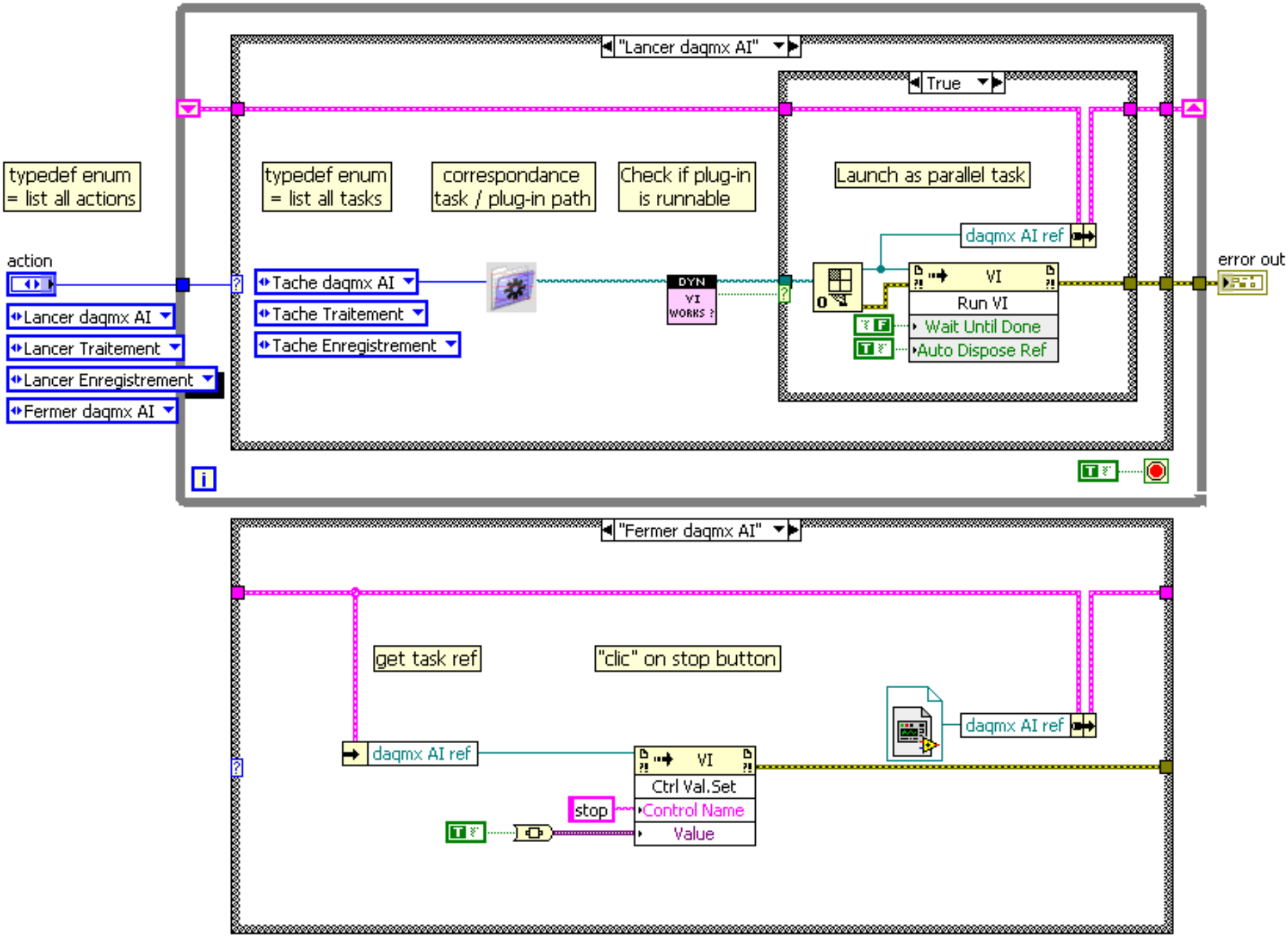
Plug-in Concept

- Basics
  - Launch parallel task
  - Run any VI dynamically
  - Run strictly-typed VI dynamically



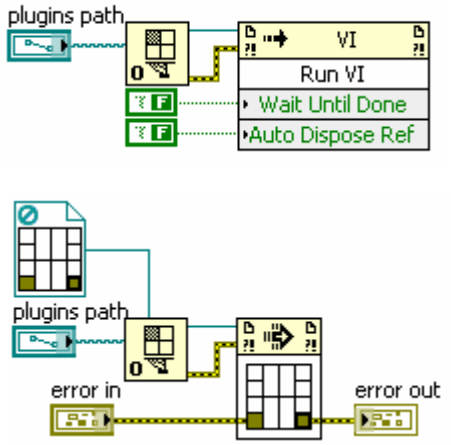





"Lancer daqmx AI"
True
typedef enum
= list all actions
typedef enum
= list all tasks
correspondance
task / plug-in path
Check if plug-in
is runnable
Launch as parallel task
action
Lancer daqmx AI
Lancer Traitement
Lancer Enregistrement
Fermer daqmx AI
Tache daqmx AI
Tache Traitement
Tache Enregistrement
DYN
VI
WORKS ?
daqmx AI ref
VI
Run VI
Wait Until Done
Auto Dispose Ref
error out
"Fermer daqmx AI"
get task ref
"clic" on stop button
daqmx AI ref
VI
Ctrl Val.Set
stop
Control Name
Value
daqmx AI ref

Considerations for building plug-ins

- Auto Dispose Ref or not?
- Run method or Call by ref?
- Sub-VI exclusion
- User.lib, Instr.lib, Addons
- Version management



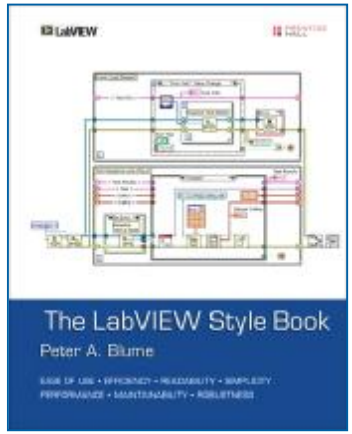
Plug-in benefitsM

- Memory efficiencyÒÕ
- Reduce initial load timeÈ
- Facilitate maintenance
- Reduce dependencies on specific hardware
- Extend functionalitieson

BUT… Require extra planning and coding

Ressources

- ni.com (forums, community, devzone)
- LAVA forum (www.lavag.org)
- LabVIEW Style Book
- LabVIEW Advanced Course Manual



Questions ?

If you want to know more :

- Ask us now
- Visit us on our stand