



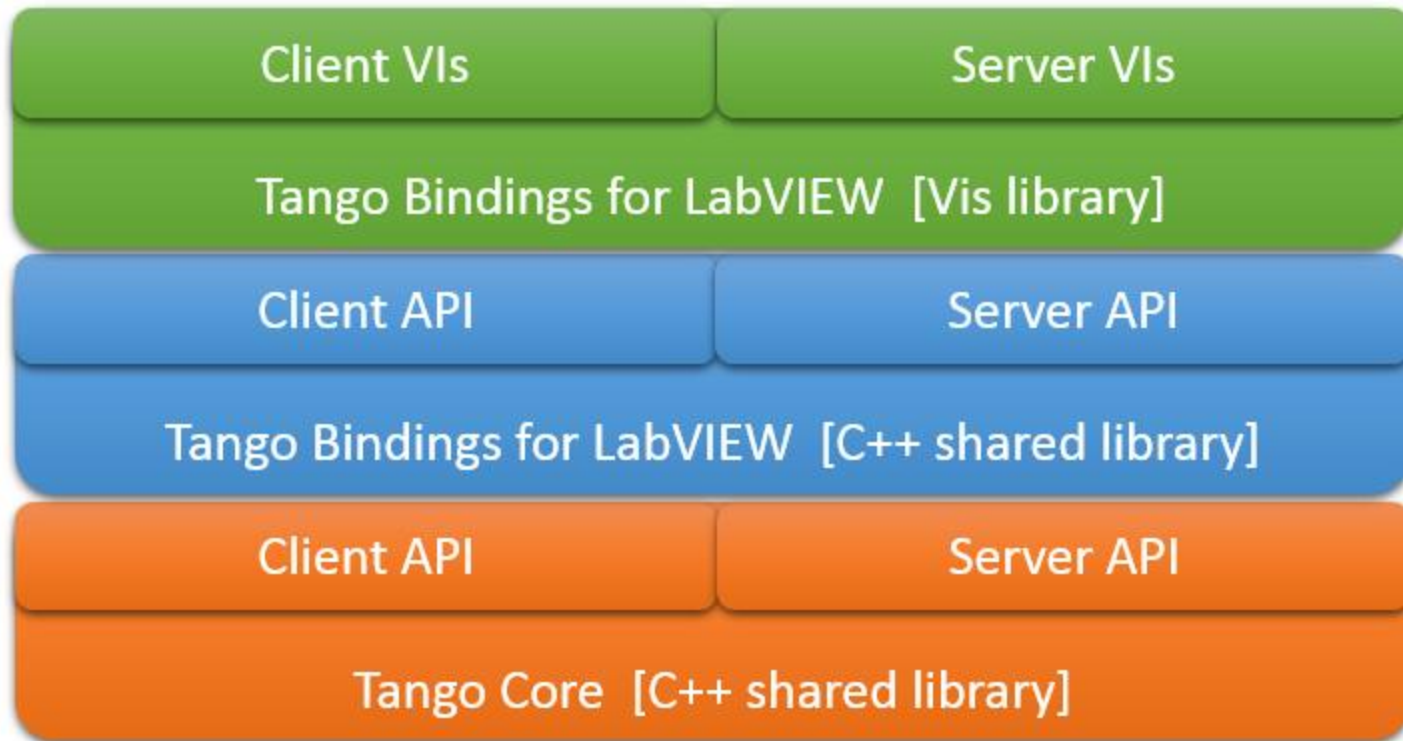
LabVIEW and TANGO for users

Birgit Plötzeneder

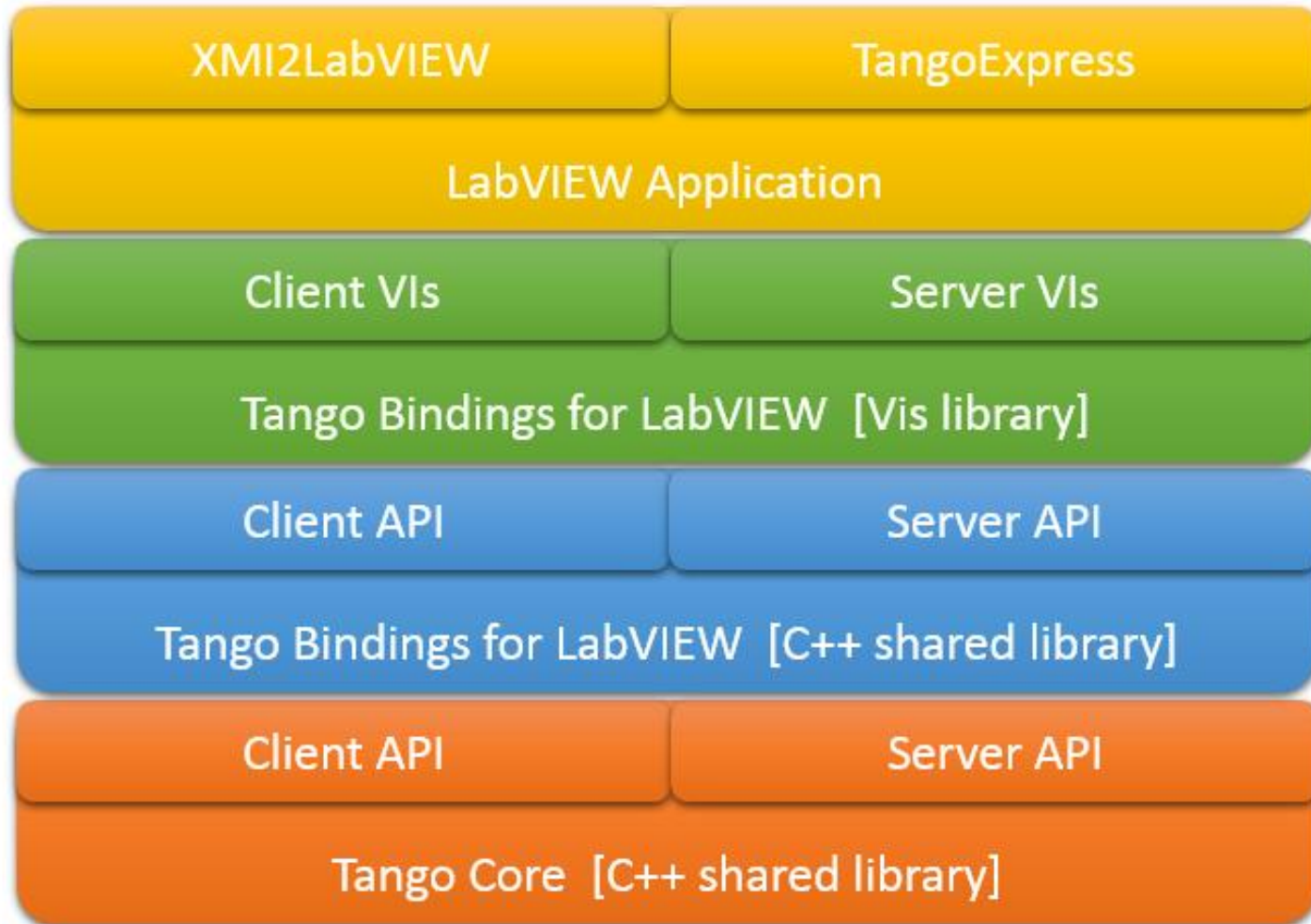
Toulouse, June 22nd, 2016



One TANGO Binding

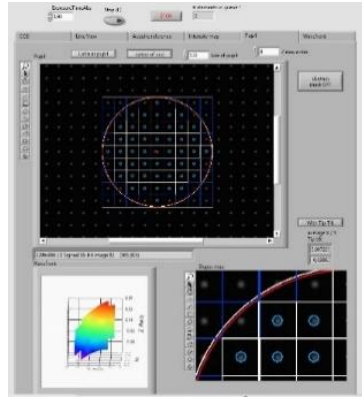


Two ways we will use it



1

Laboratory VI: Wavefront Sensing

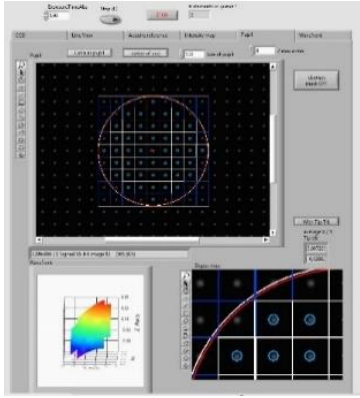


Case Study (including integration): Accary, Plötzener: Beam-synchronous Wavefront Characterization for kHz-Laser at ELI Beamlines, submitted to IBIC 2016

“I don’t even know what TANGO is, but I have this LabVIEW program and it does my DAQ. Help me get it into the main control room.”

User stories

① Laboratory VI: Wavefront Sensing

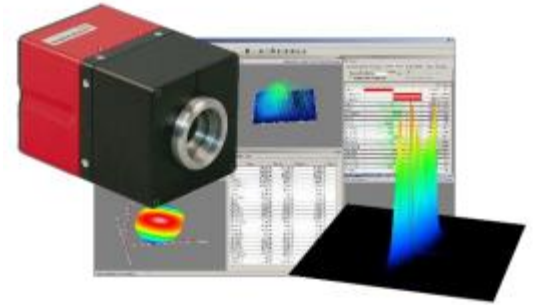


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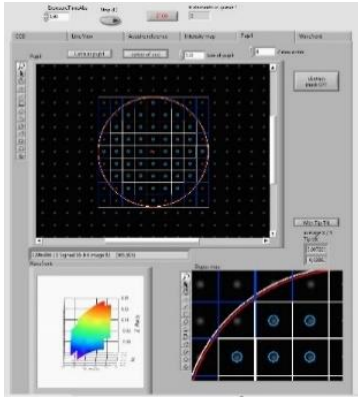
New subsystem: Adaptive Optics ②

“I will build a subsystem based on LabVIEW (because of existing drivers, wish to use NI hardware or my own skills). The main control system is TANGO.”



User stories

1 Laboratory VI: Wavefront Sensing

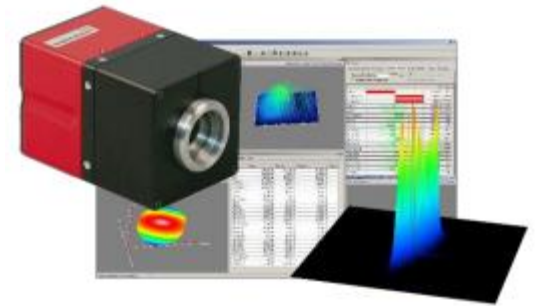


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2 New subsystem: Adaptive Optics

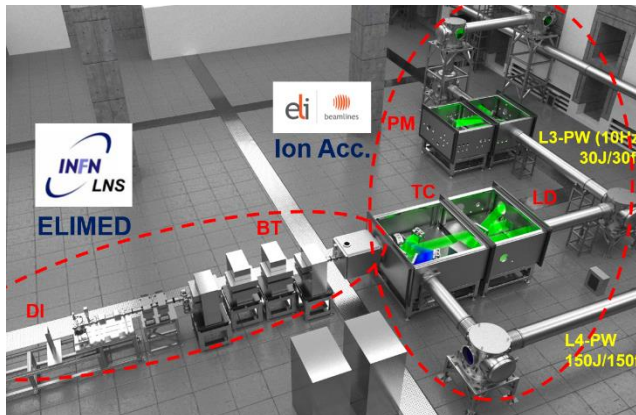
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User stories

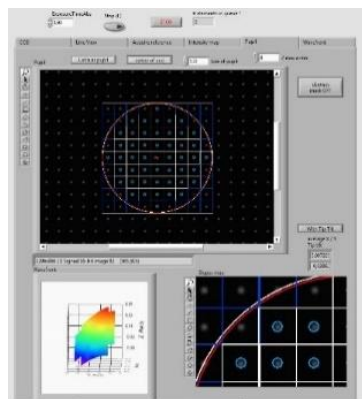
Existing subsystem : ELIMED

“I have built this station based on NI technology and have to integrate it into a facility running on TANGO.
What do I do?”



Margarone/Levato: RP 3 Status/Achievements

1 Laboratory VI: Wavefront Sensing

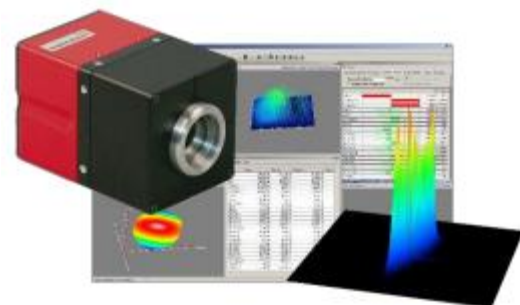


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New subsystem: Adaptive Optics

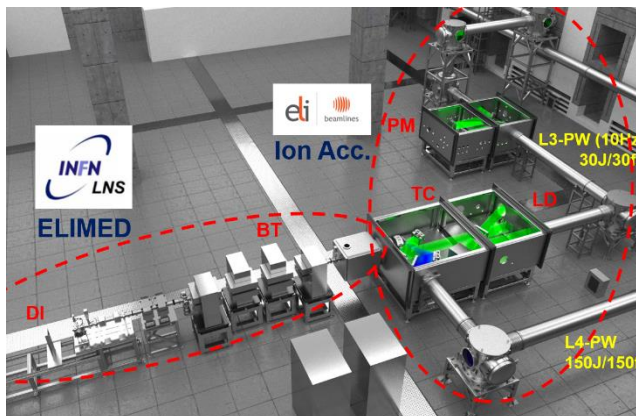
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User stories

Existing subsystem : ELIMED

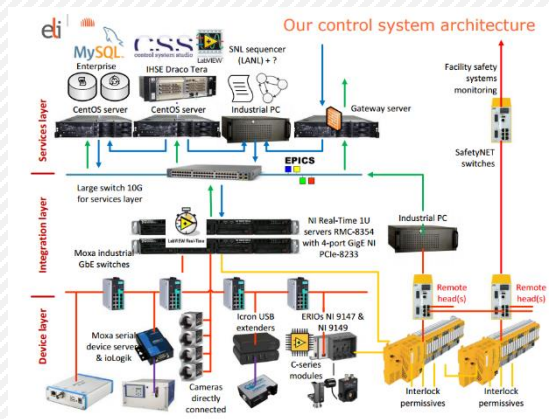
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Margarone/Levato: RP 3 Status/Achievements

External control system: L1 (2/3/4)?

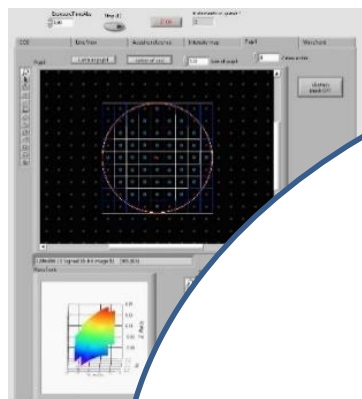
"They will deliver a CS based on LabVIEW. I need to integrate it."



Our laser control systems are currently planning to
- bridge to EPICS via LabIOC
- use the EPICS-TANGO bridge

LabVIEW-TANGO could be an option .

1 Laboratory VI: Wavefront Sensing



Case Study (including synchronous Wave Beamlines, submit

New subsystem: Adaptive Optics

2

"I don't

subsystem based on LabVIEW (because of
use NI hardware or my own skills).

Big Patterns:

User-programmers are inexperienced in
TANGO OR LabVIEW (.. or both)

2 kinds of integration

A: Ad-hoc, shallow, quick, CLAD

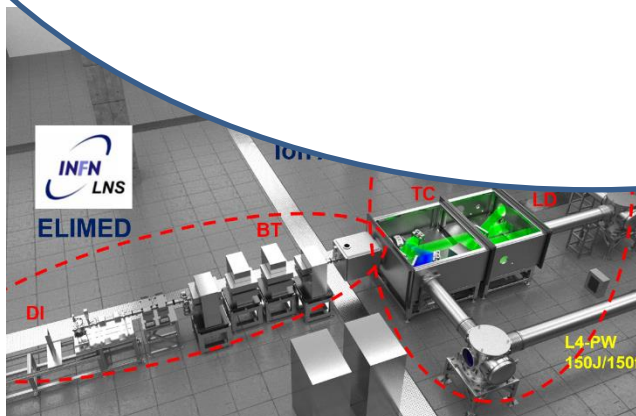
B: Long-term, better architecture, CLD

Existing
ELIMED

"I have built this

integrate it into
a facility running
on TANGO.

What do I do?"



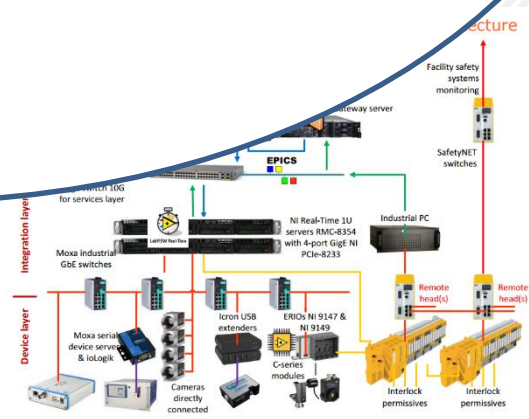
Margarone/Levato: RP 3 Status/Achievements

Control system:

"W. I need to integrate it."

Our laser control systems
are currently planning to
- bridge to EPICS via
LabIOC
- use the EPICS-TANGO
bridge

LabVIEW-TANGO could
be an option.



Naylon: Control system architecture for the L1 laser at
ELI Beamlines, ICALEPCS, 2015

3

4

One solution doesn't fit everyone

XMI2LabVIEW



TANGO-centric approach
load an XMI-file (generated from POGO)
and let it generate an empty LabVIEW
program with the communication in the
background

Really easy to use (no TANGO skills!)
Nice architecture in LabVIEW on CLD level
(events or message-queue)

New subsystem:
Adaptive Optics Loop

3

Existing subsystem:
ELIMED

2


XMI2LabVIEW

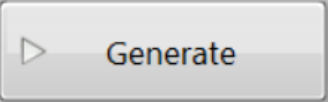
Source

C:_experiments_LVTango...\examples\xmi\LabviewTangoTest.xmi

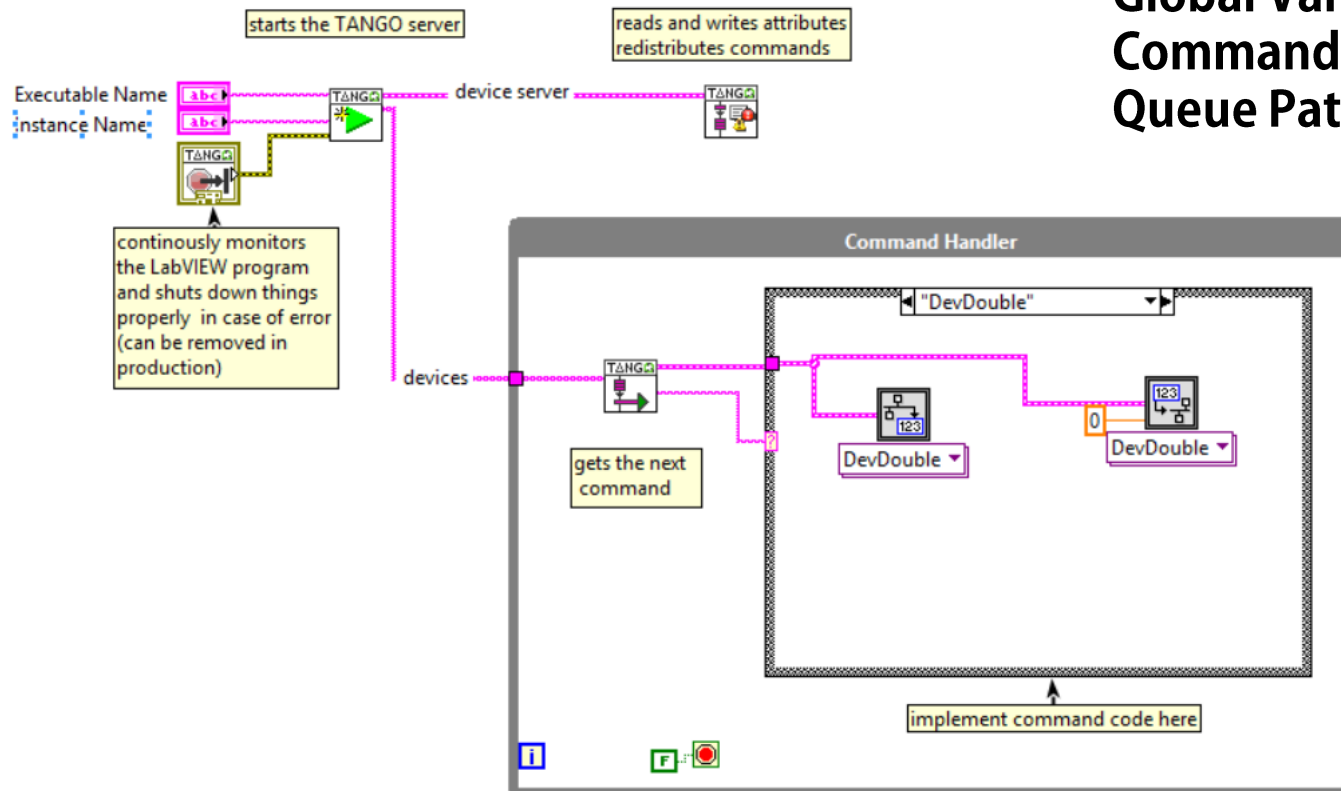
TargetPath

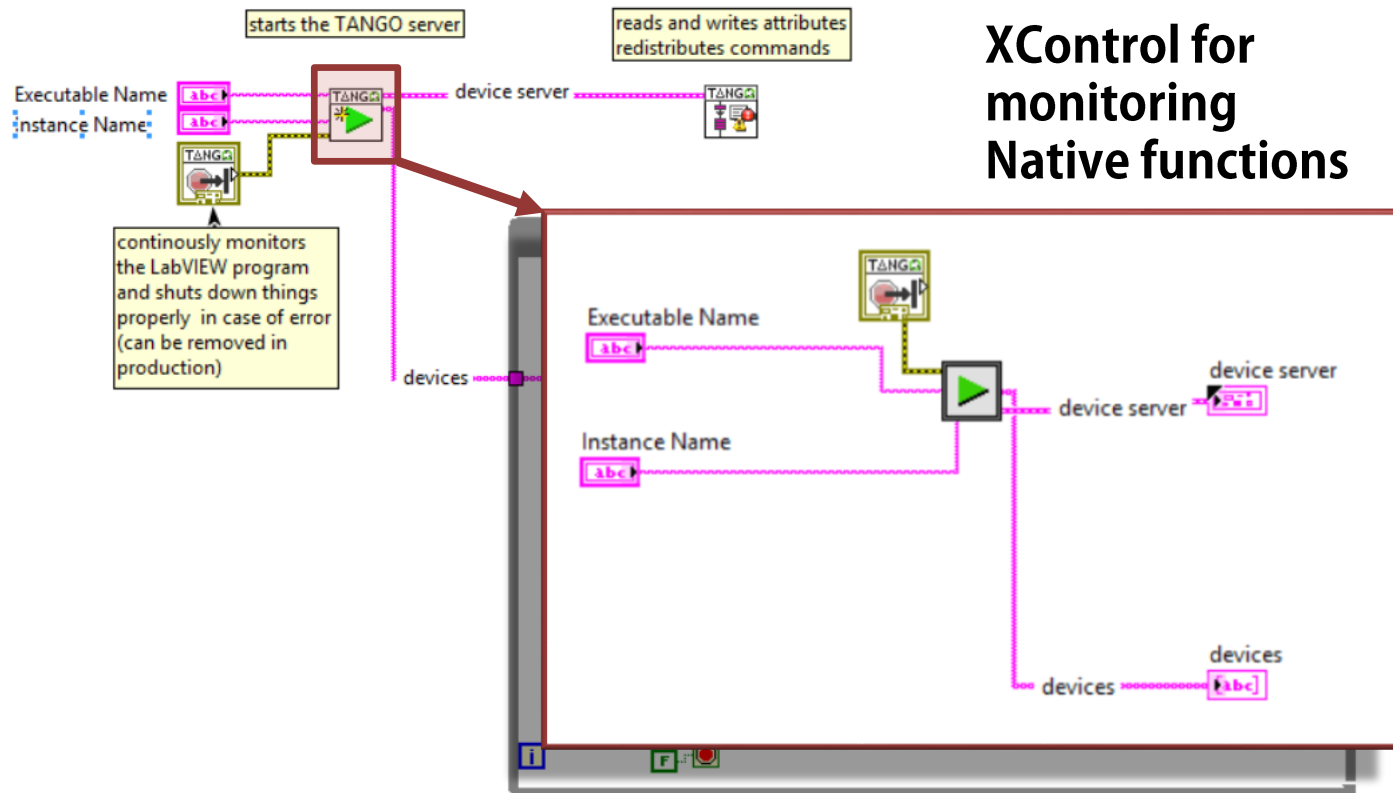
C:_experiments_LVTango\Target

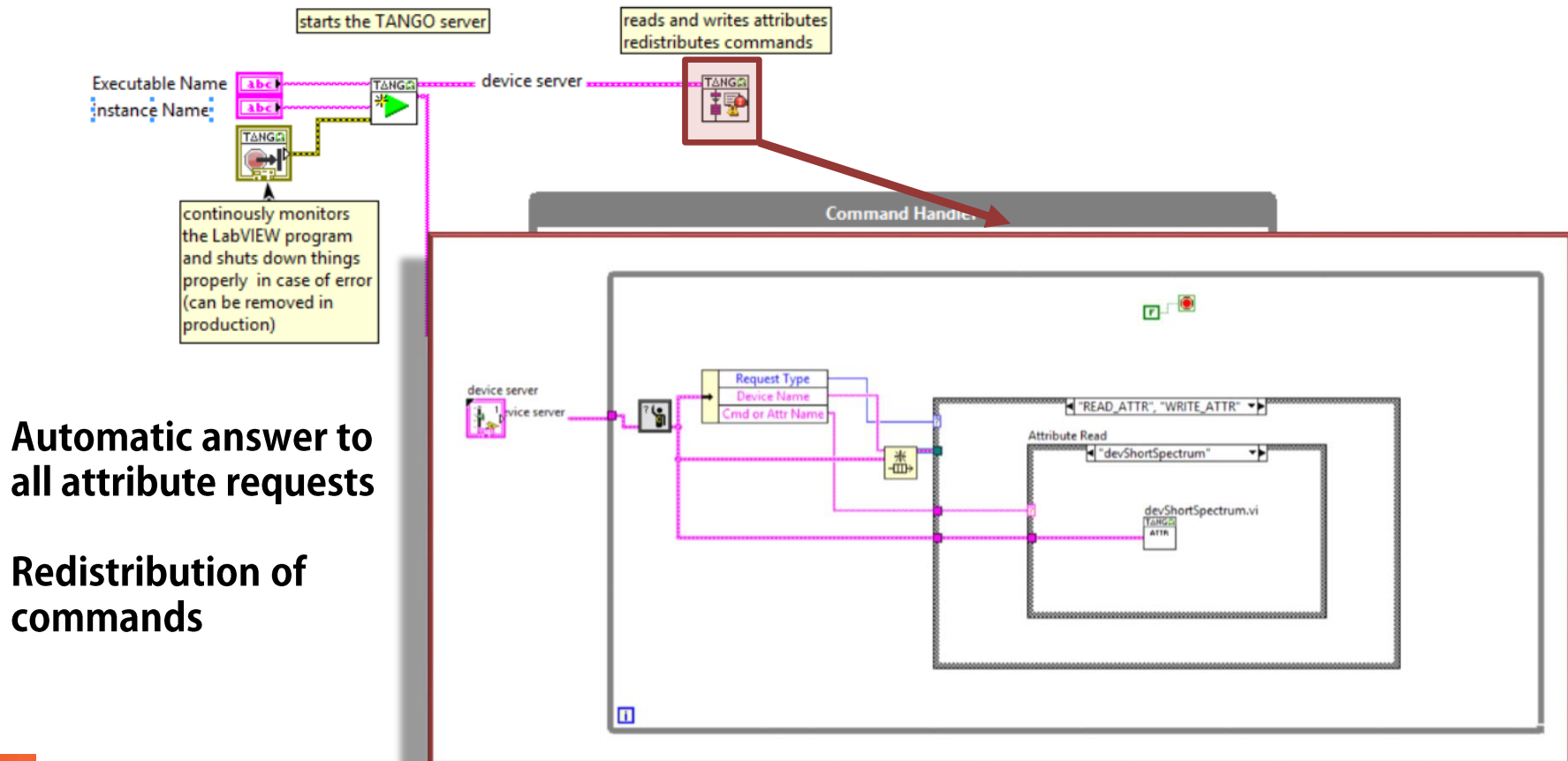
 TANGO

 Generate

Attributes: "Functional Global Variables"
Commands: Message Queue Pattern

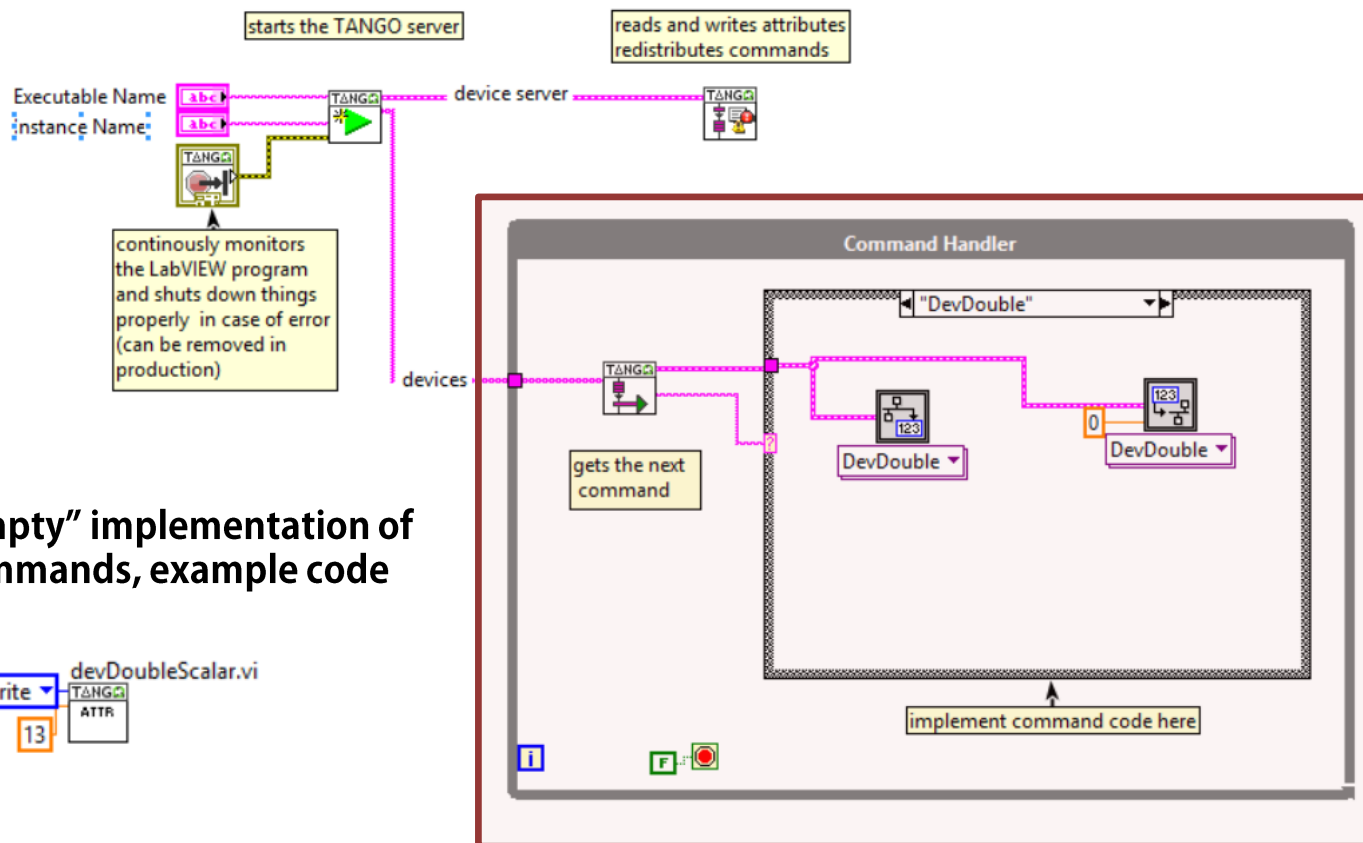




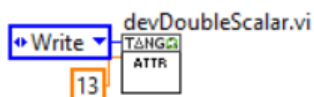


**Automatic answer to
all attribute requests**

**Redistribution of
commands**



"Empty" implementation of Commands, example code



One solution doesn't fit everyone



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(events or message-queue)

3 New subsystem:
Adaptive Optics Loop

2 Existing subsystem:
ELIMED

4 External control
system: L1

TangoExpress

LabVIEW-centric approach
Drop an Express-vi in an existing LabVIEW
program and let it do the rest

Zero skills required
Shallow integration,
Sub-optimal architecture

Laboratory VI:
Wavefront Sensing

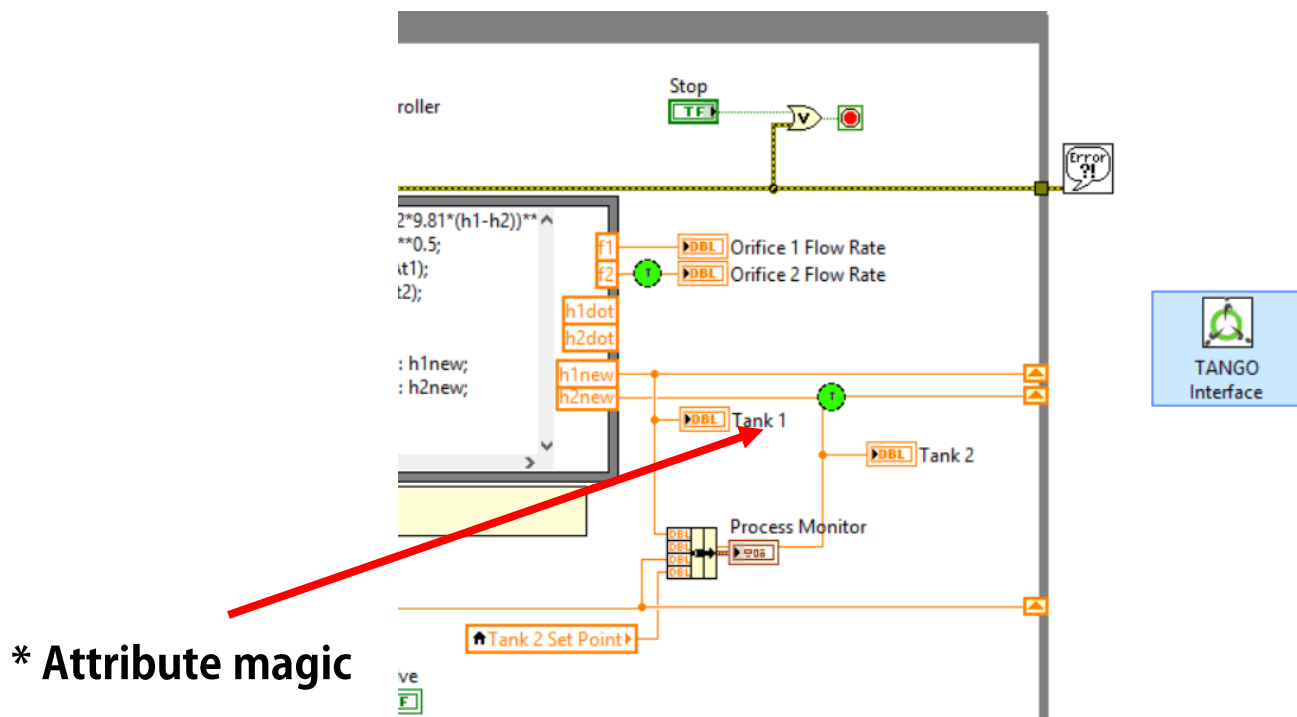
1

In the background:
LV-TANGO Library

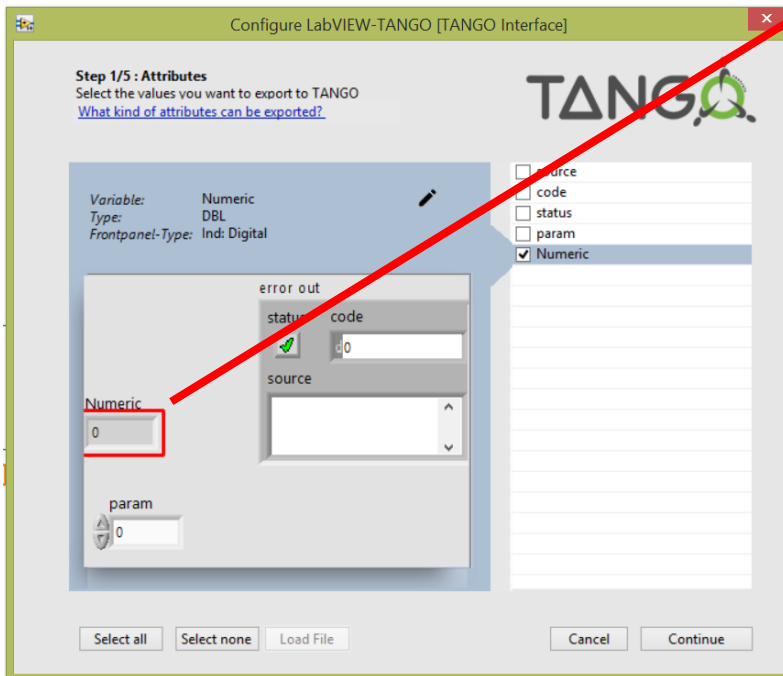
Extra Focus on
"Zero-Prereqs"-
docs (most users
are not software
engineers)

Demo: TangoExpress

TangoExpress - What does it create?

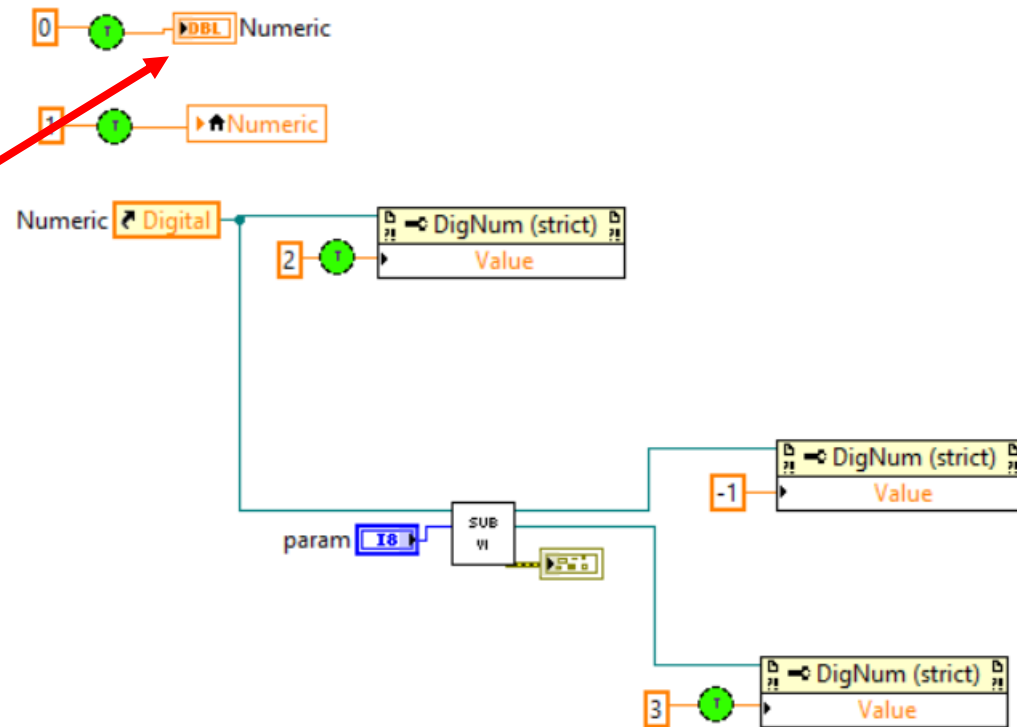
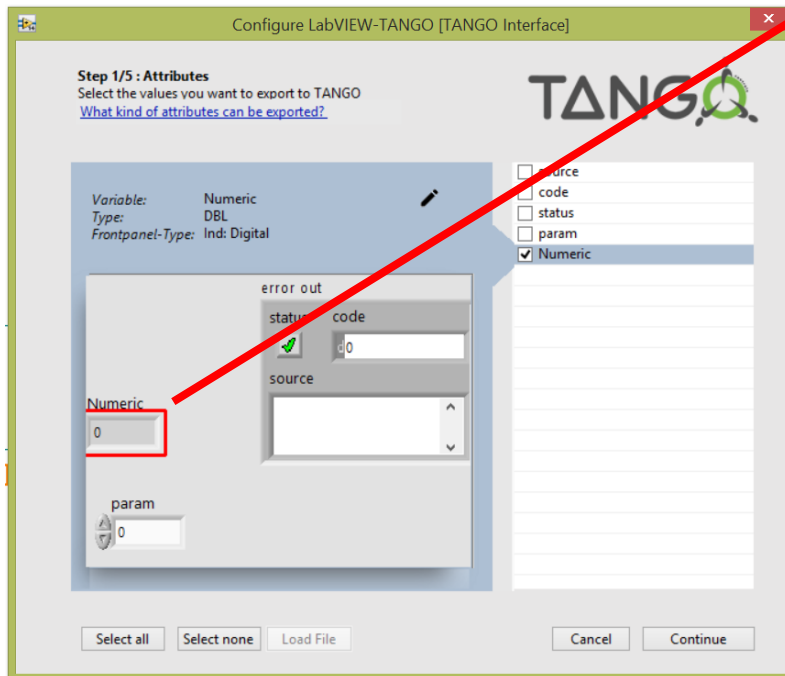


Whenever you modify your FP element (direct, via reference or local variable, in a subvi etc), it intercepts the value



<https://decibel.ni.com/content/blogs/bp/2016/06/15/vi-scripting-following-a-wire-from-source-node-to-end-node>

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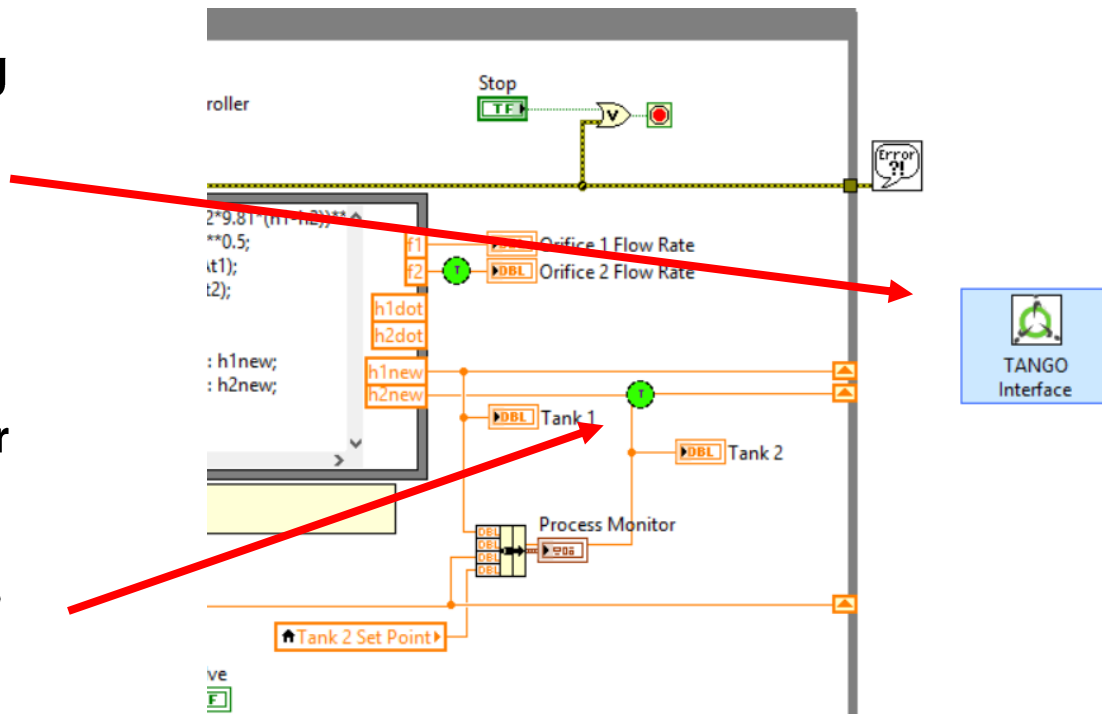
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* Changes via Events not yet implemented

Creates communication / glue code implementing all commands and answering to client requests

Attribute Magic

Whenever you modify your FP Element (direct, via reference or local variable, in a subvi etc), it intercepts the value



XMI2LabVIEW

**First “real” testcase running
Wavefrontsensor (IBIC 09/2016)**

**07/2016: Internal user training
(Documentation and Beta ready)**

Summer:

- production ready**
- v3 of the library - cRIO compilation**

**Goal (12/2016): Official publication
via NI Tools Network**

TangoExpress

**Lab prototype
Functionality proven, but still
long todo: IMAQ (easy),
Waveforms (not so), States,
Errors vs exceptions
Packaging, dependencies**

Alpha test: ELI-MED (08/2016)

**Goal (12/2016): Binary beta
release**

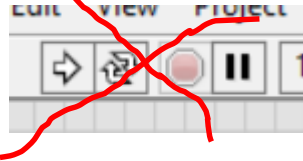
COME TO SEE!

We are open for collaboration:

- Sharing ready to use components, strategies, ideas
- Co-development for higher efficiency
- HW, SW and integration support

Extra slide: Technologies

3X-techniques that break the runtime



Practically: Start a second instance of LabVIEW and use that to modify your current files

ExpressVIs

Vis that are executed the moment you “drop” them into the parent and get a VI.
Examples from NI: DAQ, Vision, VISA,...



XControls

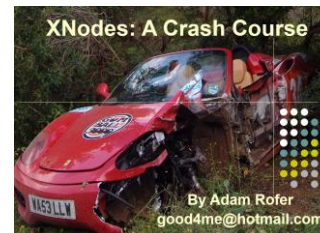
Custom Front Panel Elements (beyond style). “Abilities” = code and functionality that is hidden.
Examples from NI: Any FP Element that can right-click!
Used for background monitoring (user closes LabVIEW, TANGC and libraries are clean!)



XNodes

Sub-vis that execute in edit time
Examples from NI: any BD Element that changes its datatype

“Neither approved, supported nor condoned by NI”



VI Scripting

NI Tools for code-generation

Code is represented as wires and nodes with terminals and you can traverse through that and change it.

Aka lots of graph theory ☺

LAVA: Forums

<https://lavag.org/> ▼

Independent, community driven information on advanced LabVIEW programming concepts, with a knowledge base, FAQ, discussion forums, code downloads ...