Scripting to Save Time

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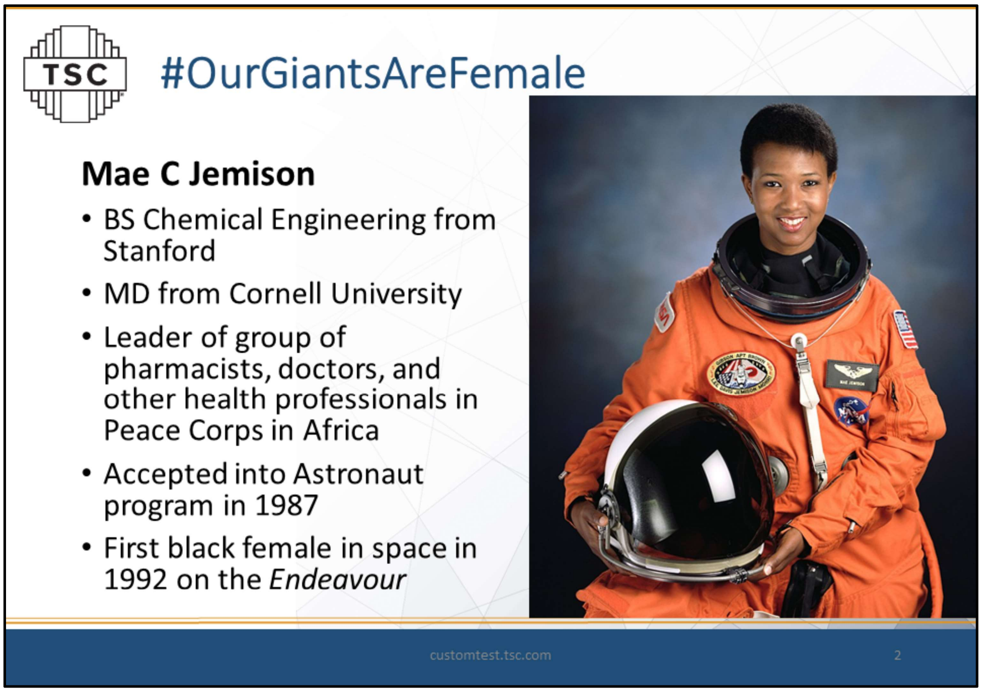
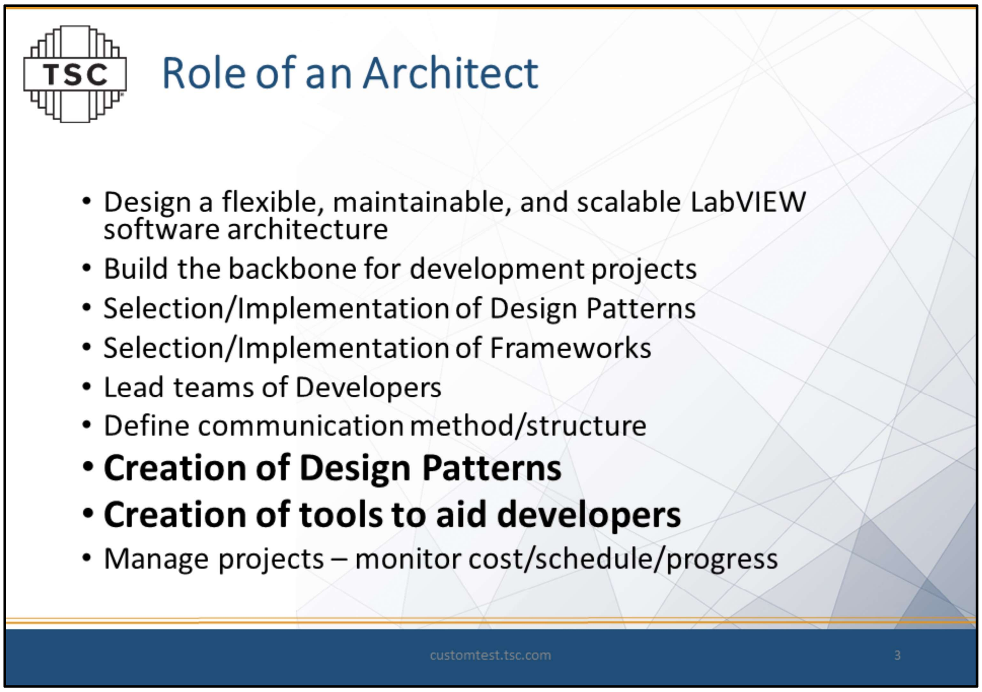


#OurGiantsAreFemale

Mae C Jemison

- BS Chemical Engineering from Stanford
- MD from Cornell University
- Leader of group of pharmacists, doctors, and other health professionals in Peace Corps in Africa
- Accepted into Astronaut program in 1987
- First black female in space in 1992 on the *Endeavour*



Role of an Architect

- Design a flexible, maintainable, and scalable LabVIEW software architecture
- Build the backbone for development projects
- Selection/Implementation of Design Patterns
- Selection/Implementation of Frameworks
- Lead teams of Developers
- Define communication method/structure
- **Creation of Design Patterns**
- **Creation of tools to aid developers**
- Manage projects – monitor cost/schedule/progress

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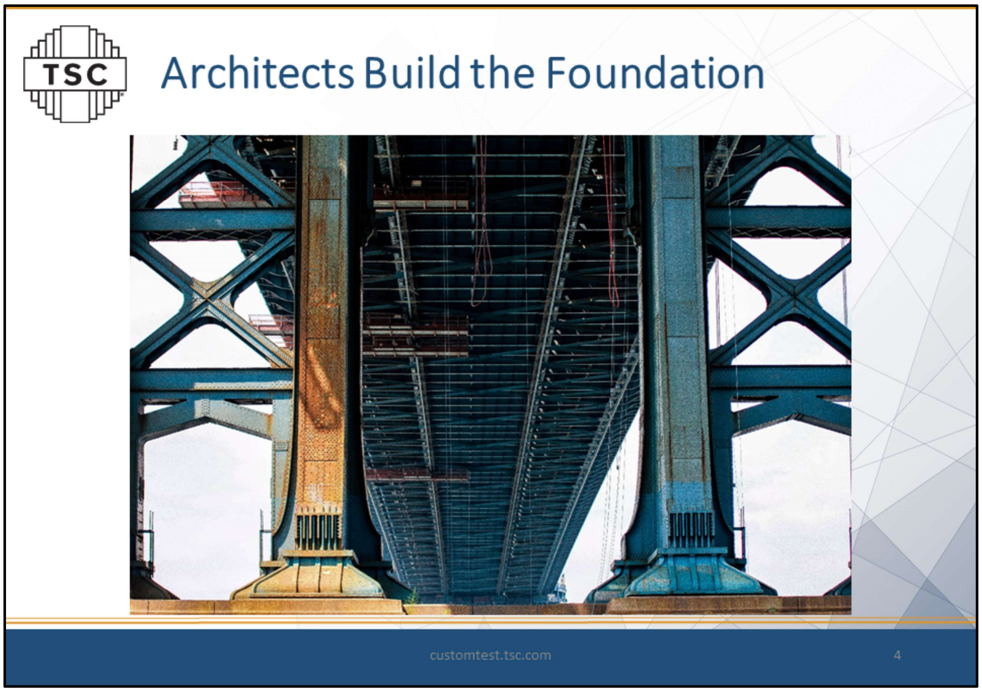

Architects Build the Foundation

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Photographer: Ghost Presenter
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TSC

We Save Time!

- Our Work:
  - Saves Time
  - Reduces Cost
  - Increases Productivity

Productivity
Time
Cost

But what about our cost?

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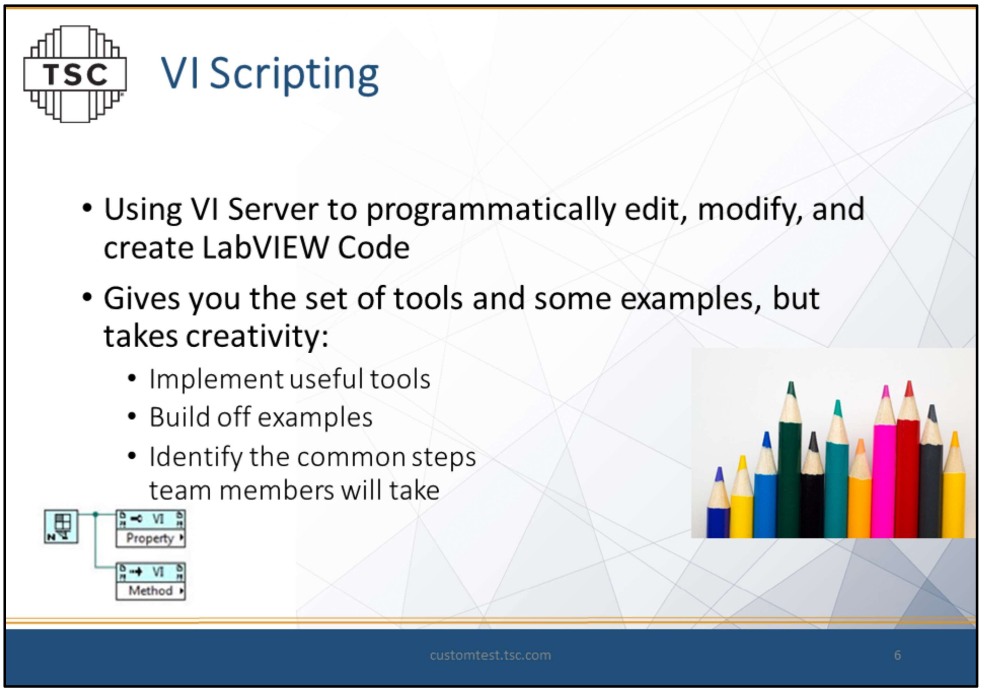
When is scripting the path forward?

Photo by Pepi Stojanovski on Unsplash
https://unsplash.com/photos/MJSFNZ8BAXw



TSC

VI Scripting

- Using VI Server to programmatically edit, modify, and create LabVIEW Code
- Gives you the set of tools and some examples, but takes creativity:
  - Implement useful tools
  - Build off examples
  - Identify the common steps team members will take

VI
Property
VI
Method

VI Scripting is a method to create the tools that can help our developers save time
-Who uses the tools? Customers, team members, end users

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Photographer: Salvatore Ventura
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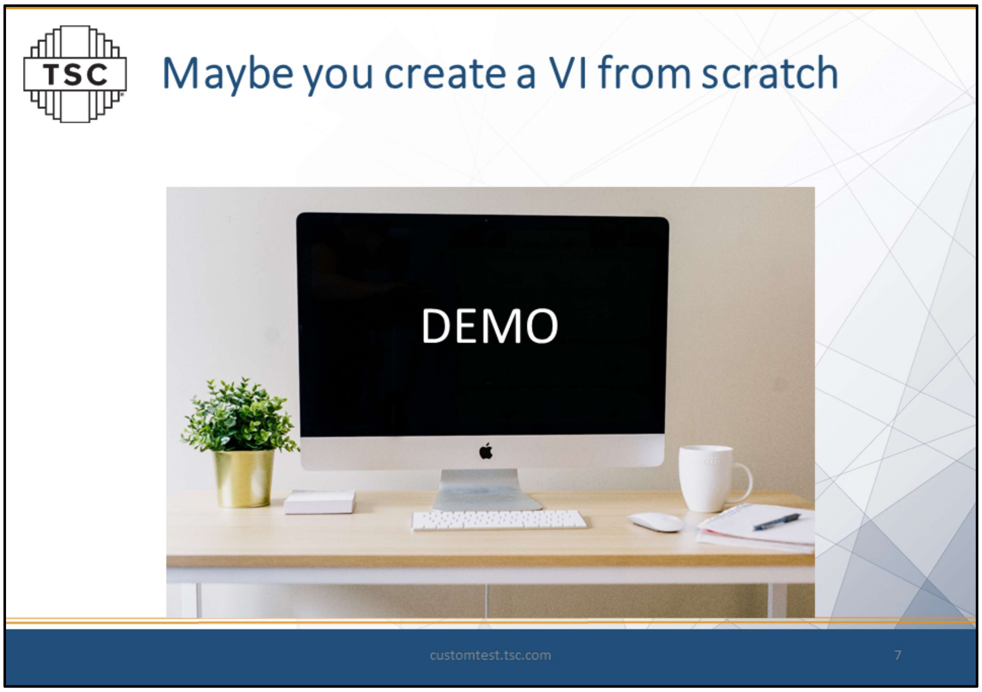

Maybe you create a VI from scratch

DEMO

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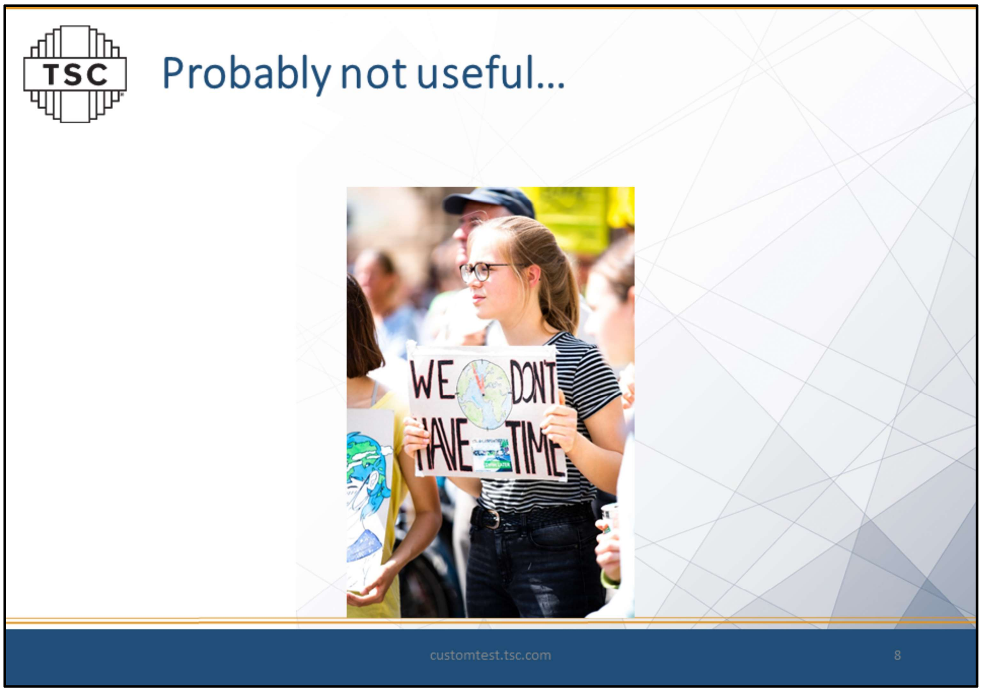
BD Drawing Demo

Photo by Amy Hirschi on Unsplash
Link: https://unsplash.com/photos/dVMWZDpCUlo



Probably not useful…

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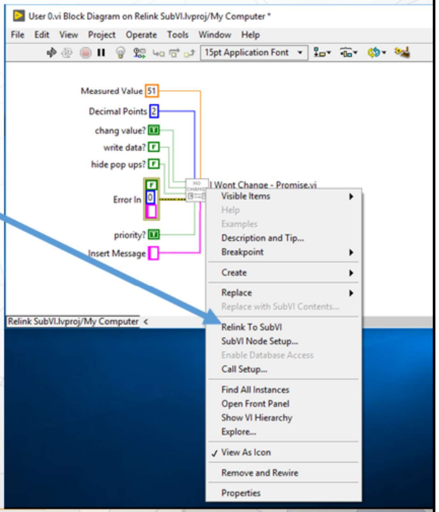
Photo by **Markus Spiske temporausch.com** from **Pexels**
Link: https://www.pexels.com/photo/woman-holding-we-don-t-have-time-signage-2559747/

One off to save time

- Relink to subVI?
- Not too painful for a few instances…



Scripting Relink

DEMO

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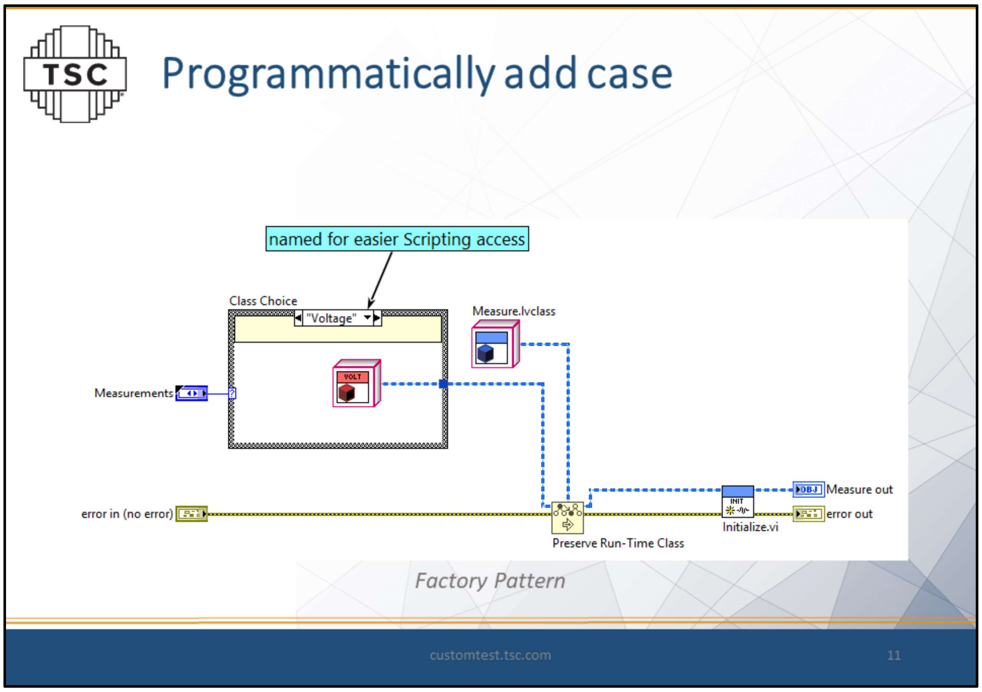
Relink SubVI Demo

Photo by Amy Hirschi on Unsplash
Link: https://unsplash.com/photos/dVMWZDpCUlo



Programmatically add case

Factory Pattern

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Using factory pattern to load specific measurement type at run-time; could do this from file by loading default class type and casting, however we can also achieve it with a simple case structure that grows over time

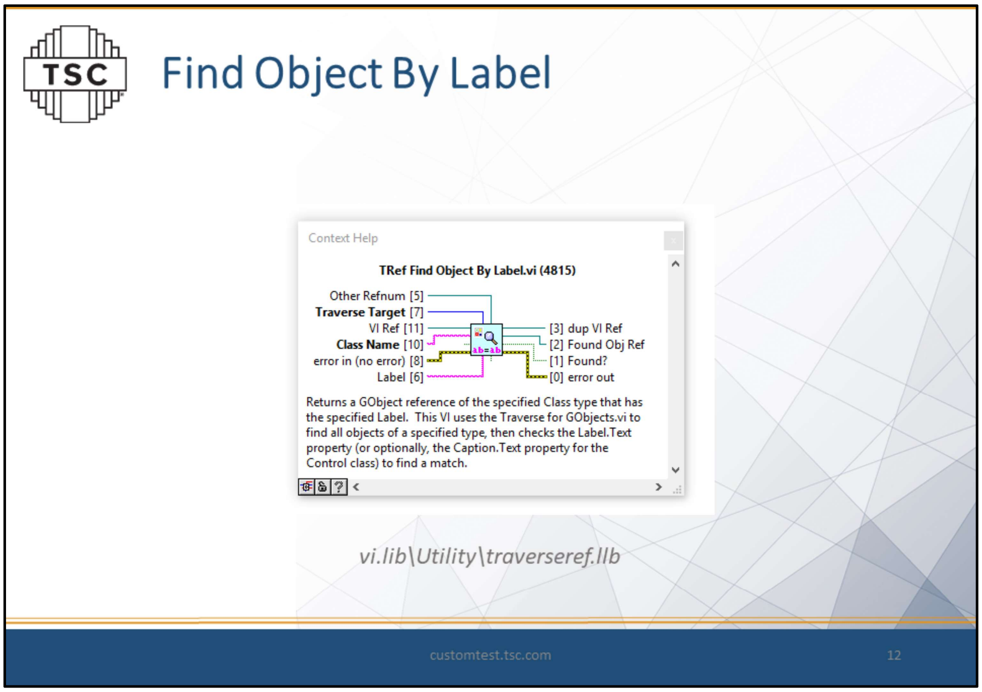
-We could create our new class, set the inheritance, and create the override functions

-Then update the type def of measurement types

-Then add a case to the case structure

OR

Script it out and only work on filling out the functions; not the structure



Find Object By Label

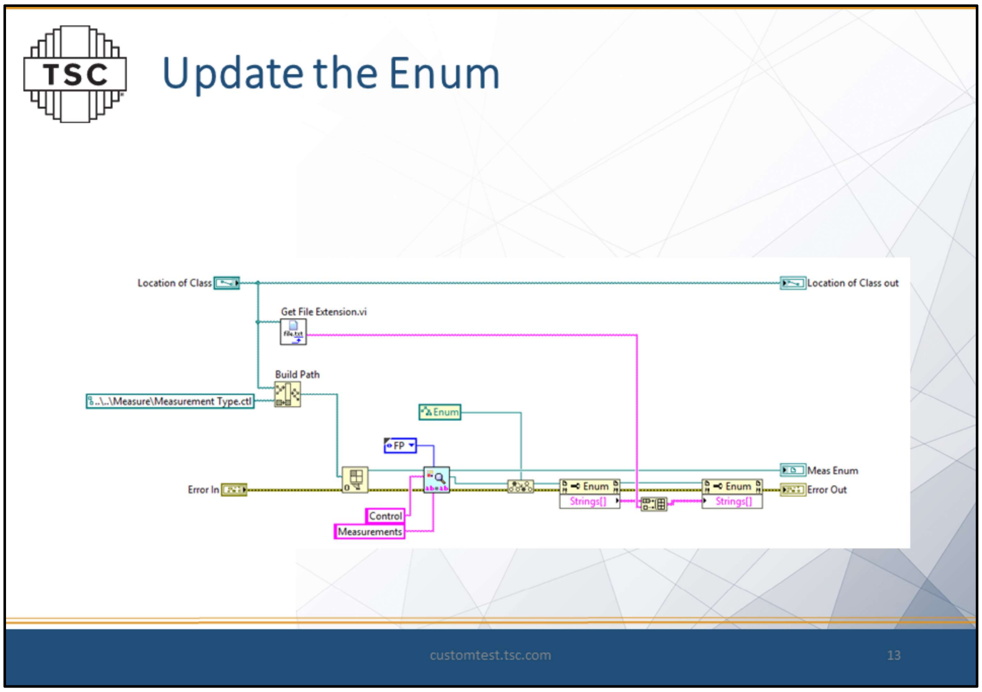
Context Help

TRef Find Object By Label.vi (4815)

Returns a GObject reference of the specified Class type that has the specified Label. This VI uses the Traverse for GObjects.vi to find all objects of a specified type, then checks the Label.Text property (or optionally, the Caption.Text property for the Control class) to find a match.

vi.lib\Utility\traverseref.llb

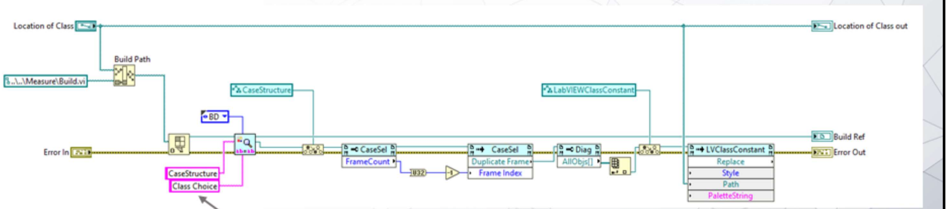
Tref Find Object By Label is an extremely useful VI that will get references to the objects on the front panel or the block diagram



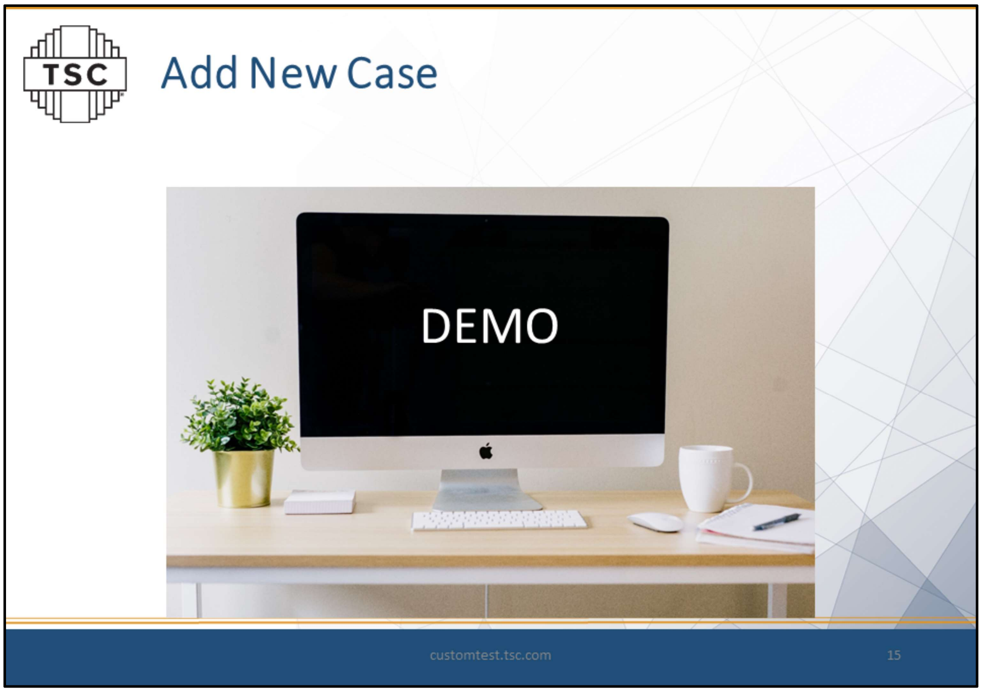
Update the Enum

Open the control, get the list of items, add the new class to the list

Update the Build VI



Name of the Case Structure



Add New Case

DEMO

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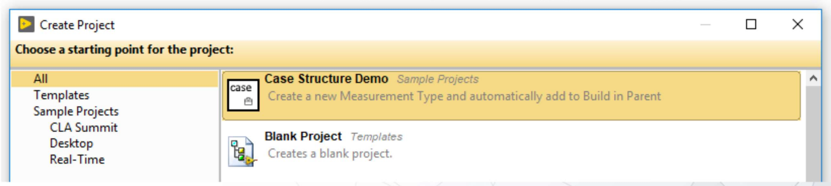
Scripting new case

Photo by Amy Hirschi on Unsplash
Link: https://unsplash.com/photos/dVMWZDpCUlo

Step Further – Project Template



Create Project

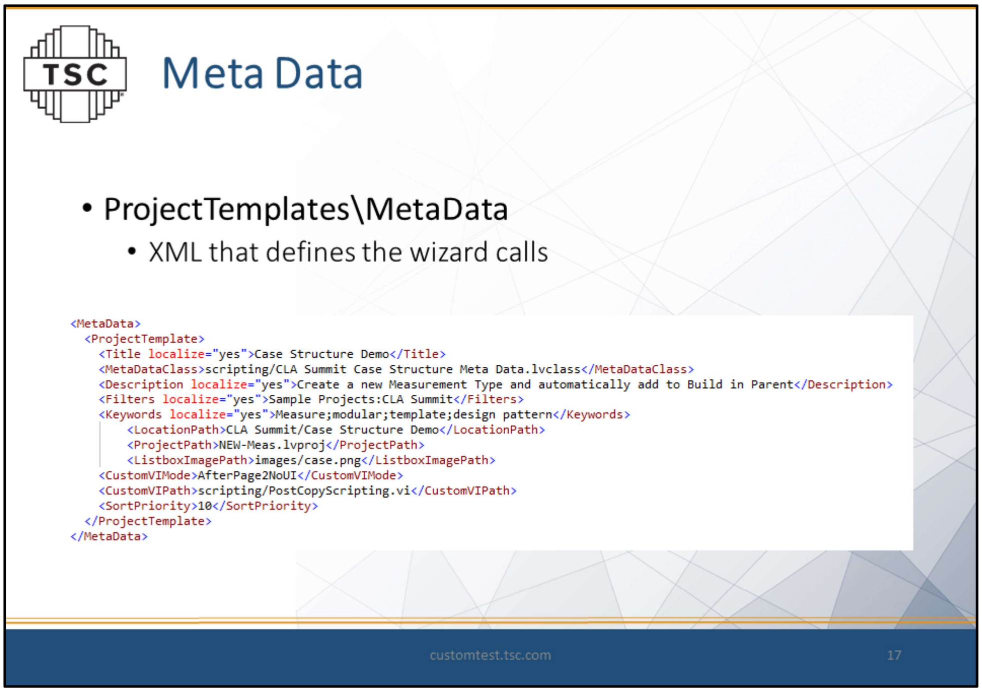
Choose a starting point for the project:

- All
- Templates
- Sample Projects
  - CLA Summit
  - Desktop
  - Real-Time

Case Structure Demo *Sample Projects*
Create a new Measurement Type and automatically add to Build in Parent

Blank Project *Templates*
Creates a blank project.

Project Template

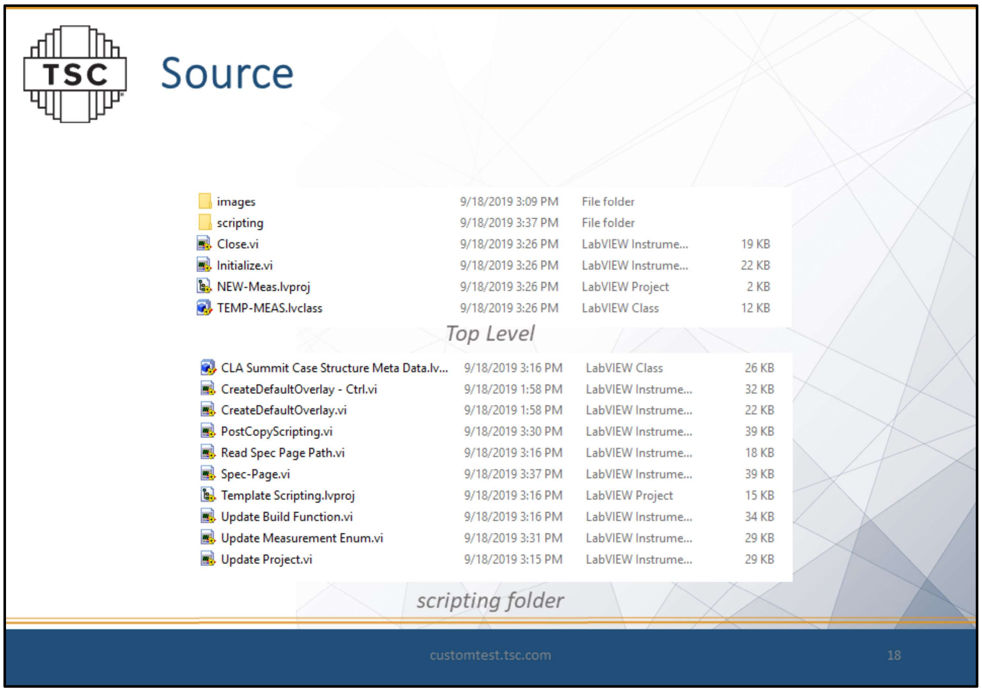


Meta Data

- ProjectTemplates\MetaData
  - XML that defines the wizard calls

```xml
<MetaData>
  <ProjectTemplate>
    <Title localize="yes">Case Structure Demo</Title>
    <MetaDataClass>scripting/CLA Summit Case Structure Meta Data.lvclass</MetaDataClass>
    <Description localize="yes">Create a new Measurement Type and automatically add to Build in Parent</Description>
    <Filters localize="yes">Sample Projects:CLA Summit</Filters>
    <Keywords localize="yes">Measure;modular;template;design pattern</Keywords>
        <LocationPath>CLA Summit/Case Structure Demo</LocationPath>
        <ProjectPath>NEW-Meas.lvproj</ProjectPath>
        <ListboxImagePath>images/case.png</ListboxImagePath>
    <CustomVIMode>AfterPage2NoUI</CustomVIMode>
    <CustomVIPath>scripting/PostCopyScripting.vi</CustomVIPath>
    <SortPriority>10</SortPriority>
  </ProjectTemplate>
</MetaData>
```

Title: name for the create project dialog
MetaDataClass: location of the class inheriting from MetaDataObj.lvclass (resource\dialog\NewProjectWizard\MetaDataObj)
Description: descriptive text for dialog
LocationPath: where the project exists, under the ProjectTemplates\Source folder
ProjectPath: your template project that will be copied to new location
ListboxImagePath: the picture for your template that shows in the dialog
CustomVIMode: http://www.ni.com/tutorial/14045/en/ (determines when custom VI is run during process)
CustomVIPath: the VI that will run during the creation process – uses scripting



Source

images	9/18/2019 3:09 PM	File folder	
scripting	9/18/2019 3:37 PM	File folder	
Close.vi	9/18/2019 3:26 PM	LabVIEW Instrume...	19 KB
Initialize.vi	9/18/2019 3:26 PM	LabVIEW Instrume...	22 KB
NEW-Meas.lvproj	9/18/2019 3:26 PM	LabVIEW Project	2 KB
TEMP-MEAS.lvclass	9/18/2019 3:26 PM	LabVIEW Class	12 KB

Top Level

CLA Summit Case Structure Meta Data.lv...	9/18/2019 3:16 PM	LabVIEW Class	26 KB
CreateDefaultOverlay - Ctrl.vi	9/18/2019 1:58 PM	LabVIEW Instrume...	32 KB
CreateDefaultOverlay.vi	9/18/2019 1:58 PM	LabVIEW Instrume...	22 KB
PostCopyScripting.vi	9/18/2019 3:30 PM	LabVIEW Instrume...	39 KB
Read Spec Page Path.vi	9/18/2019 3:16 PM	LabVIEW Instrume...	18 KB
Spec-Page.vi	9/18/2019 3:37 PM	LabVIEW Instrume...	39 KB
Template Scripting.lvproj	9/18/2019 3:16 PM	LabVIEW Project	15 KB
Update Build Function.vi	9/18/2019 3:16 PM	LabVIEW Instrume...	34 KB
Update Measurement Enum.vi	9/18/2019 3:31 PM	LabVIEW Instrume...	29 KB
Update Project.vi	9/18/2019 3:15 PM	LabVIEW Instrume...	29 KB

scripting folder

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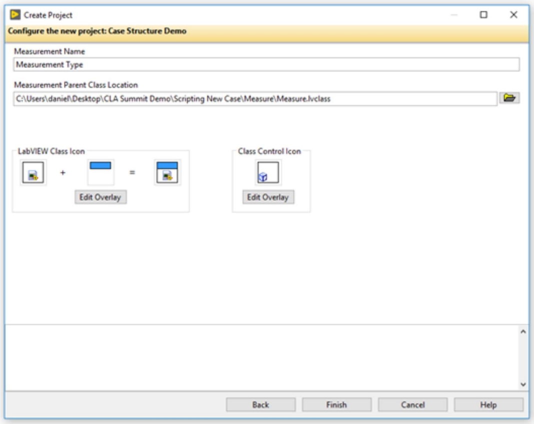
In this example, NEW-Meas.lvproj is what gets copied and what the scripting code will run on

Scripting folder contains the VIs necessary to add a page to the dialog and run scripting code after copying

Actor Framework is a great example to build off of: ProjectTemplates\Source\Core\Actor Framework

Demo Project Template Page

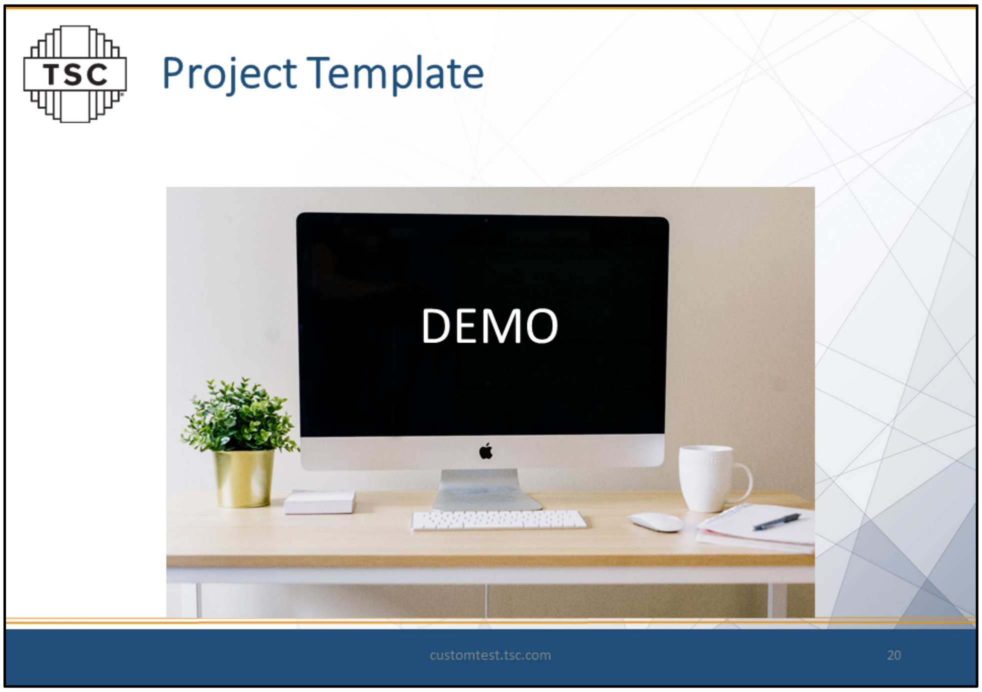


Create Project

Configure the new project: Case Structure Demo

Measurement Name: Measurement Type

Measurement Parent Class Location: C:\Users\daniel\Desktop\CLA Summit Demo\Scripting New Case\Measure\Measure.lvclass



Project Template

DEMO

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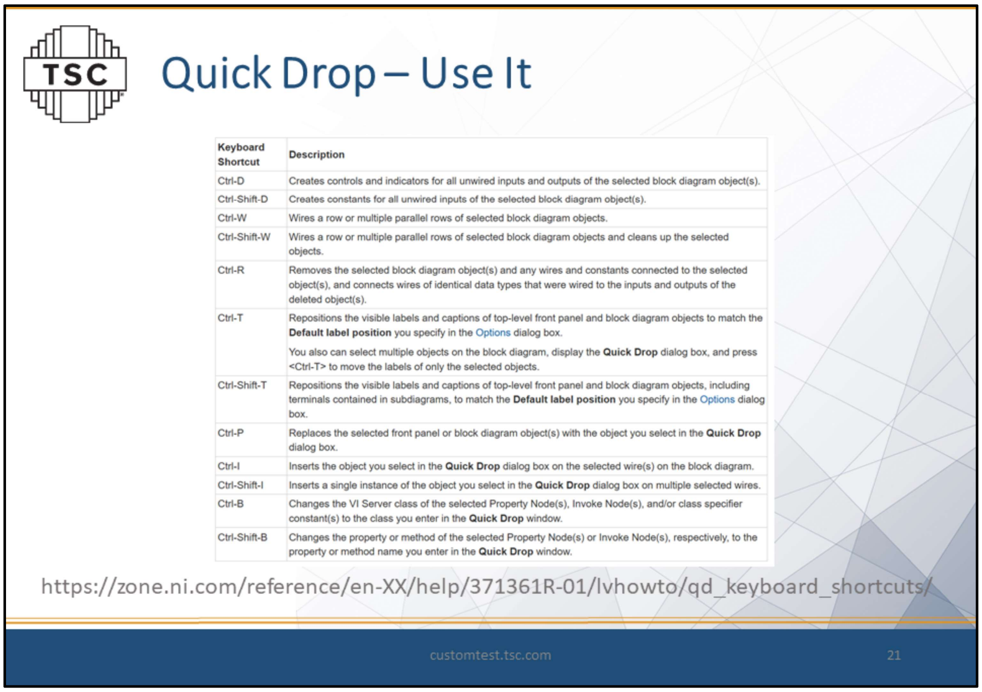
Project Template Demo

Photo by Amy Hirschi on Unsplash
Link: https://unsplash.com/photos/dVMWZDpCUlo



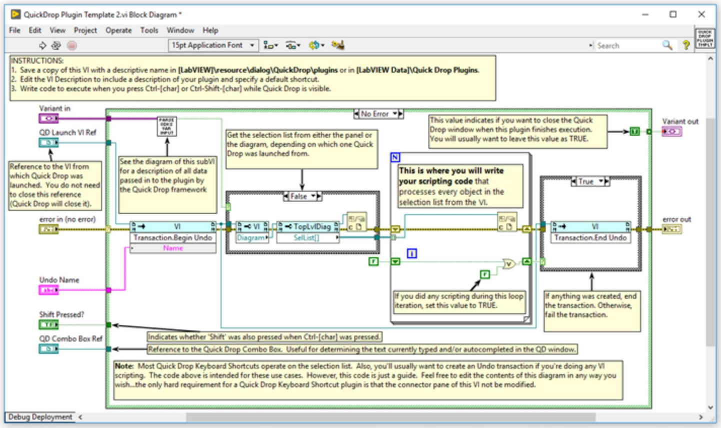
Quick Drop – Use It

Keyboard Shortcut	Description
Ctrl-D	Creates controls and indicators for all unwired inputs and outputs of the selected block diagram object(s).
Ctrl-Shift-D	Creates constants for all unwired inputs of the selected block diagram object(s).
Ctrl-W	Wires a row or multiple parallel rows of selected block diagram objects.
Ctrl-Shift-W	Wires a row or multiple parallel rows of selected block diagram objects and cleans up the selected objects.
Ctrl-R	Removes the selected block diagram object(s) and any wires and constants connected to the selected object(s), and connects wires of identical data types that were wired to the inputs and outputs of the deleted object(s).
Ctrl-T	Repositions the visible labels and captions of top-level front panel and block diagram objects to match the **Default label position** you specify in the Options dialog box. You also can select multiple objects on the block diagram, display the **Quick Drop** dialog box, and press <Ctrl-T> to move the labels of only the selected objects.
Ctrl-Shift-T	Repositions the visible labels and captions of top-level front panel and block diagram objects, including terminals contained in subdiagrams, to match the **Default label position** you specify in the Options dialog box.
Ctrl-P	Replaces the selected front panel or block diagram object(s) with the object you select in the **Quick Drop** dialog box.
Ctrl-I	Inserts the object you select in the **Quick Drop** dialog box on the selected wire(s) on the block diagram.
Ctrl-Shift-I	Inserts a single instance of the object you select in the **Quick Drop** dialog box on multiple selected wires.
Ctrl-B	Changes the VI Server class of the selected Property Node(s), Invoke Node(s), and/or class specifier constant(s) to the class you enter in the **Quick Drop** window.
Ctrl-Shift-B	Changes the property or method of the selected Property Node(s) or Invoke Node(s), respectively, to the property or method name you enter in the **Quick Drop** window.

https://zone.ni.com/reference/en-XX/help/371361R-01/lvhowto/qd_keyboard_shortcuts/

https://zone.ni.com/reference/en-XX/help/371361R-01/lvhowto/qd_keyboard_shortcuts/
More defaults added in LabVIEW 2018

Quick Drop – Your Own Shortcuts (or leverage the community…)



INSTRUCTIONS:
1. Save a copy of this VI with a descriptive name in **[LabVIEW]\resource\dialog\QuickDrop\plugins** or in **[LabVIEW Data]\Quick Drop Plugins**.
2. Edit the VI Description to include a description of your plugin and specify a default shortcut.
3. Write code to execute when you press Ctrl-[char] or Ctrl-Shift-[char] while Quick Drop is visible.

Reference to the VI from which Quick Drop was launched. You do not need to close this reference (Quick Drop will close it).

See the diagram of this subVI for a description of all data passed in to the plugin by the Quick Drop framework

Get the selection list from either the panel or the diagram, depending on which one Quick Drop was launched from.

This value indicates if you want to close the Quick Drop window when this plugin finishes execution. You will usually want to leave this value as TRUE.

This is where you will write your scripting code that processes every object in the selection list from the VI.

If you did any scripting during this loop iteration, set this value to TRUE.

If anything was created, end the transaction. Otherwise, fail the transaction.

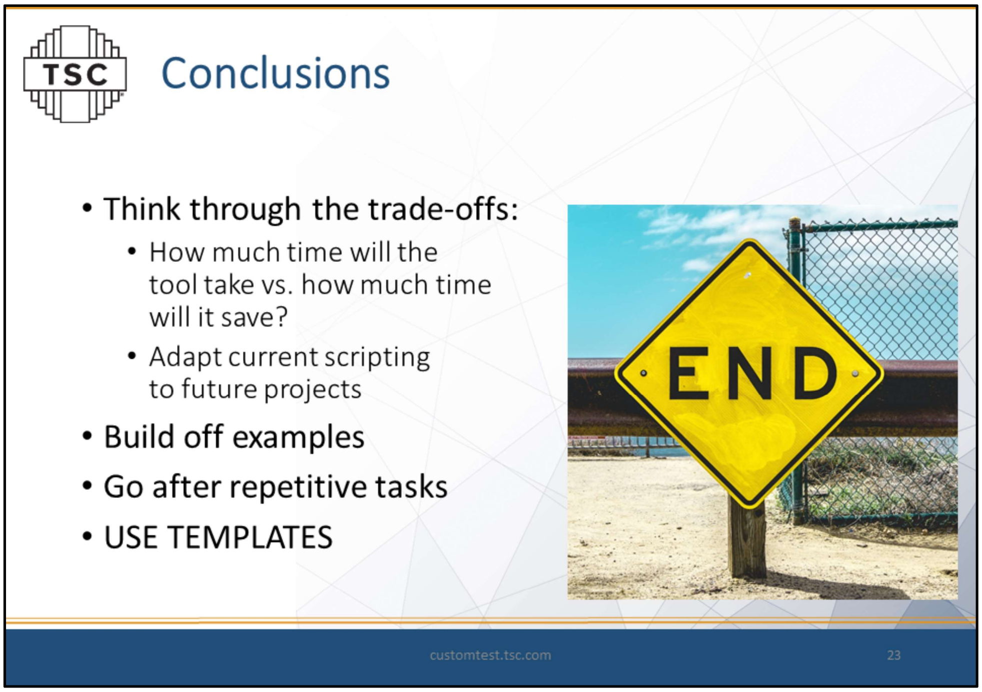
Indicates whether 'Shift' was also pressed when Ctrl-[char] was pressed.

Reference to the Quick Drop Combo Box. Useful for determining the text currently typed and/or autocompleted in the QD window.

Note: Most Quick Drop Keyboard Shortcuts operate on the selection list. Also, you'll usually want to create an Undo transaction if you're doing any VI scripting. The code above is intended for these use cases. However, this code is just a guide. Feel free to edit the contents of this diagram in any way you wish...the only hard requirement for a Quick Drop Keyboard Shortcut plugin is that the connector pane of this VI not be modified.

resource\dialog\QuickDrop

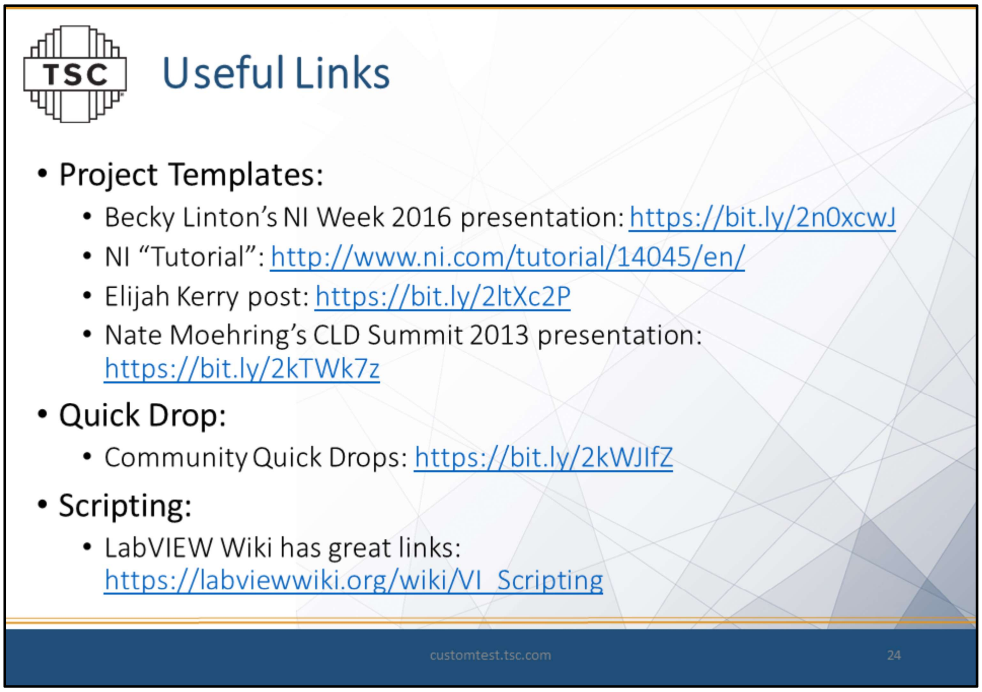
Start with the VI Template located in: resource\dialog\QuickDrop
https://forums.ni.com/t5/Quick-Drop-Enthusiasts/List-of-Community-Quick-Drop-Keyboard-Shortcuts/gpm-p/3527206?profile.language=en



Conclusions

- Think through the trade-offs:
  - How much time will the tool take vs. how much time will it save?
  - Adapt current scripting to future projects
- Build off examples
- Go after repetitive tasks
- USE TEMPLATES

Photo by Matt Botsford on Unsplash



Useful Links

- Project Templates:
  - Becky Linton’s NI Week 2016 presentation: https://bit.ly/2n0xcwJ
  - NI “Tutorial”: http://www.ni.com/tutorial/14045/en/
  - Elijah Kerry post: https://bit.ly/2ltXc2P
  - Nate Moehring’s CLD Summit 2013 presentation: https://bit.ly/2kTWk7z
- Quick Drop:
  - Community Quick Drops: https://bit.ly/2kWJlfZ
- Scripting:
  - LabVIEW Wiki has great links: https://labviewwiki.org/wiki/VI_Scripting