LabVIEW UI Tips and Tricks
Before we begin...

• Different tastes exist – our tips may not always apply

• This presentation assumes a basic experience level

• Visit (and join) our UI Community Group to find:
  – Part I of this presentation online
  – Downloadable demos and examples
  – LabVIEW users passionate about UI (who share)

decibel.ni.com/content/groups/ui
Topics

• Brush Up: Introduction to UI Design Part One
• Giving your UI a Custom Look
• Organisation of Complex UIs
• Indicating Progress of Slow Operations
• Conclusion
“Good artists borrow...
...great artists steal.”

– Pablo Picasso
Sources of Inspiration

- Apple
- Microsoft Office
- Applications on your own computer
- Icon galleries
- Web design tutorials
- Your corporate design team
- Photography, Art
- Books on:
  - User interface design
  - User interaction design
  - Usability
  - Graphic design
  - Visualisation of information
Three Commandments from Part One

I. Think About Your User
II. Don’t Be Innovative
III. Less Is More
I. Think About Your User

- Do they know as much as you (they never do)?
- How will they interact with the application?
- Why are they using your software?
  - The software (and UI) should support their goal
II. Don’t Be Innovative

• Use familiar elements
• Don’t change expected functionality
• Polish – don’t reinvent

System controls mimic common operating system controls and are familiar to most users
III. Less Is More

- Too much at once is distracting; err toward minimalism
- Stick to requirements
  - Don’t do what isn’t necessary
  - You’ll get done sooner
  - It’ll cost you less to own it
- Focus should be on what’s important
  - Example: Guide the user with colour...
“It seems that perfection is attained not when there is nothing more to add, but when there is nothing more to remove.”

– Antoine de Saint-Exupéry
Guiding the User with Colour

Which cereal catches your eye first?

Why?
Giving your UI a Custom Look
UI Customisation Techniques

Front Panel Images and Decorations
• Make default controls transparent
• Add an image via menu **Edit » Paste**

Custom Controls
• Use to customise cosmetics of controls and indicators
• Access via front panel right-click context menu **Advanced » Customize**

XControls
• Use to customise the functionality or cosmetics of controls and indicators
• Access via menu **File » New**
Adding an Image to the Front Panel

• As simple as **Copy and Paste**!
• Use an image editor to erase, add transparency
• Populate native LabVIEW controls

*Start: PowerPoint Clipart  Finish: Custom LabVIEW UI*
Differences in the Control Editor

Normal Front Panel

Control Editor Window
When you should use **Controls**
- To create cosmetically different, reusable controls
  - **Example:** resizing a Stop button to make it easier to click

When you should use **Type Defs**
- To automatically update data type in custom controls
  - **Example:** reusing an Enum whose values may change

When you should use **Strict Type Defs**
- To create reusable controls that are identical copies
  - **Example:** propagating changes to Gauge size and color
Edit Mode vs. Customize Mode

**Edit Mode**
- Change size or color of a control or indicator
- Access a right-click shortcut menu

**Customize Mode**
- Make extensive changes to controls or indicators
- Change individual parts of a control or indicator
Components of a Control (Slide)

- Digital Indicator
- Pixel Increment
- Housing
- Needle, Fill and Scale
- Pixel Decrement
- Cosmetic
Components of a Control (Gauge)

Digital Indicator

Housing

Needle, Ramp and Scale

Extra Frame Part

Frame
Viewing Control Components

• View individual control components using menu **Window » Show Parts Window**
Adding a Decoration and Custom Imagery to a Gauge Control

CUSTOMISING A GAUGE CONTROL
When you **should** use XControls

- To create reusable components with dynamic behavior
- To encapsulate extended functionality or cosmetics

When you **should not** use XControls

- To accomplish pure cosmetic changes
- When working on a single-shot application

**Use Strict Type Defs instead when...**

- You do not need dynamic run-time and edit-time behavior
An XControl Example...

Design a thermometer control that can represent a single numeric input in either Celsius or Fahrenheit.

What makes this a good application for an XControl?

Note: This example XControl is pre-built as part of the default LabVIEW Examples
Example XControl Requirements

1. Thermometer must keep track of which temperature unit it represents

2. Thermometer must convert temperature between Fahrenheit and Celsius

3. Thermometer must represent a single numeric value and look (visually) like a thermometer.
Using XControls

- Manage XControls via the Project Explorer
- XControls appear as regular terminals
- You start with shell code

Remember – you can go a long way without resorting to XControls
Structure of an XControl

- **XControl**
  - Properties (Optional)
  - Methods (Optional)
  - Abilities (Mandatory)
XControl Properties

• Allow the user to configure the XControl programmatically via Property Node
XControl Methods

• Allow the user to engage functionality of the XControl programmatically via Invoke Node
XControl Abilities

• Required components for proper function
• Represented by VIs or Controls
• Four mandatory abilities:
  – Data
  – State
  – Facade
  – Init
• Additional optional abilities may exist
XControl Data Ability

- Type Definition Control
- Specifies the data type of the XControl
XControl State Ability

- Type Definition Control
- Specifies information other than data type that affect the appearance of the XControl
XControl Facade Ability

• Defines the appearance of the XControl
• Invoked after changes to Properties / Methods
XControl Facade Ability

• Also invoked when:

  • Data is written to the control
  • Appearance needs updating
  • Changing between Control and Indicator
  • Shortcut menu activates
  • Short menu is selected
  ...and more
XControl Init Ability

- Called upon first placement or load into memory
- Initialises display state before being displayed
Creating a Simple XControl from Scratch

CREATING AN XCONTROL
Gallery of Examples

Credit: Simon Hogg
NI Community UI Interest Group
Gallery of Examples

Credit: Simon Hogg
NI Community UI Interest Group

ni.com
Gallery of Examples

Credit: Jonathan Cohn – Bloomy Controls
LabVIEW Example Code Contest 2010 UI Controls
Category Winner
Importance of Visualisation Choices

UI “Signal to Noise Ratio:”
Which slide is more effective and why?
Organisation of Complex UIs

**Tab Control**
- Use when controls don’t all have to be visible at once
- Limit to the number of tabs you can gracefully use
- Loads all controls into memory at once

**Category and Content View using SubPanels**
- Use to dynamically decide which controls to display
- No limit to the number you can gracefully interact with
- You control when the VI is loaded or release from memory
Using a Tab Control

1. Add to front panel
2. Customise tab control
3. Populate with controls

• More flexible than most people realize
  – Transparent tabs
  – Vertical tabs
  – Tabs with images
Example Tab Control Application

Using LabVIEW to mimic NI DIAdem, software that outshines Excel for data postprocessing
Disguising a Tab Control with Transparent or Image Tabs

CUSTOMISING A TAB CONTROL
Using a SubPanel

1. Determine higher level VI screen real estate
2. Develop size appropriate, modular SubVIs
3. Dynamically Run SubVI
4. Dynamically insert SubVI into subpanel
Displaying Subpanels based upon User Selections

SUBPANEL OPTIONS
DIALOG
Gallery of Examples

Credit: Simon Hogg
NI Community UI Interest Group

ni.com
Indicating Progress of Slow Operations

• Splash screens are effective when applications have a long load time
  – Provide development and support information

• Busy cursors

• Progress bars

For tips on using busy cursors, view Part I of this presentation available on the NI Community UI Interest Group site
Gallery of Examples

Sine Wave Tester

Version: 1.0.32

Author: Derrick Snyder

For Support, Please Visit: http://www.ni.com/

Framework Credit: Mark Ridgley, Logic PD
NI Developer Community
Key Take-aways

• Don’t be innovative
• Less is more
• Think about your user

• Customise controls using Control Editor
• Encapsulate functionality via XControls
• Clean up your front panels with tabs, subpanels
• Disguise load times using splash screens
Learn and Share – UI Interest Group

decibel.ni.com/content/groups/ui
"Certification is an absolute must for anyone serious about calling himself a LabVIEW expert... At our organisation, we require that every LabVIEW developer be on a professional path to become a Certified LabVIEW Architect."

- President, JKI Software, Inc.
How do I go further?

• Reading
  • decibel.ni.com/content/groups/ui

• Learn more
  – LabVIEW Advanced Architectures

• Talk to your
  – Local Engineer
  – The UI group online