MATLAB EXPO 2016
Developing and Sharing MATLAB Apps and Toolboxes

David Sampson
MathWorks Consulting
MATLAB talks at EXPO today

“The Adoption of MATLAB Apps and Toolboxes at Jaguar Land Rover”
David Barry
1400

“Developing and Sharing MATLAB Apps and Toolboxes”
David Sampson
1430

“Developing Robust MATLAB Code and Apps”
Paul Peeling
1545
This talk aims to help you...

Design

Organize

Share

...your MATLAB tools
Why is it difficult to develop and share tools?
Real-world sharing

- Diverse requirements
- Different experiences and approaches

- Conventions and patterns
- Processes and tools

- Learning and collaboration
- Productivity
Before software can be reusable it first has to be usable.

– Ralph Johnson
Designing MATLAB software
What makes a good design?

- Easy to learn
- Easy to use
- Easy to read code that uses it
- Provides the required functionality

*specific – familiar – concise – expressive*
What's in a name? that which we call a rose
By any other name would smell as sweet

– Juliet Capulet
It's OK to figure out murder mysteries, but you shouldn't need to figure out code. You should be able to read it.

– Steve McConnell
There are only two hard things in Computer Science: cache invalidation and naming things.

– Phil Karlton
Naming functions and methods

- lowercase short or camelCase full names
- Verb, verb phrase (for actions)
  - delete, split
  - traverseGraph
- Noun, noun phrase (where the noun is the thing being returned)
  - eig, chebwin
- Avoid empty verbs: compute, get, display, perform, detect, retrieve, extract, return, do, does
  - computeFFT
- Conversion functions take the form foo2bar or fooToBar
- Readers and writers take the form fooread, barwrite
Naming classes

- lowercase short or camelCase full or MixedCase full names
- Noun, noun phrase (for things)
  - tf, ss, sym
  - griddedInterpolant
  - matlab.ui eventdata.MouseData
- Adjective, adjective phrase (for mixins)
  - Selectable
- Avoid prepending “Abstract”
- Avoid appending “Class”
Naming class properties

- MixedCase full names
- Noun, noun phrase
  - Connection
  - CornerThreshold
- Verb, verb phrase, adjective, adjective phrase (for logical-valued properties)
  - ShowLineNumbers
  - Visible
- Avoid appending qualifiers to denote property value type
  - ConnectionObject
Naming packages

- lowercase short names
- Use root packages to represent “products”
- Use singular not plural
  ✓ chart.Pie
- Avoid repeating a package name in a subpackage name
  ✗ foobar.foobarexamples
- Put private classes and functions in an “internal” subpackage
Naming events

- MixedCase full names
- Noun + participle
  - DeviceAdded
- Gerund + noun
  - AddingDevice
- Avoid including “to be”
  - DeviceBeingAdded
Architecting MATLAB software
… with proper design, the features come cheaply. This approach is arduous, but continues to succeed.

– Dennis Ritchie
If you think good architecture is expensive, try bad architecture.

– Brian Foote & Joseph Yoder
Model-view-controller pattern

Credit: www.wikipedia.org
HeartRateHistogramView

StripChartView

Track Model

Player

MapView

Event notification
Property access, method call
Tests of an architecture

- Which part does what?
  - Reads data
  - Launches an app
  - Creates a chart
  - Holds the data and application state
  - Updates a chart when time changes

- Can you change the functionality?
Packaging and distributing MATLAB software
MATLAB app installer files (.mlappinstall)

- Available from R2012b
- Packs multiple files into a single file to be distributed
- Includes metadata and product dependencies
- Single step to install (or update)

http://www.mathworks.com/help/matlab/creating_quis/app-creation.html
MATLAB Toolbox files (.mltbx)

- Available from R2014b
- Packs multiple files into a single file to be distributed
- Includes metadata and product dependencies
- Single step to install (or update)
- Configures MATLAB path
- Registers apps and documentation

Toolbox packaging dialog
**Toolbox distribution functions**

- `matlab.addons.toolbox.packageToolbox`: Package a toolbox project
- `matlab.addons.toolbox.toolboxVersion`: Query and modify the version of a toolbox file
- `matlab.addons.toolbox.installToolbox`: Install a `.mltbx` file
- `matlab.addons.toolbox.uninstallToolbox`: Uninstall an installed toolbox
- `matlab.addons.toolbox.installedToolboxes`: Return information about installed toolboxes
A starter store – .mltbx files in a shared location

Updating:
- Query installed toolboxes
- Compare installed versions with versions available in the store
- Update if a newer version is available
- Can be automated

Browsing:
- Peruse an HTML view of store content
Demonstration:

Starter app store
Closing remarks
Community effects

- Generate awareness and interest
- Build relationships
- Build advocacy
- Enhance skills
- Improve results and productivity
Key points

- Designing your code: names matter
- Organizing your code: patterns help
- Sharing your code: the right tools make it easy

To learn more…
- Master class “Developing Robust MATLAB Code and Apps” @ 1545
- Slides and code @ [www.matlabexpo.com/uk](http://www.matlabexpo.com/uk)
- MATLAB Developer Zone @ [blogs.mathworks.com/developer](http://blogs.mathworks.com/developer)
- Training courses, consulting workshops, coaching, …
Thank you.

Questions?