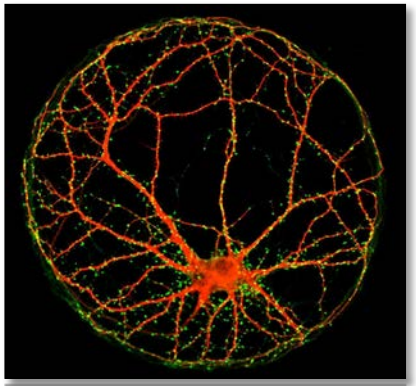
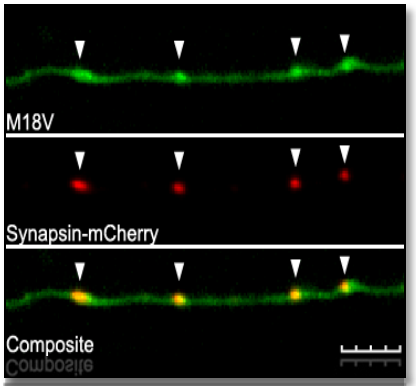
Amsterdam Neuroscience

Writing readable code

Jurjen Broeke

Center for Neurogenomics and Cognitive Research – CNCR

Vrije Universiteit & VU Medical Center, Amsterdam, The Netherlands

Code readability & formatting

- Clearly written and formatted code that follows naming conventions…
  - is easier to understand (for yourself and others)
  - helps finding/identifying syntax errors easier
  - conveys purpose of variables/functions

https://indianajones.fandom.com/wiki/Hangar_51

Naming conventions: Variables

http://technologyhill.blogspot.com/

- mixed case (camelCase, snake_case)

```
linearity, credibleThreat, qualityOfLife
```

- variable scope:
  - large: meaningful name `qualityOfLife`
  - short: short name `i, j, k, m, n`
- counts or numbers of objects prefixed with *n*

```
nFiles, nSegments
```

- pluralization of variables

```
point,   pointArray
```

- single instance of a group or iterator

```
tableNo, employeeNo      iTable, iEmployee
```

- avoid boolean variables with double negative meaning

Use `isFound` Avoid `isNotFound`

CNCR

Naming conventions: Structures

- structures should start with upper case
  - `Segment`, `CellData`
- alternatively, use the `Struct` suffix
  - `cellStruct`, `dataStruct`
- field names should follow the variable naming conventions
  - `Segment.length`, `CellData.rawData`

Naming conventions: Functions

- function name should describe its function
  - `computewidth()`, `getcurrentcell()`, `createplot()`, `updatetable()`
- function name and filename need to be identical (Matlab): use lower case
- use a prefix that describes the purpose
  - `compute…`, `find…`, `sort…`
- make sure name is unique (shadowing)
- use complementary prefixes for complementary functions:
  - `add/remove`, `get/set`, `insert/delete`, `show/hide`

CNCR

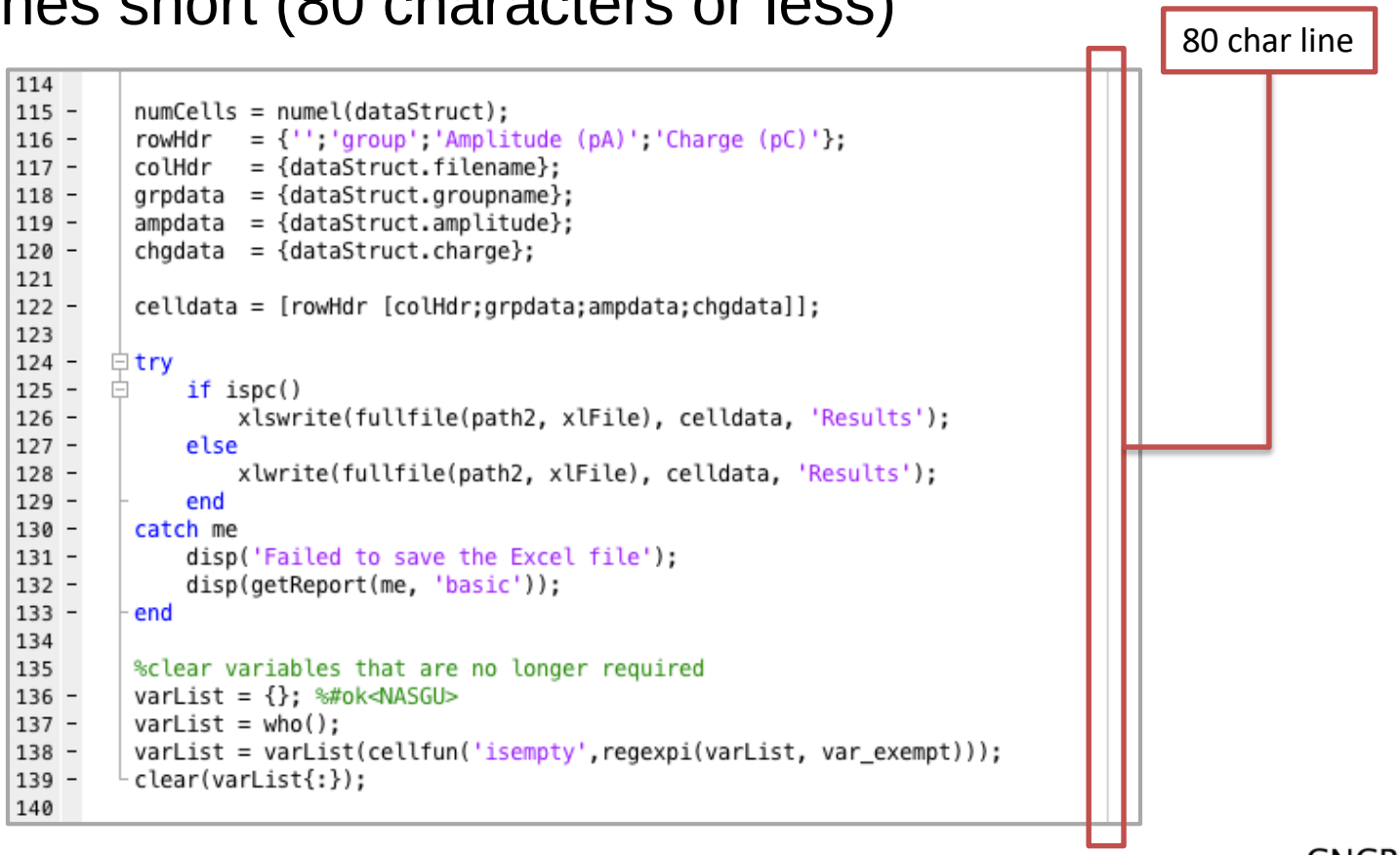
Code readability: Files

- split different functions into different files (modularize)
  - useful for large programs/programs with user interface
  - allows reuse of code in different projects
- keep sub-functions in the same file
  - easier to distribute and maintain
- prevent the use of global variables
  - use function parameters to pass data between functions
  - use structures for large amounts of different data types

CNCR

Code readability: Formatting

- use indentation (3 or 4 spaces)
- use newlines to separate blocks with similar purpose
- keep lines short (80 characters or less)




```
114
115 -    numCells = numel(dataStruct);
116 -    rowHdr   = {'';'group';'Amplitude (pA)';'Charge (pC)'};
117 -    colHdr   = {dataStruct.filename};
118 -    grpdata  = {dataStruct.groupname};
119 -    ampdata  = {dataStruct.amplitude};
120 -    chgdata  = {dataStruct.charge};
121
122 -    celldata = [rowHdr [colHdr;grpdata;ampdata;chgdata]];
123
124 -    try
125 -        if ispc()
126 -            xlswrite(fullfile(path2, xlFile), celldata, 'Results');
127 -        else
128 -            xlwrite(fullfile(path2, xlFile), celldata, 'Results');
129 -        end
130 -    catch me
131 -        disp('Failed to save the Excel file');
132 -        disp(getReport(me, 'basic'));
133 -    end
134
135      %clear variables that are no longer required
136 -    varList = {}; %#ok<NASGU>
137 -    varList = who();
138 -    varList = varList(cellfun('isempty',regexpi(varList, var_exempt)));
139 -    clear(varList{:});
140
```

Code readability: Comments

- comments should explain the why/how of a code section that follows
  - write comments at the same time as the code
- use the same indentation as the code it describes
- use regular sentences with proper punctuation

```
216
217     function keyPressed(~, eventdata)
218     % handle key presses within the interface. This function only has an effect
219     % when the Process data tab is selected. Keys for panning (arrow keys) are
220     % implemented and functional. The A, B, Shift and Windows/Command key have
221     % no function within regular processing, but are captured for the easter egg.
222
223 -   hMain = getappdata(0, 'h_mainSynEM2');
224 -   handles = getappdata(hMain, 'handles');
225 -   kc = getappdata(hMain, 'code_konami');
226 -   prefs = getappdata(hMain, 'settingsSynEM2');
227
228 -   if ~strcmpi(handles.tabGroup.SelectedTab.Title, 'Process data')
229           %only deal with keys in the process tab
230 -         return;
231 -   end
232
```

CNCR

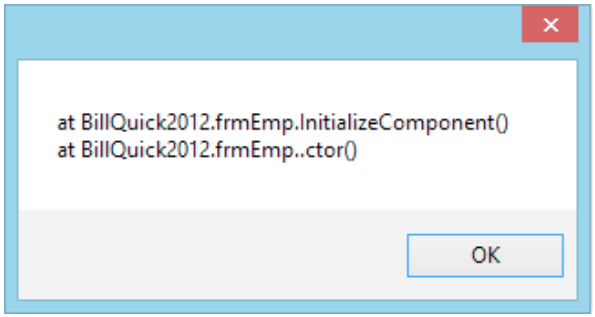
Code readability: Documentation

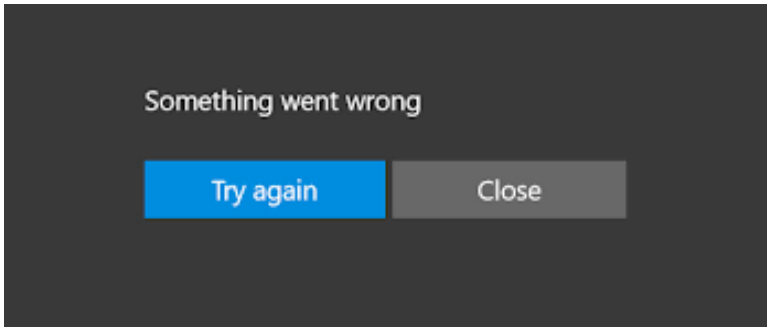
- for large projects, write documentation
  - comments below function declarations
  - use simple html files to use graphics/screenshots
- write documentation before or during coding
- keep track of changes/versions
  - use revision software (integrated since Matlab R2015b)
  - add comment stating the last change
  - for large projects, include a version number (e.g. `1.2.0`)

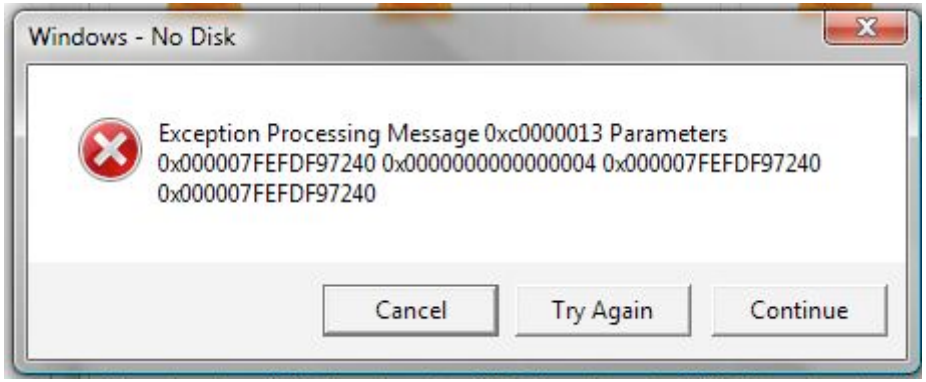
```
% version info
% Major version of the software
%   0:  initial code base
%   1:  first release version
%   2:
%   3:
%   4:
majorV = 1;

% Minor version of the software
%  8:   completed plotting + 2-axes diameter measurements
%  9:   added options for setting the histogram ranges
%  0:   first release reset
%  1:   added PSD length to export table, bug fixes in length
%  2:   added option to fix non-unique identifiers
minorV = 2;
```

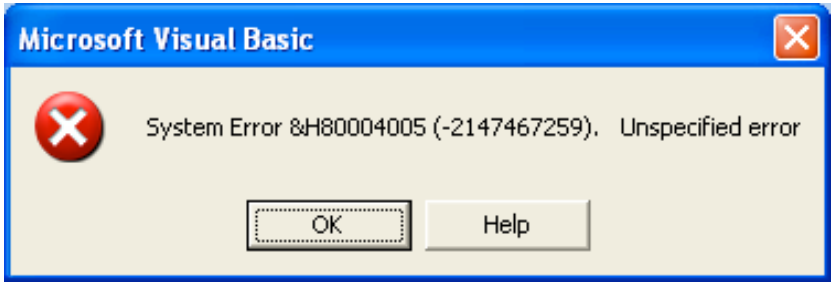
CNCR

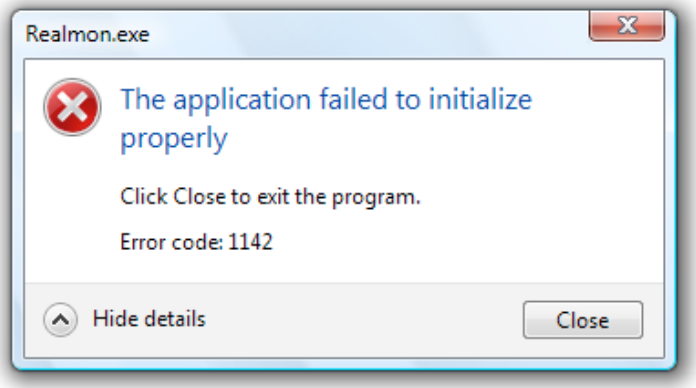
Write clear error messages!





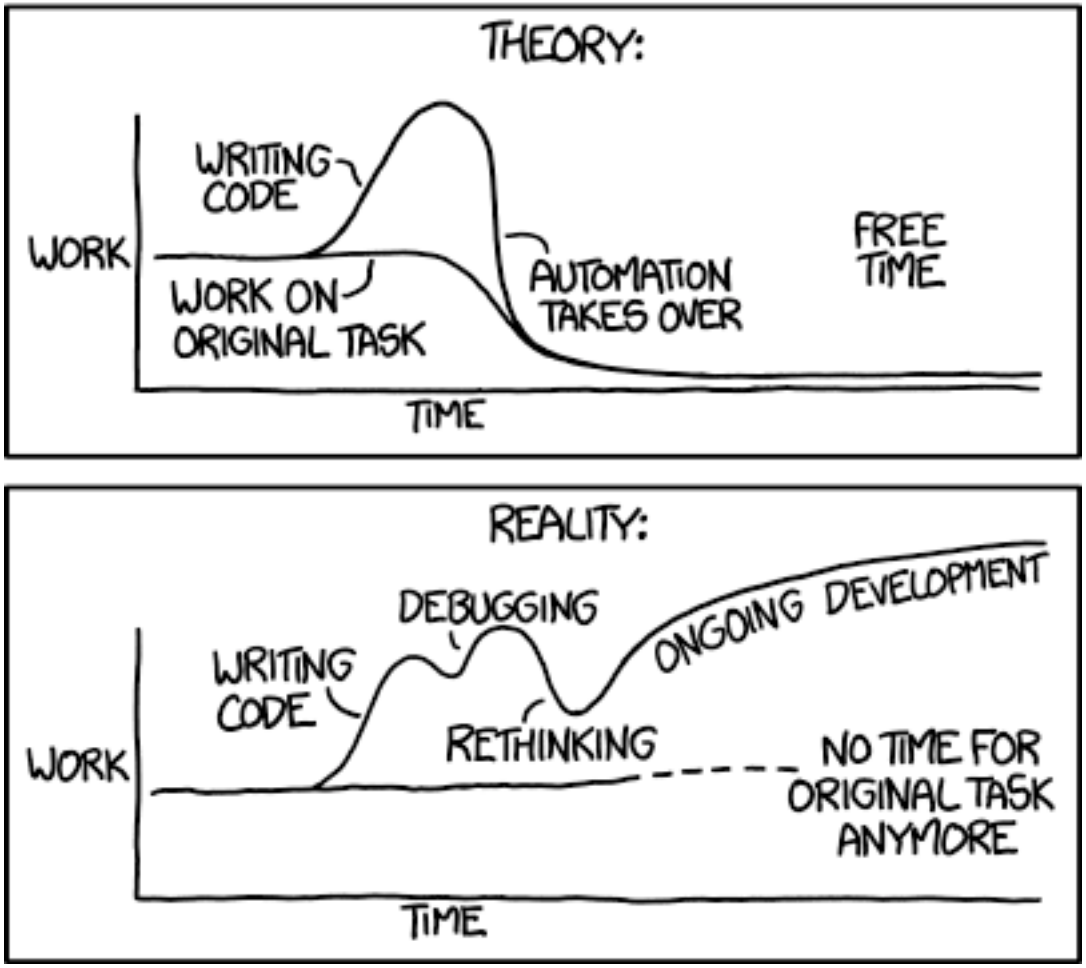






CNCR

"I SPEND A LOT OF TIME ON THIS TASK.
I SHOULD WRITE A PROGRAM AUTOMATING IT!"



https://www.xkcd.com/1319/

CNCR