

USING OUT OF THE BOX TOOLS TO CREATE DYNAMIC MAPKEYS AND AUTOMATE CREO WITH EXCEL

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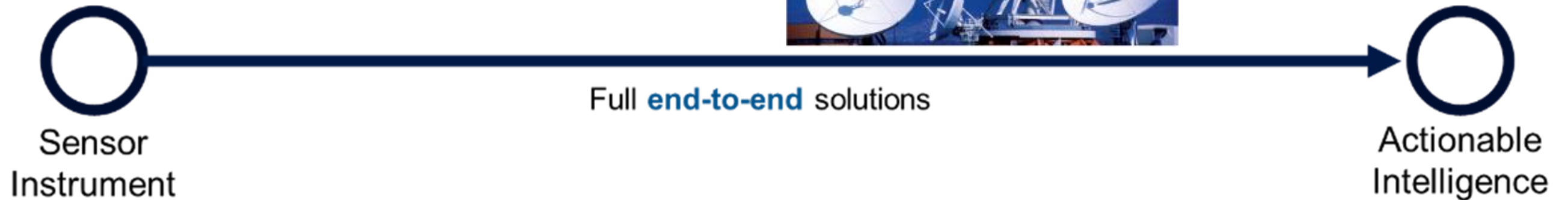
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AGENDA

- Arka Overview
- Mapkey Overview
- Mapkey Tips
- Process Flow Diagram
- Step by Step Through Process Flow

- Real World Examples

ARKA GROUP - COMPANIES



01 Facilities

600,000+

Sq. ft. of facilities dedicated to advanced design, development, and manufacturing

02 Workforce

850+

Mission-driven scientists, engineers, and professionals

03 Years in Operation

100+

Combined years of operation delivering success in science-based missions

04 Mission Experience

60+

Space missions for DoD, IC, and civic programs

DANBURY BUSINESS OVERVIEW

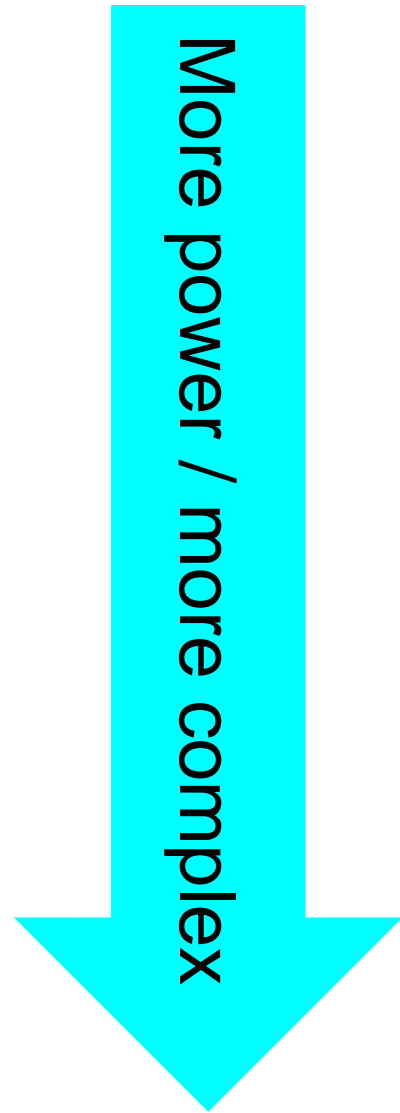
WORLD CLASS FACILITY FOR DESIGN, MANUFACTURE & VERIFICATION OF ELECTRO-OPTICAL SYSTEMS

- Core Offerings
 - Optical systems & Payloads
 - Spacecraft Subsystems
 - Platform Avionics
 - Advanced Windows
 - Laser Threat Warning Receivers
 - Optical Assemblies & Components
- Capabilities Include:
 - Electro-Optical mission systems engineering
 - Program and supplier management
 - Payload & Spacecraft System/Subsystem development, manufacturing, assembly, integration & test
 - World leading optical metrology & manufacturing capabilities
 - High reliability avionic and electronic subsystem design and production
 - State-of-the-Art facility for design, production, & verification of Electro-Optical systems
 - Proven and adaptable processes and personnel support a wide range of end-to-end Electro-Optical system solutions with extensive flight heritage

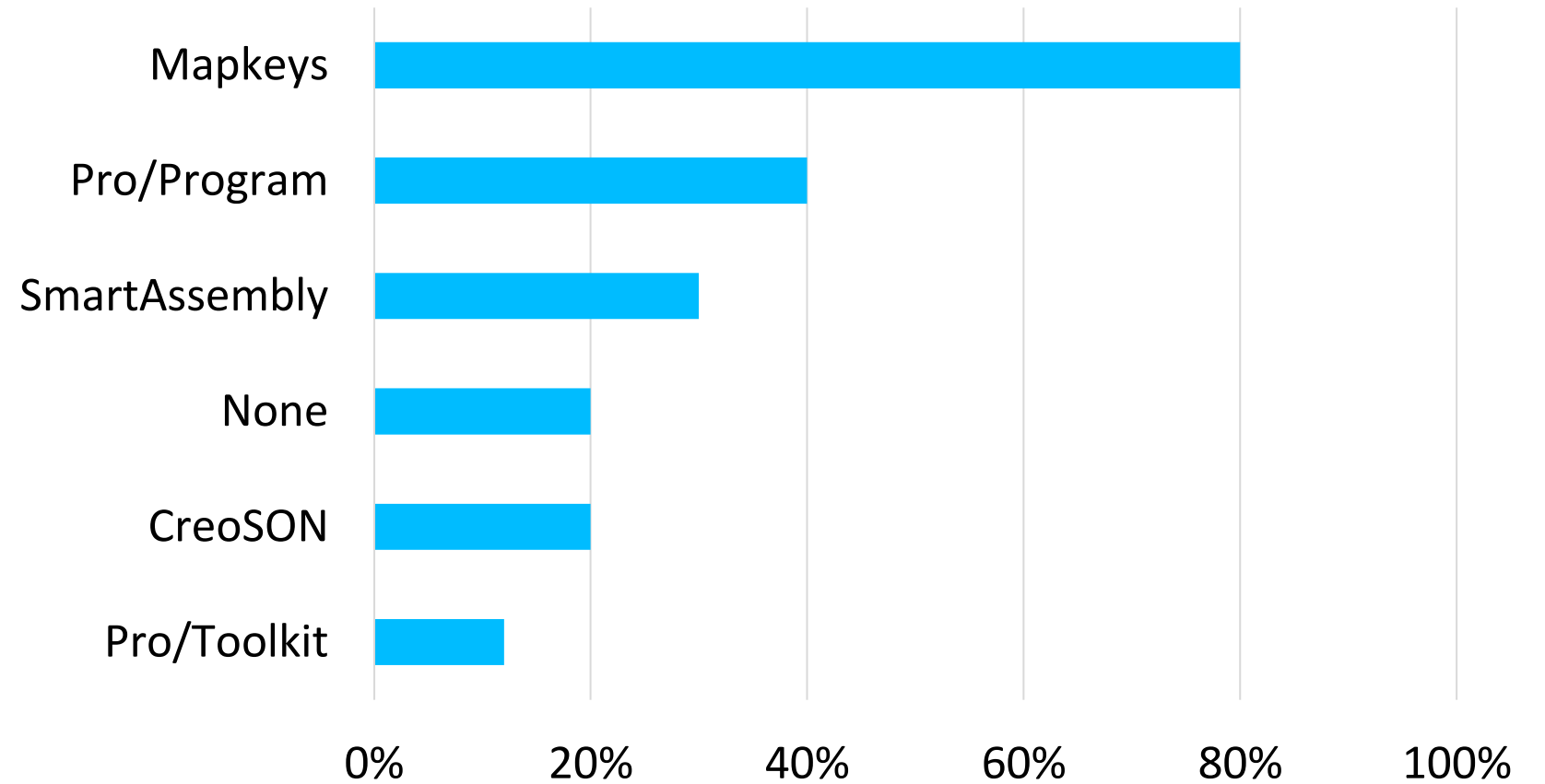


TOOLS FOR CREO AUTOMATION

- Relations
- Pro/PROGRAM
- Mapkeys
- Trail files
- SmartAssembly
- CreoSON
- Pro/Toolkit
 - Web.Link
 - J-Link
 - VB
 - C++



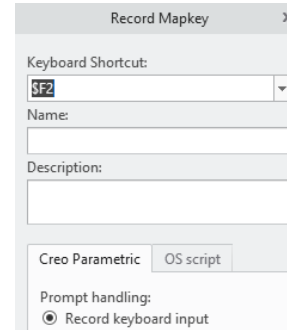
Creo Automation Poll



How do we make mapkeys dynamic with user input?

MAPKEY GROUND RULES

- Easy to use – just click record
- No extra software install needed
- Easy to manipulate
 - Manipulation not supported by PTC even though some support articles require it
- Understand that mapkey code can change every release
- Notepad ++ language files (syntax color coding) available here:
 - <https://github.com/DonChunior/Creo-Configuration-Files>
- Per CS114528 there are now 260 characters allowed per row; no longer a limit on the total number of characters in the file
 - By default when recording a mapkey Creo still wraps at 80 characters per line



Cause

- Mapkey's are not fully functional in graphics area

Resolution

- Works to product specification for Creo Parametric 8.0 and upper versions:
 - Add custom Right Mouse Button RMB arm/disarm actions to the mapkey manually:
 - Add this line right before the `popupMenuRMBTimerCB` line
`~ RButtonArm `main_dlg_cur` `proe_win` 9 1059 355 0 4 1594 836 1920 1080 85780;\`
 - Add this line right after the `popupMenuRMBTimerCB` line
`~ RButtonDisarm `main_dlg_cur` `proe_win` 9 1059 355 0 256 1594 836 1920 1080 86024;\`
 (The exact numbers in these lines shouldn't matter in this particular case)

MAPKEY TIPS

- Paste in entire paths to files rather than typing them in
- Harness the power of the find command to select things
- Make sure to click all the options; don't rely on defaults
 - Reset as needed (Find command remembers the last options selected)
- Mapkeys skip lines they can't execute so try and record all possible steps
 - This means all dialog boxes that may pop up (Windchill check out, part already in session, save overwrite, etc.)
- Every continuing line needs to have a \ at the end
- Comment with the ! `!=====this is a comment`
- After loading config.pro check (file-> options -> config editor) for lines not read in
 - These will appear as a red warning circle
- More tips and tricks in the PTC community


```

`CSYSInput` ``;\
`OkPush`;\
`DlgClose_push`;\

```

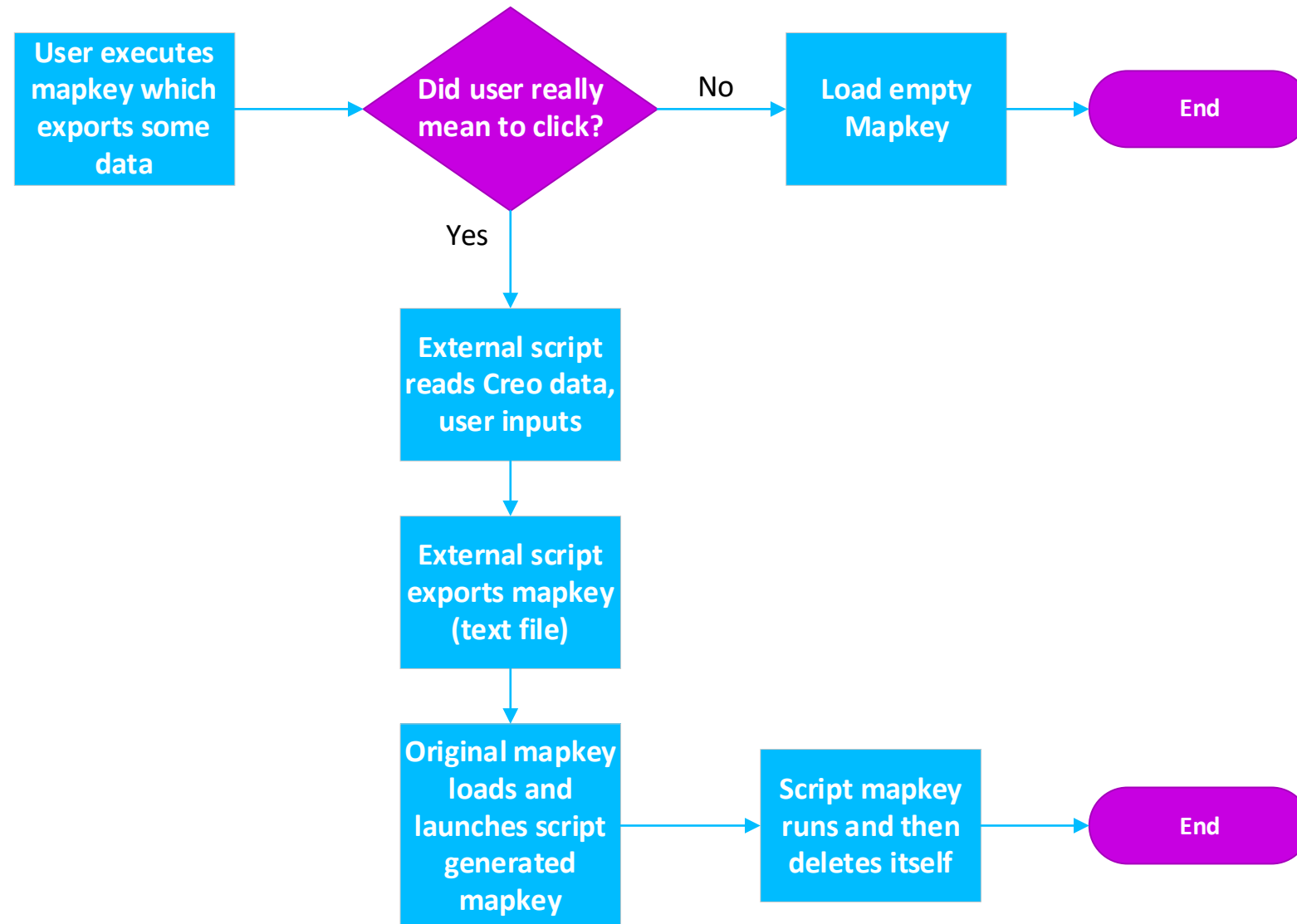
Continue to
next line

End of
mapkey

Name	Value	Status	Description
 ~comment	what about th		

Test, Test, Test!

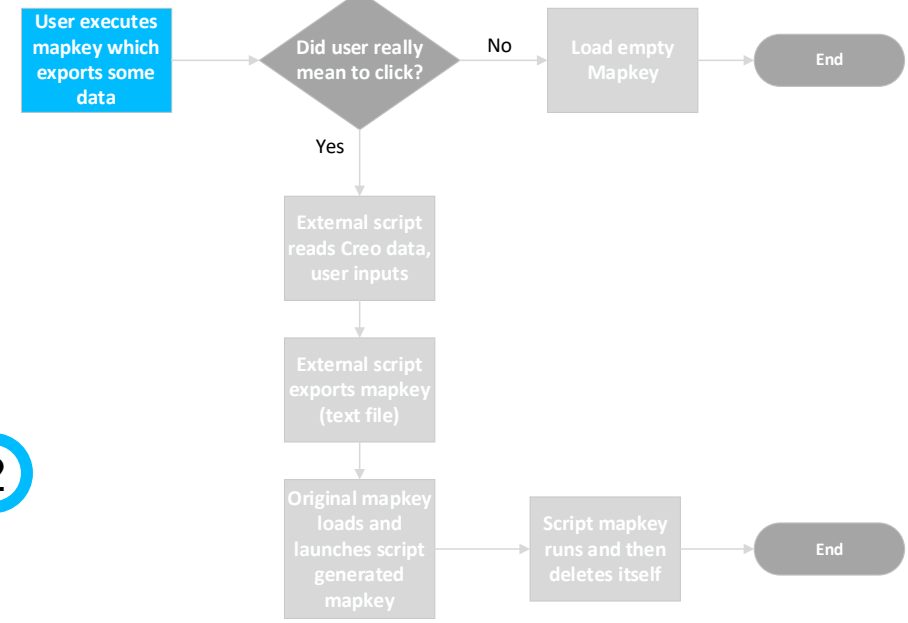
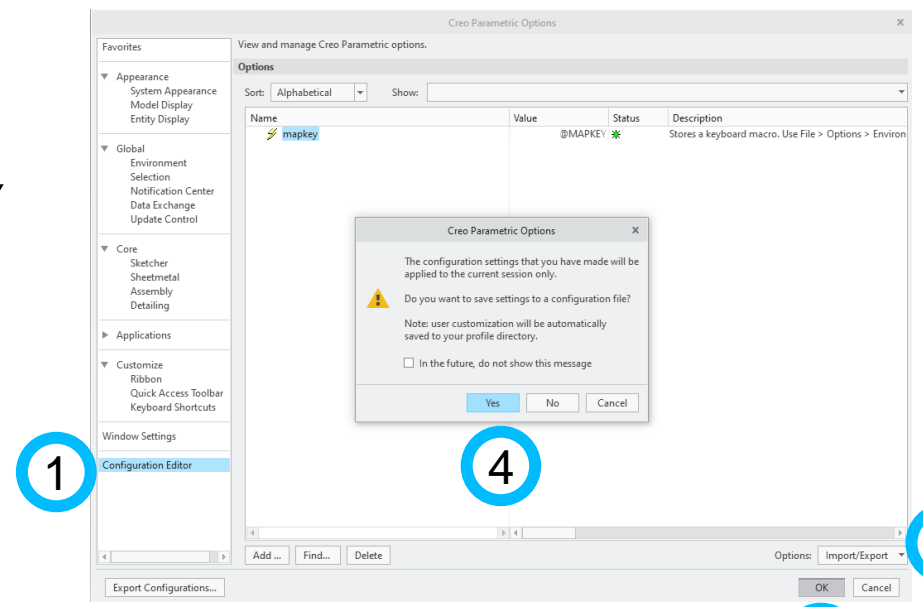
TYPICAL DYNAMIC MAPKEY GENERATION FLOW



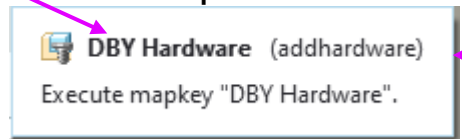
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STEP 1: STARTING MAPKEY

- Programming language:
 - Mapkey version: Creo 4.0 – 9.0
 - File:config.pro



```
!=====
!== Company script 001
!=====
```



keyboard stroke

```
mapkey zzzmapkey @MAPKEY_LABELCompany Mapkey 001;\
mapkey (continued) @SYSTEMJ:\\folder\\subfolder\\script.VBS;\
mapkey (continued) ~ Select `main_dlg_cur` `appl_casc`;\
mapkey (continued) ~ Close `main_dlg_cur` `appl_casc`;~ Command `ProCmdRibbonOptionsDlg` ;\
mapkey (continued) ~ Select `ribbon_options_dialog` `PageSwitcherPageList` 1 `ConfigLayout`;\
mapkey (continued) ~ Select `ribbon_options_dialog` `ConfigLayout.ImportExportBtn`;\
mapkey (continued) ~ Close `ribbon_options_dialog` `ConfigLayout.ImportExportBtn`;\
mapkey (continued) ~ Activate `ribbon_options_dialog` `ConfigLayout.Open`;\
mapkey (continued) ~ Trail `UI Desktop` `UI Desktop` `DLG_PREVIEW_POST` `file_open`;\
mapkey (continued) ~ Update `file_open` `Inputname` `C:\\folder\\subfolder\\config.pro`;\
mapkey (continued) ~ Activate `file_open` `Inputname`;\
mapkey (continued) ~ Activate `ribbon_options_dialog` `OkPshBtn`;\
mapkey (continued) ~ FocusIn `UITools Msg Dialog Future` `no`;\
mapkey (continued) ~ Activate `UITools Msg Dialog Future` `no`;\
mapkey (continued) %script_generated_mapkey_name;
```

Mapkey keyboard stroke and Label

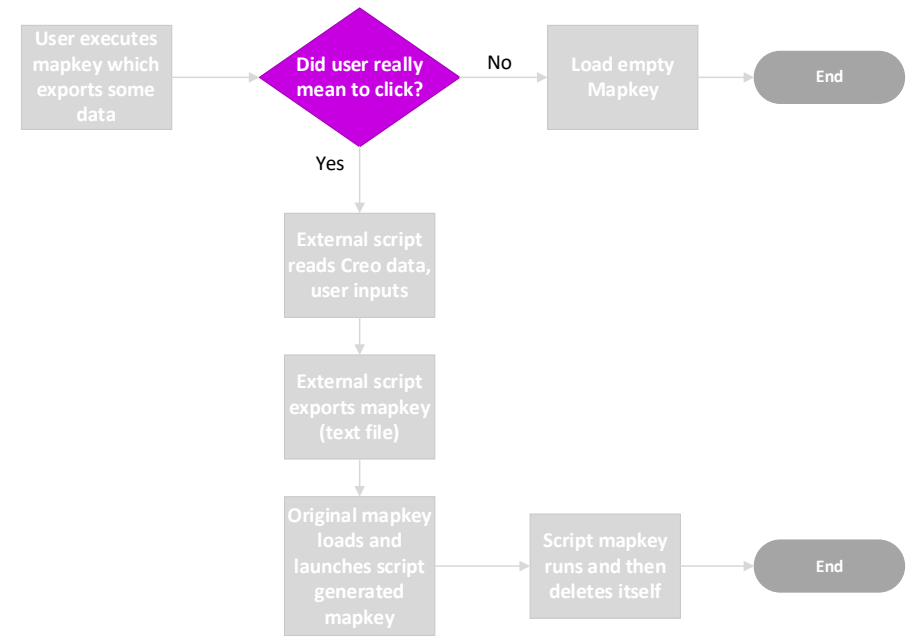
Path to script

Load in config.pro
Steps 1 – 4 shown above

New script generated mapkey

STEP 2: QUALITY CHECK AND SCRIPT MAPKEY

- Programming language:
 - VBS (but can be anything, Batch, powershell, python, etc.)
 - File: script.vbs



```
Const ForReading = 1
strDirectory = "C:\folder\subfolder"
strTemp = "C:\folder\subfolder\bom.txt"
strFile = "C:\folder\subfolder\config.pro"
```

Set variables

```
Set objFSO = CreateObject("Scripting.FileSystemObject")
```

```
If Not objFSO.FolderExists(strDirectory) Then objFSO.CreateFolder(strDirectory)
```

If a folder doesn't already exist, create it

```
If objFSO.FileExists(strTemp) Then objFSO.DeleteFile strTemp
```

Delete any left-over files

```
Set ConfigPro = objFSO.CreateTextFile(strFile, True)
```

Create an empty config.pro file

```
Prompt = MsgBox("Only run this if you have Visio installed!" & vbCrLf & "Do you want to proceed?", 36, "Choose Wisely")
```

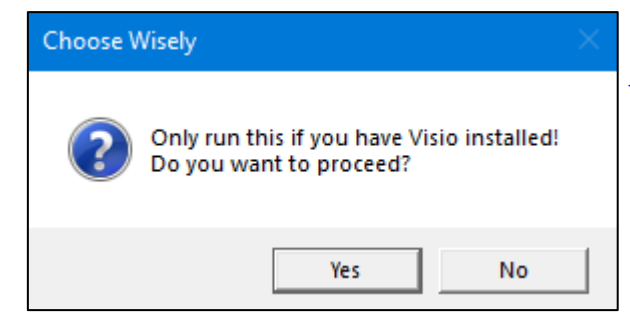
Check to make sure the user clicked the right button

```
If Prompt = 6 Then
  'see next slide
Else
  ConfigPro.WriteLine("mapkey script_generated_mapkey_name @MAPKEY_LABELBlank;")
  ConfigPro.WriteLine("mapkey(continued) ~ Close `main_dlg_cur` `MenuBar1`;")
  ModelWarn = MsgBox("I see you have decided to play it safe. " & vbCrLf & "The script will now end.", 48, "You took the blue pill and now the story ends.")
End If
```

If accidental click, write blank config.pro file

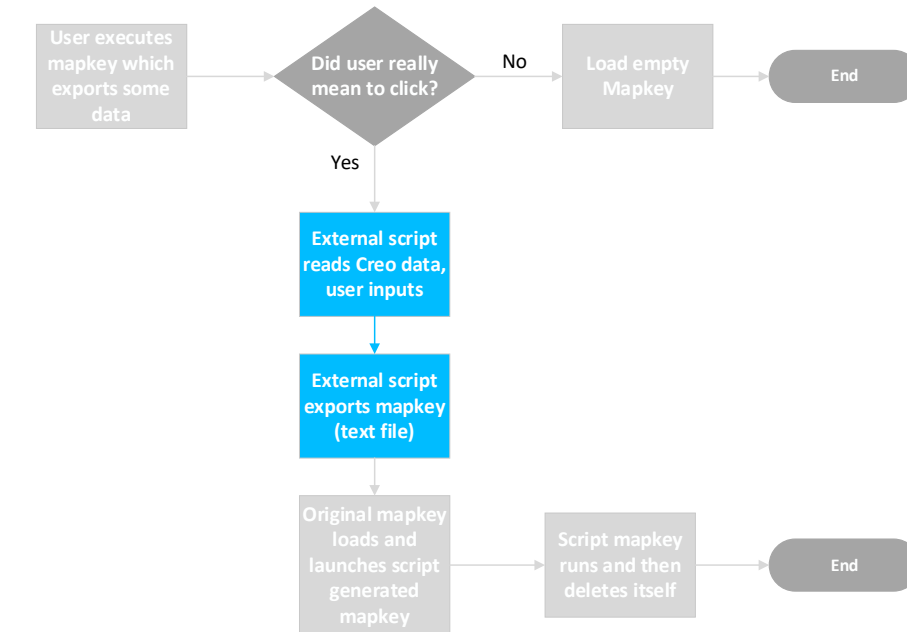
```
ConfigPro.Close
Set objFSO = Nothing
Set ConfigPro = Nothing
WScript.Quit
```

Close out script



STEP 3: DYNAMIC MAPKEYS WITH USER INPUT

- Programming language:
 - VBS (but can be anything, Batch, powershell, python, etc.)
 - File: script.vbs
- 3 different examples of scripting



1

```

ConfigPro.WriteLine("mapkey(continued) ~ Activate `siteregistrydialog` `WorkspaceNewPshBtn`;\"")
ConfigPro.WriteLine("mapkey(continued) ~ Input `registernewworkspacedlg` `NewWorkspaceIPanel` \")
ConfigPro.WriteLine("mapkey(continued) `WS_` & TimeStamp & "`;\"")
ConfigPro.WriteLine("mapkey(continued) ~ Update `registernewworkspacedlg` `NewWorkspaceIPanel` \")
ConfigPro.WriteLine("mapkey(continued) `WS_` & TimeStamp & "`;\"")
ConfigPro.WriteLine("mapkey(continued) ~ FocusIn `registernewworkspacedlg` `NewWSOptMenu`;\"")
ConfigPro.WriteLine("mapkey(continued) ~ Open `registernewworkspacedlg` `NewWSOptMenu`;\"")
ConfigPro.WriteLine("mapkey(continued) ~ Close `registernewworkspacedlg` `NewWSOptMenu`;\"")
    
```

Create a new workspace with a timestamp

2

```

Set objFileToRead = objFSO.OpenTextFile(DLFile,ForReading)
DwgNumList = objFileToRead.ReadAll()
objFileToRead.Close
Set objFileToRead = Nothing

For i = LBound(DArray) To UBound(DArray)
If Trim(DArray(i)) <> "" Then
ConfigPro.WriteLine("mapkey(continued) ~ Command `ProCmdModelOpen` ;\"")
ConfigPro.WriteLine("mapkey(continued) ~ Trail `UI Desktop` `UI Desktop` `DLG_PREVIEW_POST` `file_open`;\"")
ConfigPro.WriteLine("mapkey(continued) ~ Update `file_open` `Inputname` `\" & Trim(DArray(i)) & \".drw`;\"")
    
```

Read in a text file and then generate a mapkey to open all the drawings listed in the text file

3

```

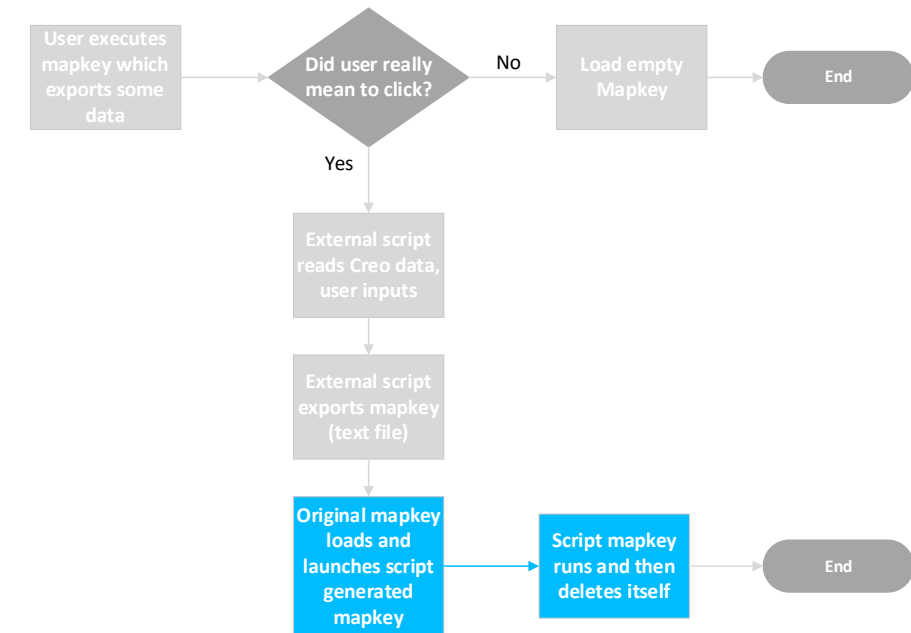
Option Explicit
Dim objExcel, objWorkBook

Set objWorkBook = objExcel.Workbooks.Open("J:\Excel_Workbook.xlsm")
objExcel.Visible = True
objExcel.Application.Run("Macro1")
    
```

Script.VBS file opens Excel and runs a VBA macro

STEP 3: DYNAMIC MAPKEYS WITH USER INPUT

- Programming language:
 - Mapkey version: Creo 4.0 – 9.0
 - File:config.pro



```

=====
!== Company script 001
=====
    
```

```

mapkey zzzmapkey @MAPKEY_LABELCompany Mapkey 001;\
mapkey (continued) @SYSTEMJ:\\folder\\subfolder\\script.VBS;\ ← This
mapkey (continued) ~ Select `main_dlg_cur` `appl_casc`;\
mapkey (continued) ~ Close `main_dlg_cur` `appl_casc`;~ Command `ProCmdRibbonOptionsDlg` ;\
mapkey (continued) ~ Select `ribbon_options_dialog` `PageSwitcherPageList` 1 `ConfigLayout`;\
mapkey (continued) ~ Select `ribbon_options_dialog` `ConfigLayout.ImportExportBtn`;\
mapkey (continued) ~ Close `ribbon_options_dialog` `ConfigLayout.ImportExportBtn`;\
mapkey (continued) ~ Activate `ribbon_options_dialog` `ConfigLayout.Open`;\
mapkey (continued) ~ Trail `UI Desktop` `UI Desktop` `DLG_PREVIEW_POST` `file_open`;\
mapkey (continued) ~ Update `file_open` `Inputname` `C:\\folder\\subfolder\\config.pro`;\
mapkey (continued) ~ Activate `file_open` `Inputname`;\
mapkey (continued) ~ Activate `ribbon_options_dialog` `OkPshBtn`;\
mapkey (continued) ~ FocusIn `UITools Msg Dialog Future` `no`;\
mapkey (continued) ~ Activate `UITools Msg Dialog Future` `no`;\
mapkey (continued) %script_generated_mapkey_name; ← Generates this
    
```

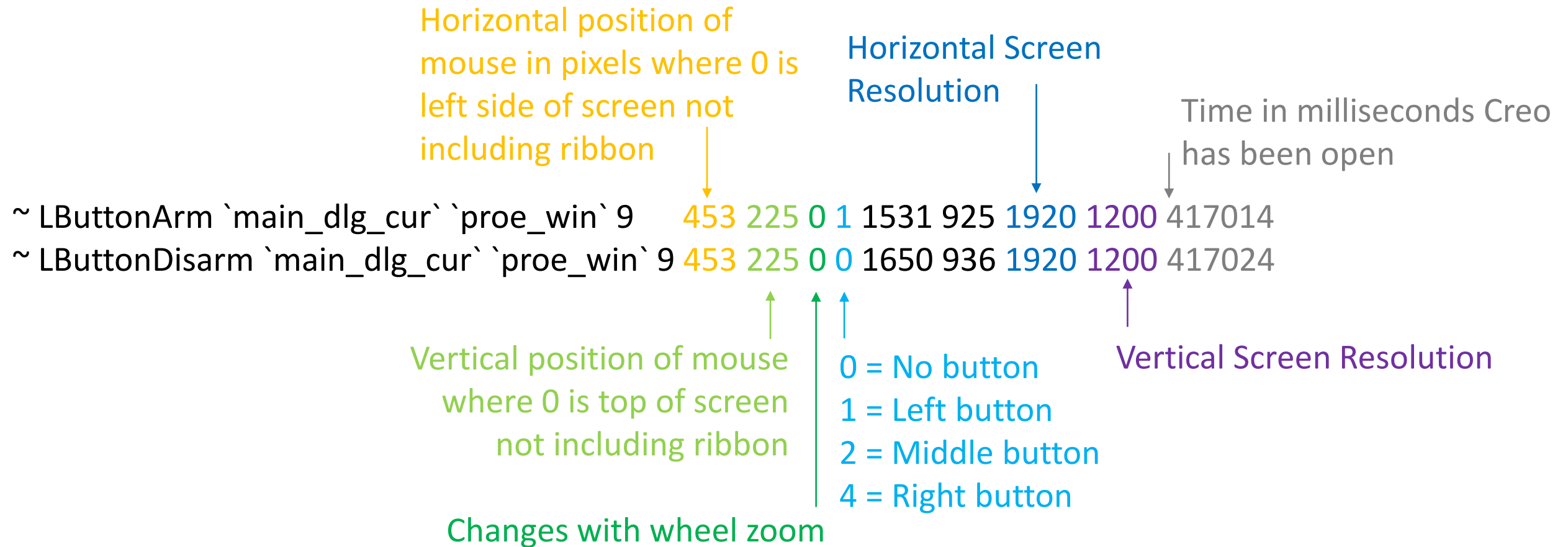
```

mapkey (continued) ~ Command `ProCmdUtilMacros`;\
mapkey (continued) ~ Select `mapkey_main` `list_mapkeys` 1 `script_generated_mapkey_name`;\
mapkey (continued) ~ Activate `mapkey_main` `DeleteButton`;\
mapkey (continued) ~ Activate `mapkey_main` `CloseButton`;
    
```

At the end, this bit of mapkey code can delete itself

DECONSTRUCTING THE MAPKEY AND TRAIL FILES

- To reiterate: PTC does not support modifying mapkey or trail files
- Modifying the horizontal and vertical positions below allows for clicks to be programmed in



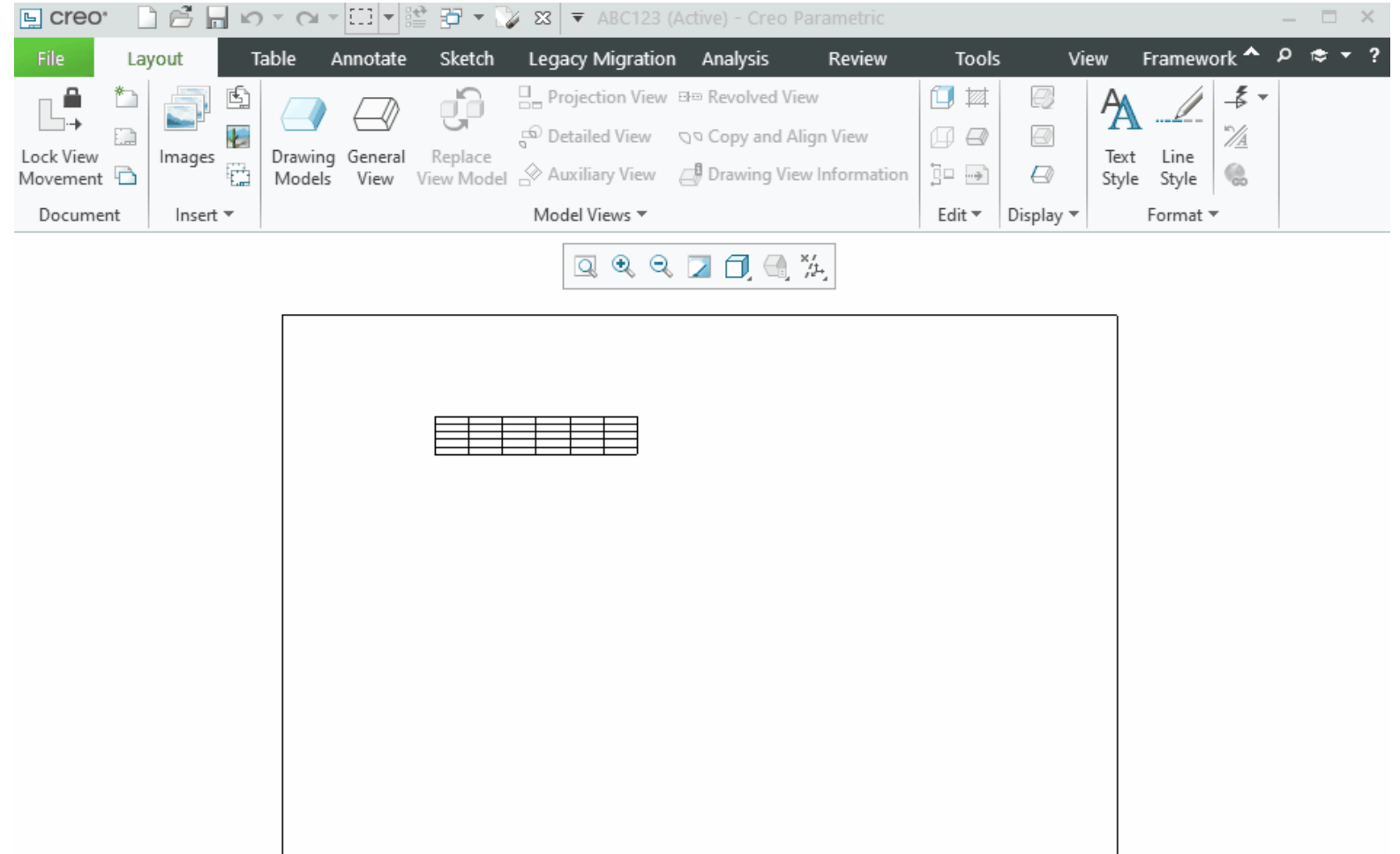
TRAIL FILE BENEFIT EXAMPLE – MERGE TABLE CELLS

PLAYING A TRAIL FILE FROM A MAPKEY (FILE -> MANAGE SESSION -> TRAIL FILE)

Need to keep header for trail files

```

!trail file version No. 2020
!Creo TM 9.0 (c) 2023 by PTC Inc. All Rights Reserved.
!Exit Logger data:
  Process ID: 26116
  Application: Creo_Parametric
  Start datetime: 2023/12/06 09:49:02
  language: usascii
  machine type: x86_win64
  datecode: 9.0.6.0
  Server: NONE
  Workspace: NONE
  traceback file: c:\Creo_data\traceback.log
!end Exit Logger data.
< 0 1.362963 1912 0 0 1150 1920 0 0 1200 13
!mem_use INCREASE Blocks 928447, AppSize 11466512, SysSize 33036736
< 0 1.052000 1052 0 0 1000 1920 0 0 1200 13
< 0 1.055000 1055 0 0 1000 1920 0 0 1200 13
< 0 1.055000 1055 0 0 1003 1920 0 0 1200 13
< 0 1.055000 1055 0 0 1006 1920 0 0 1200 13
< 0 0.897000 897 0 0 1006 1920 0 0 1200 13
< 0 1.129481 1626 0 0 953 1920 0 0 1200 13
< 0 1.129481 1517 0 0 953 1920 0 0 1200 13
< 0 1.138963 1525 0 0 961 1920 0 0 1200 13
~ Timer `UI Desktop` `UI Desktop` `EmbedBrowserTimer`
~ Activate `main_dlg_cur` `page_Table_control_btn` 1
~ Command `ProCmdDwgTblMergeCells`
~ LButtonArm `main_dlg_cur` `proe_win` 9 501 249 0 1 1647 936 1920 1200 25533
@ stack attr 2
~ Move `main_dlg_cur` `proe_win` 9 501 249 0 1 1647 936 1920 1200 25543
~ LButtonDisarm `main_dlg_cur` `proe_win` 9 501 249 0 0 1647 936 1920 1200 25622
@ stack attr -1 -1 1
@ stack idx 0
~ LButtonArm `main_dlg_cur` `proe_win` 9 538 249 0 1 1647 936 1920 1200 27143
~ LButtonDisarm `main_dlg_cur` `proe_win` 9 538 249 0 0 1647 936 1920 1200 27262
@ stack attr -1 -1 1
@ stack idx 0
~ MButtonArm `main_dlg_cur` `proe_win` 9 538 249 0 2 1647 936 1920 1200 27950
~ MButtonDisarm `main_dlg_cur` `proe_win` 9 538 249 0 0 1647 936 1920 1200 28126
** 0.242638 0.732906 0 4 4
0.242638 0.618389 M 0 1.109333333 0
~ MButtonArm `main_dlg_cur` `proe_win` 9 538 249 0 2 1647 936 1920 1200 28854
~ MButtonDisarm `main_dlg_cur` `proe_win` 9 538 249 0 0 1647 936 1920 1200 28990
** 0.242638 0.732906 0 4 4
  
```



Mapkey doesn't record mouse movements; trail files do

```

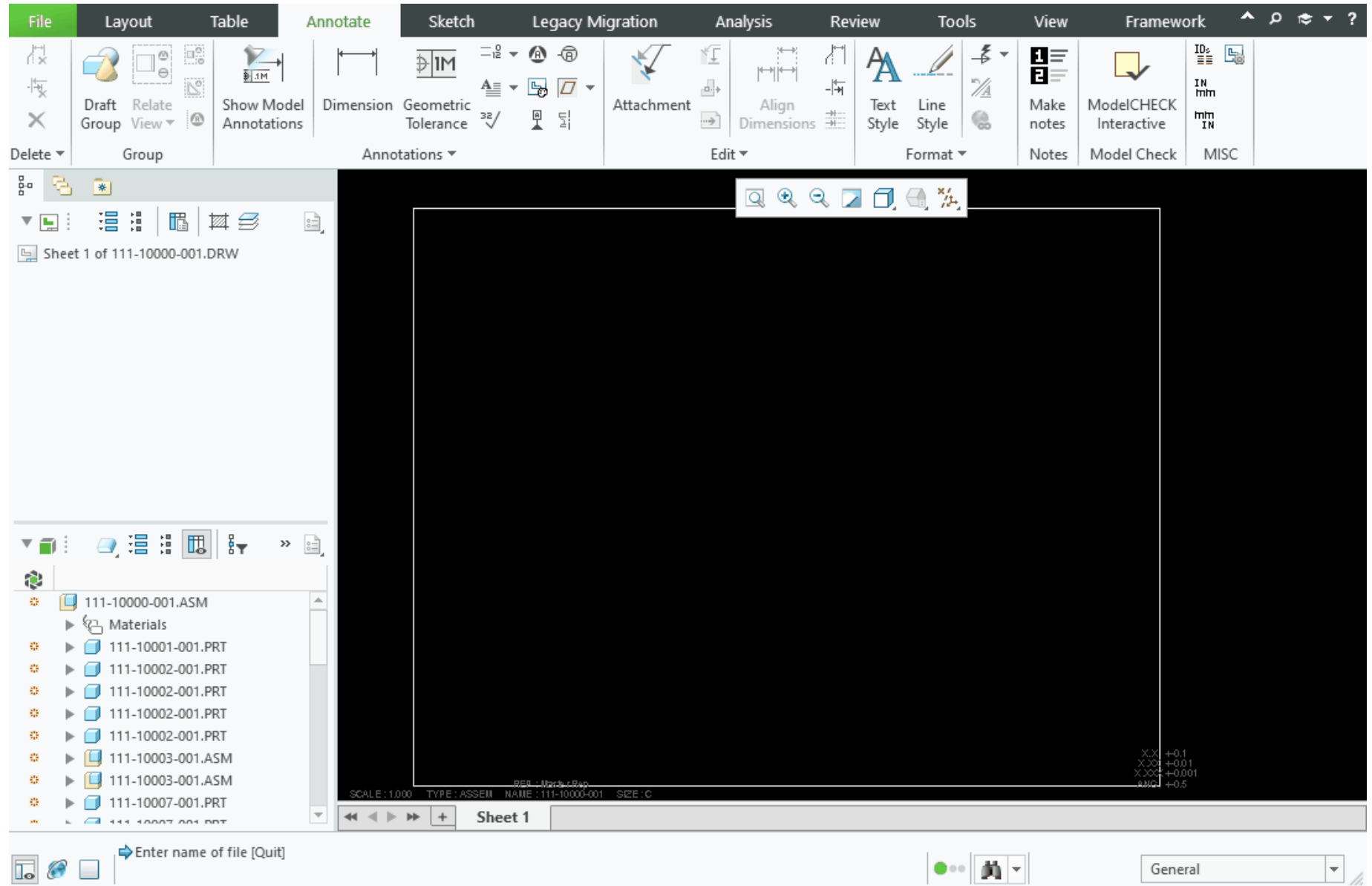
mapkey (continued) ~ Command `ProCmdDwgTblMergeCells` ;@PAUSE_FOR_SCREEN_PICK;\
mapkey (continued) @PAUSE_FOR_SCREEN_PICK;@PAUSE_FOR_SCREEN_PICK;
  
```



APPLICATION EXAMPLES

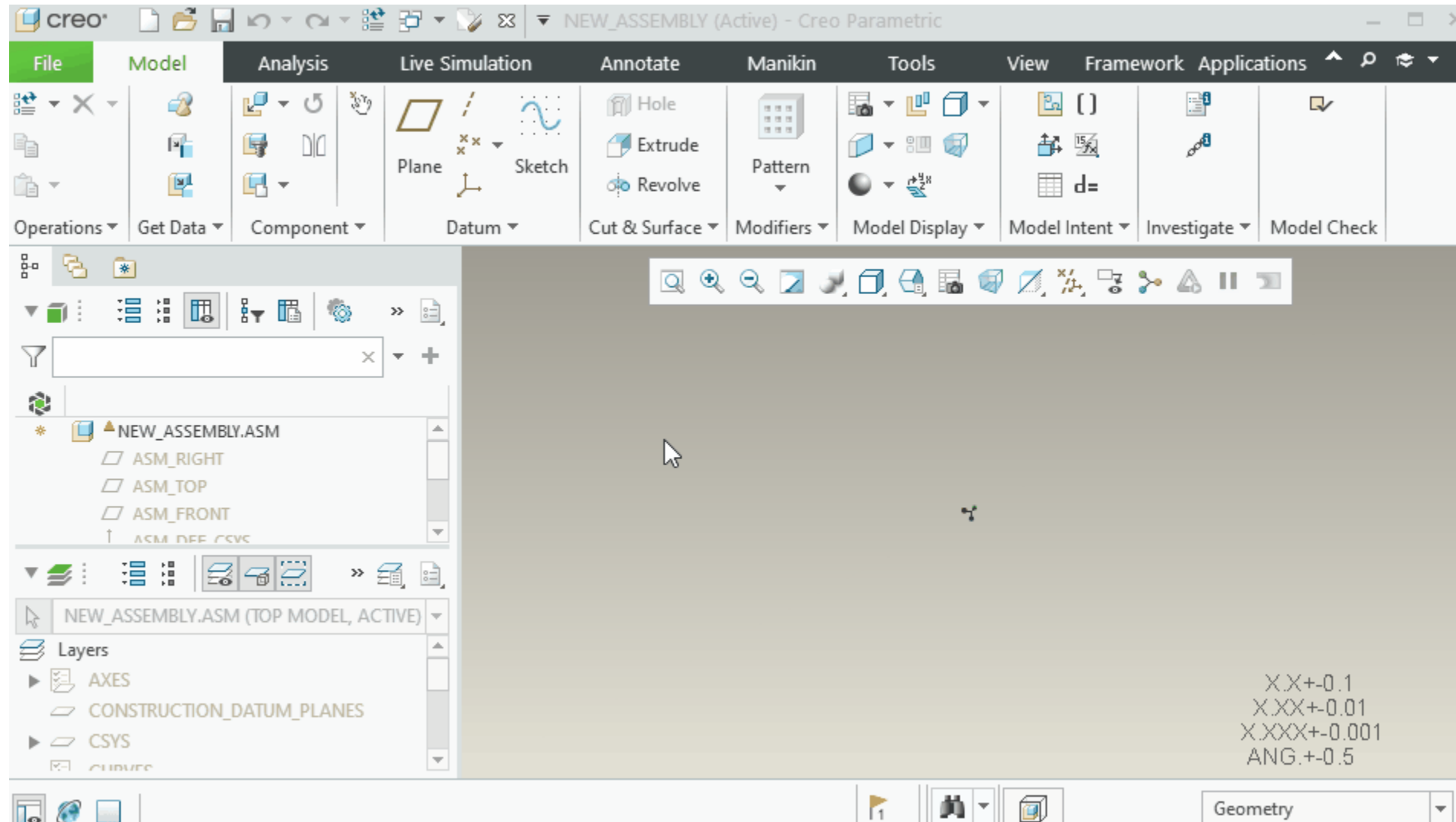
STANDARDIZED NOTES

MAPKEY -> VBS -> EXCEL -> VBA -> EXCEL USERFORM -> MAPKEY



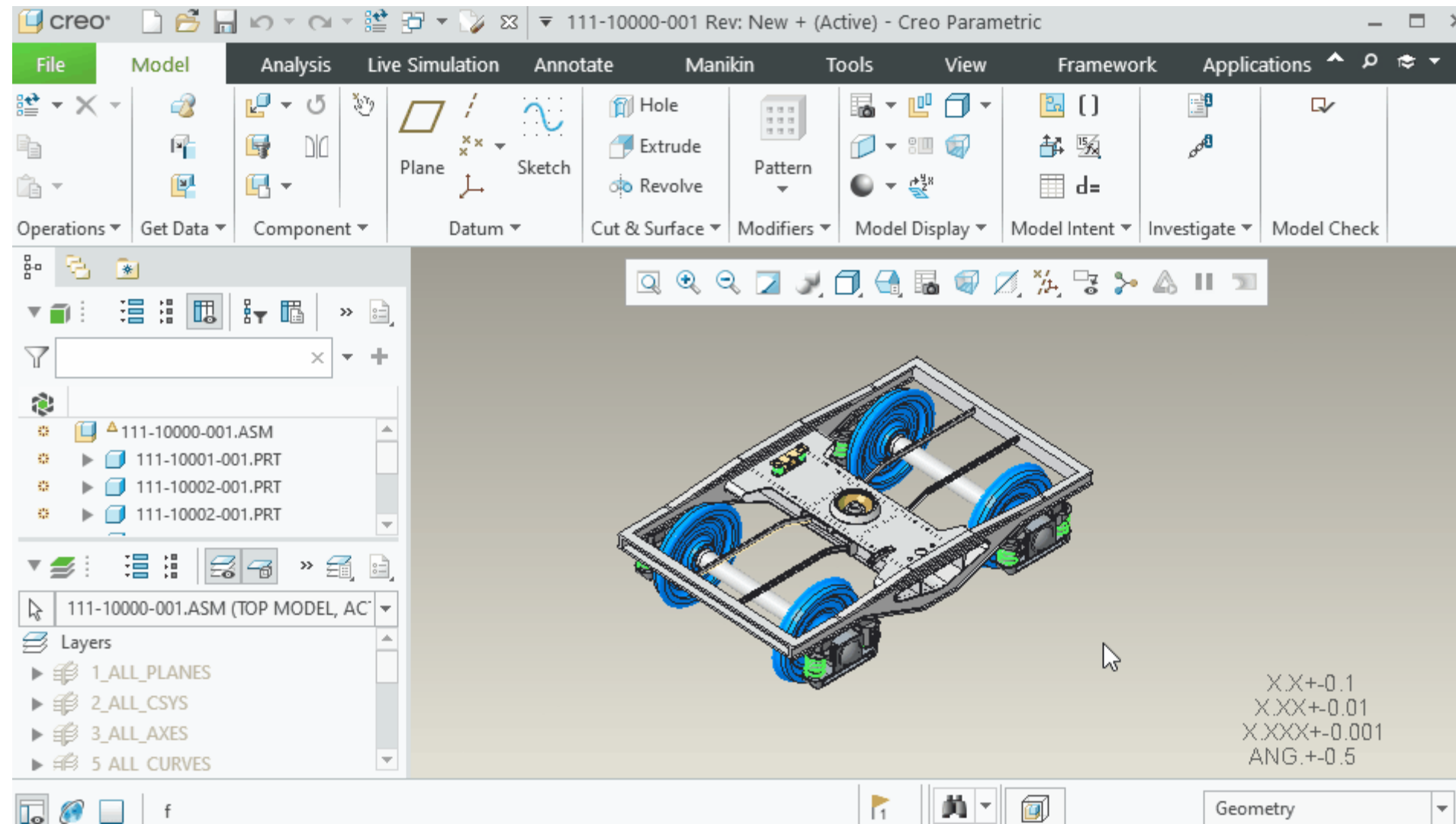
STANDARDIZED HARDWARE

MAPKEY -> VBS -> EXCEL -> VBA -> EXCEL USERFORM -> MAPKEY



FAMILY TREES

MAPKEY -> OPEN REPEAT REGION -> EXPORT TABLE -> VBS -> VISIO -> VBA



MASS PROPERTIES SOAP BOX

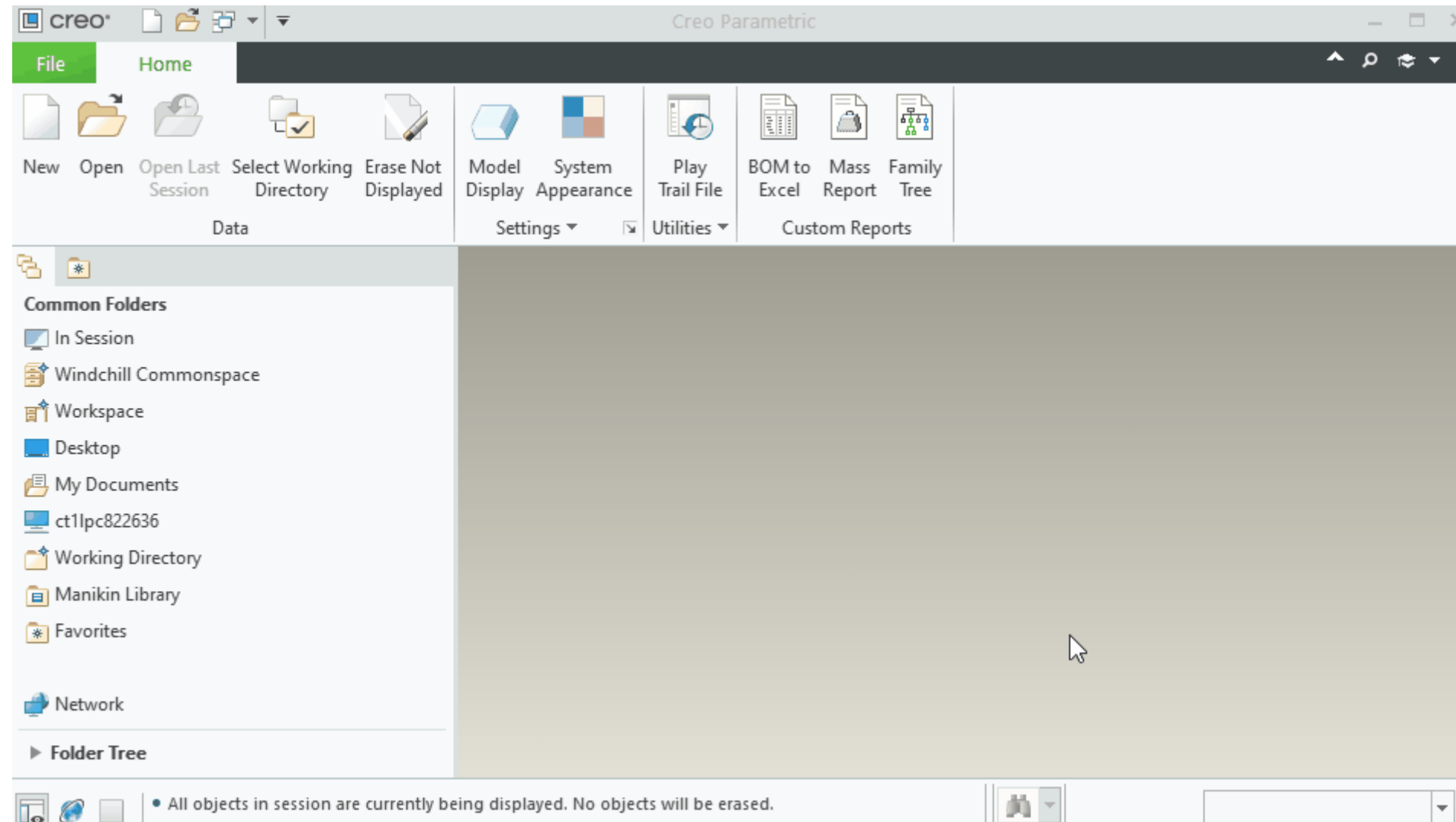
- PRO_MP_MASS is only updated if mass_property_calculate is set to automatic
 - mass_property_calculate automatic doesn't work well for released Windchill parts or large assembly management
- PRO_MP_MASS does not account for flexibility; A shim may have a different mass at the assembly level; A subassembly may not use all its components
- Alternatively, the Analysis -> Mass properties report can be run
 - CG locations can be obtained from this report
 - This report leaves out basic information like level and part description
 - Formatting leaves a lot to be desired
 - **Frustratingly it fails to report any components that have no geometry**
 - Supposedly this is working to specification
- Our solution is to use the Analysis -> Mass properties report and to try combine it with repeat region information although the datasets don't always match

MASS PROPERTIES OF COMPONENTS OF THE ASSEMBLY
(in assembly units and the _111-10000-001 coordinate frame)

DENSITY	MASS	C.G.: X	Y	Z
		MATERIAL:		STEEL
2.83599e-01	3.12104e+03	0.00000e+00	-5.12185e+00	0.00000e+00
		MATERIAL:		STEEL
2.83599e-01	9.64277e+01	4.04994e+01	-1.01006e+01	4.50811e+01
		MATERIAL:		STEEL
2.83599e-01	9.64277e+01	-4.05006e+01	-1.01006e+01	4.50811e+01
		MATERIAL:		STEEL

MASS PROPERTIES REPORT

MAPKEY -> REPEAT REGION -> EXPORT TABLE -> MASS PROP -> VBS -> EXCEL -> VBA



THANK YOU!

WAKE UP YOUR NEIGHBOR



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