

Open-Source Applications

Procedure

During this procedure, the ESAPI guru will accomplish the following:

1. Download Open applications from the internet
2. Run and modify these files for custom use.

References:

- a. NRG Clinical Trial Reporting Tool <https://www.nrgoncology.org/Scientific-Program/Center-for-Innovation-in-Radiation-Oncology>.

A. General Information

1. The utilization of Open Source scripts is crucial to all facets of programming. Operating systems, programming languages and projects of massive scale have been built through open-source collaboration.
2. This procedure walks you through the download and use of some popular open source applications for Eclipse Scripting API. Feel free to choose as many applications as you can download in the allotted time-frame.

B. NRG Center for Innovation in Radiation Oncology

- a) General Description: The DVHMetric script uses a CSV as a DVH metrics template and generates a result file in HTML format.
- b) Download the CIRO tool from the following location: <https://www.nrgoncology.org/Scientific-Program/Center-for-Innovation-in-Radiation-Oncology>
- c) Click on the **Eclipse Scripting API Source & App** link to download the application.

GENERAL INFORMATION

NRG Protocol Radiation Therapy Section Template

NRG Structure Name Library

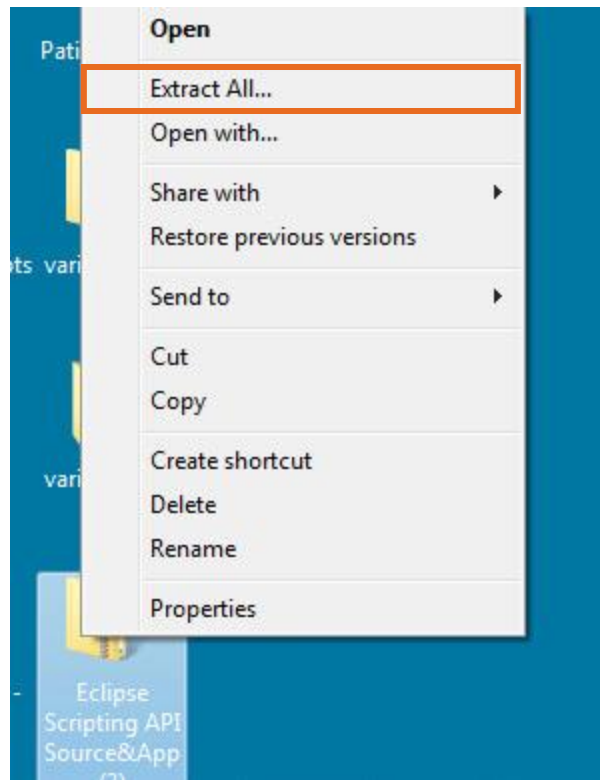
NCTN CIRO Radiotherapy Section Feedback

SOFTWARE TOOLS

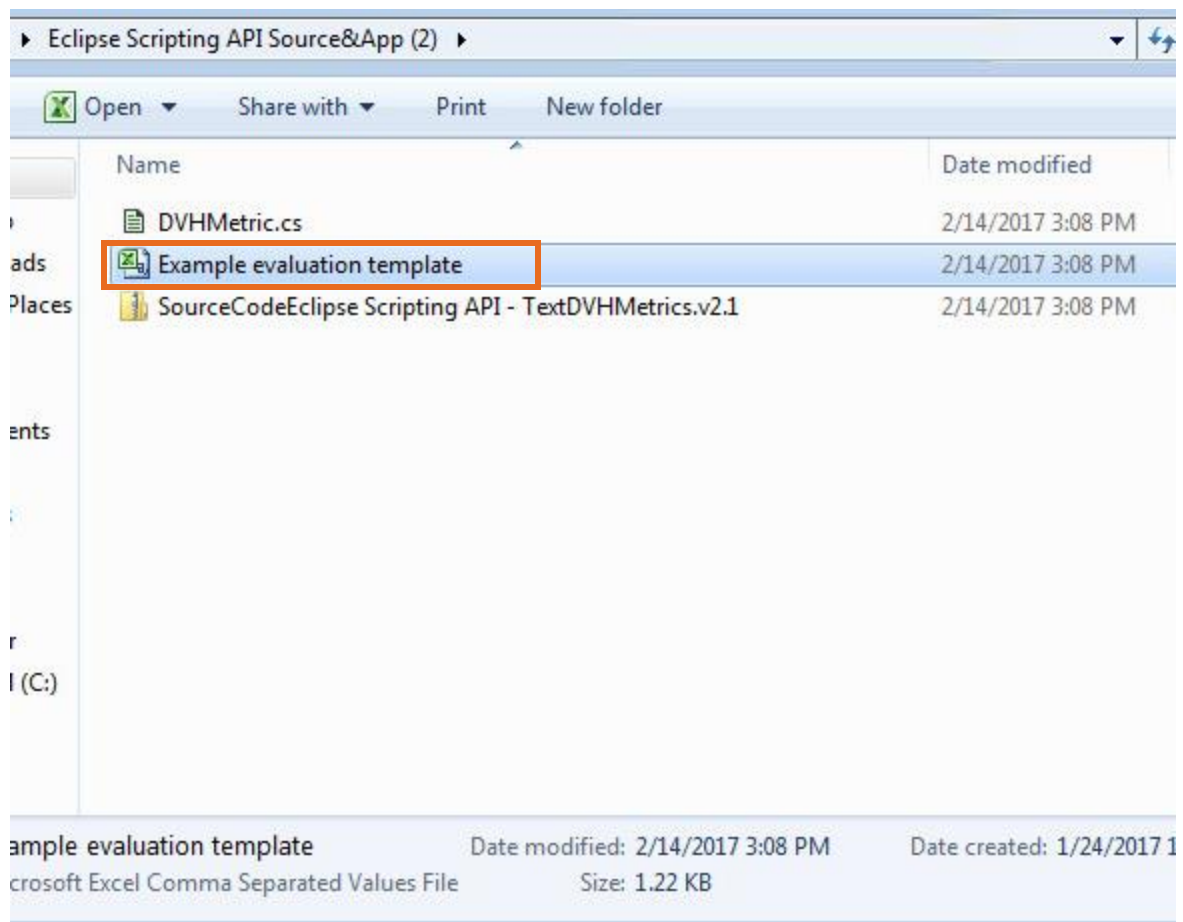
Eclipse Scripting API Source & App

(Instructions: Video 1, Video 2)

- d) Extract the zipped folder to the Desktop



- e) Open the CSV file that contains the DVH metrics that will be analyzed.



- f) Notice, this evaluation template can be used to calculate dose to structures **SpinalCord**, **PTV_<dose>**, **Brain**, and **BrainStemCore**.

	A	B	C	D	E	F	G	H	I
1	Structure	Structure	Aliases	DVH Obje	Evaluator	Variation	Priority	Met	Achieved
2	PTV_4600			D95%[Gy]	>=46	43.7	2		
3	PTV_6000			D95%[cGy]	<=60.75	63	2		
4	PTV_6000			D95%[Gy]	>=59.75	57	2		
5	PTV_6000			D10%[Gy]	<=63	65.12	2		
6	PTV_6000			D0.03cc[G	<=64	66	2		
7	PTV_5000			D95%[Gy]	>=50	47.5	2		
8	PTV_7500			D95%[Gy]	<=75.75	78.75	2		
9	PTV_7500			D95%[Gy]	>=74.25	71.25	2		
10	PTV_7500			D10%[Gy]	<=78.7	81.4	2		
11	PTV_7500			D0.03cc[G	<=80	82.5	2		
12	PTV_7500			Max[Gy]	<=80	82.5	2		
13	PTV_7500			Min[Gy]	>=75	82.5	2		
14	PTV_7500			Mean[%]	>=100	95.5	2		
15	PTV_7500			Volume[cc]			Report		
16	SpinalCord			D0.03cc[G	<=50	50	1		
17	BrainStemCore			D0.03cc[G	<=55	60	2		
18	BrainStemSurf			D0.03cc[G	<=55	64	2		
19	OpticChiasm_PRV			D0.03cc[G	<=55	60	2		
20	OptNrv_L_PRV			D0.03cc[G	<=55	60	2		
21	OptNrv_L_PRV			D0.03cc[G	<=55		2		
22	OptNrv_L_PRV			D0.03cc[Gy]			Report		
23	OptNrv_L_PRV			D0.03cc[G	<=0.5		2		
24	OptNrv_L_PRV			D0.03cc[G	<=0.5	55	2		
25	OptNrv_L_PRV			D0.03cc[G	<=0.5	55	2		

g) Since Single-file plug-in scripts are compiled by ESAPI, we can run this file.



h) Open User Home ()

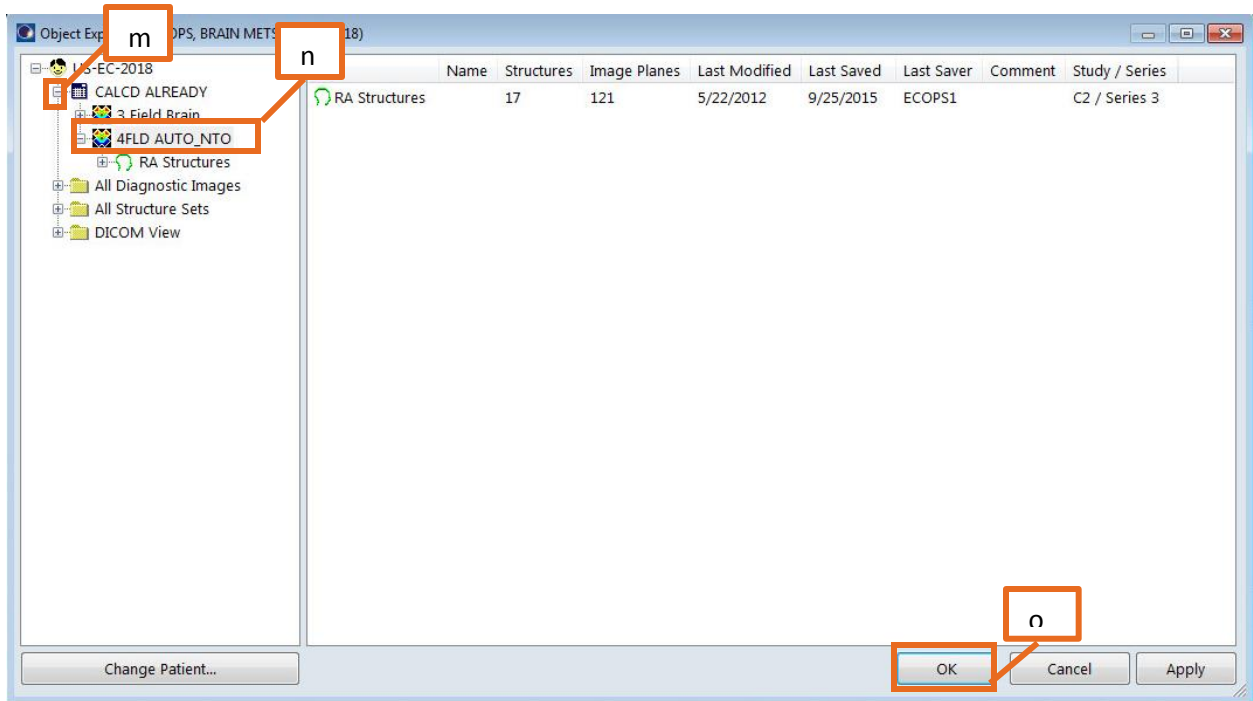
i) Navigate to External Beam Planning by using **Quicklinks→Treatment Planning→External Beam Planning**.

j) Click on the **Open Objects** button () to open **Patient Explorer**.

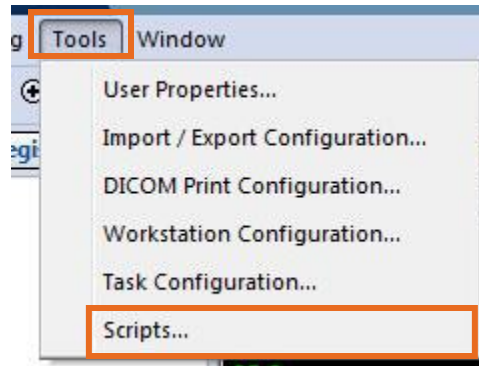
k) In the Patient Explorer, enter the ID1 of the patient you want to run this script against. For this example **US-EC-2018** will be opened, Click **Search**.



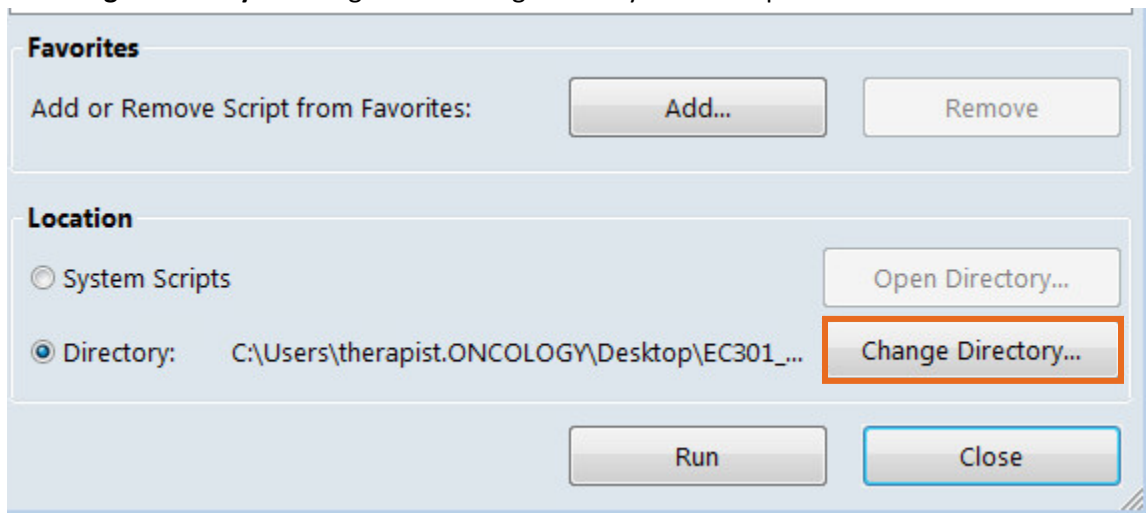
l) Click the row with the Patient Identity, and select ()



p) Once the plan **4FLD AUTO_NTO** opens, Select the **Tools→Scripts** menu.

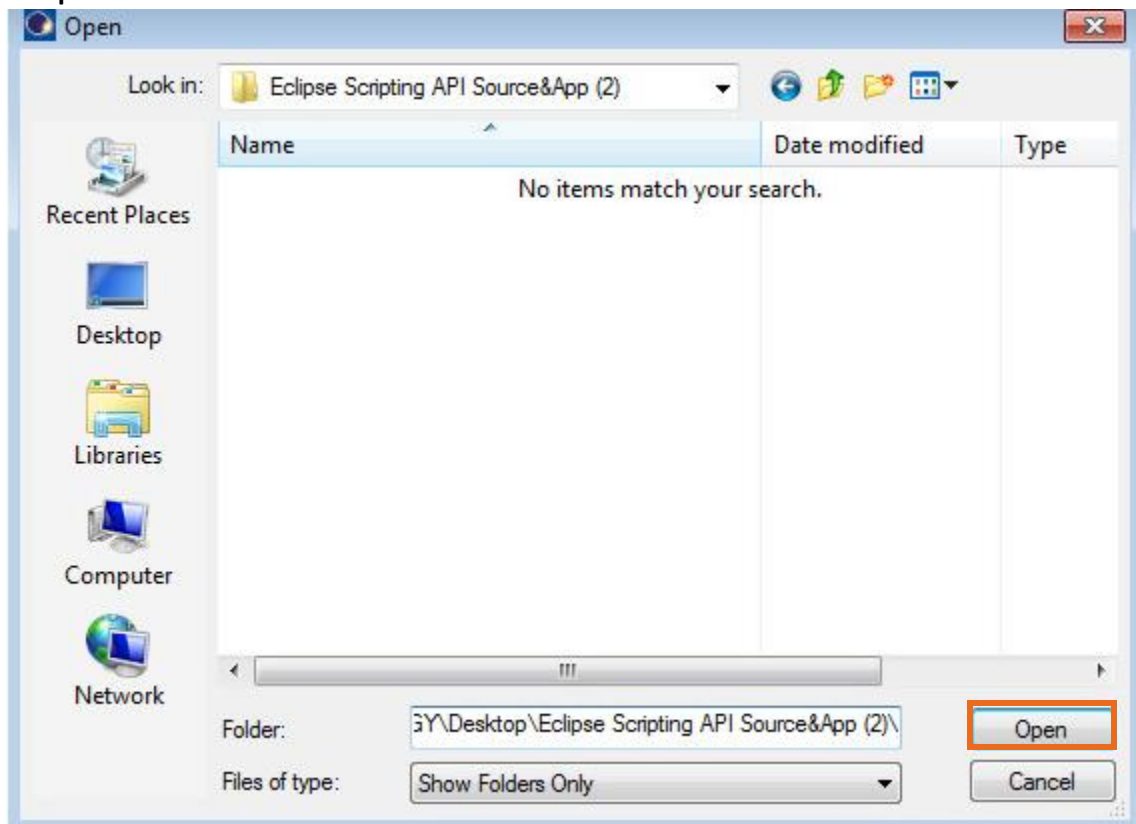


q) Click **Change Directory** to change the working directory of the script.



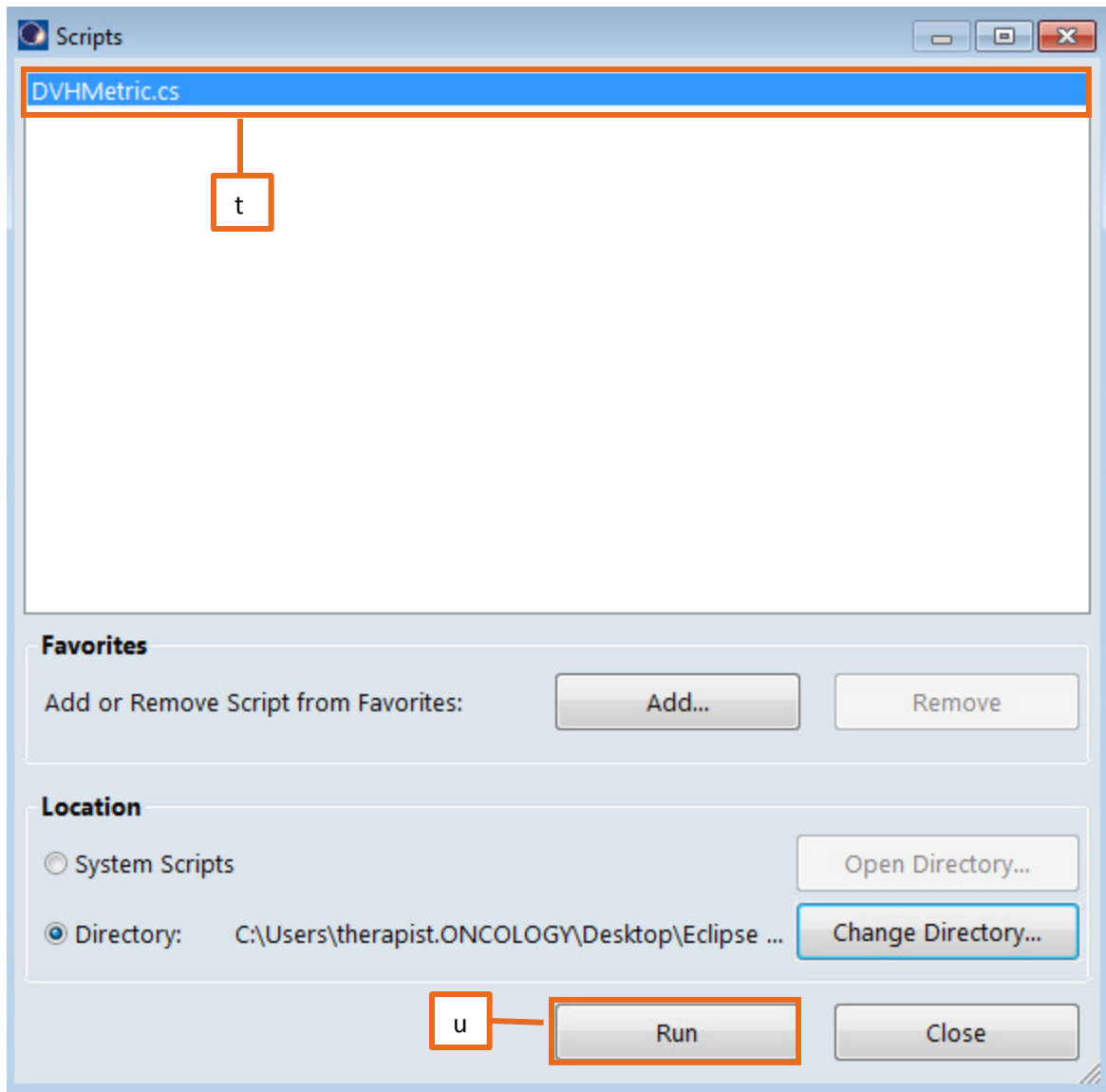
r) Navigate to the folder location of the script file downloaded from NRG.

s) Click **Open**

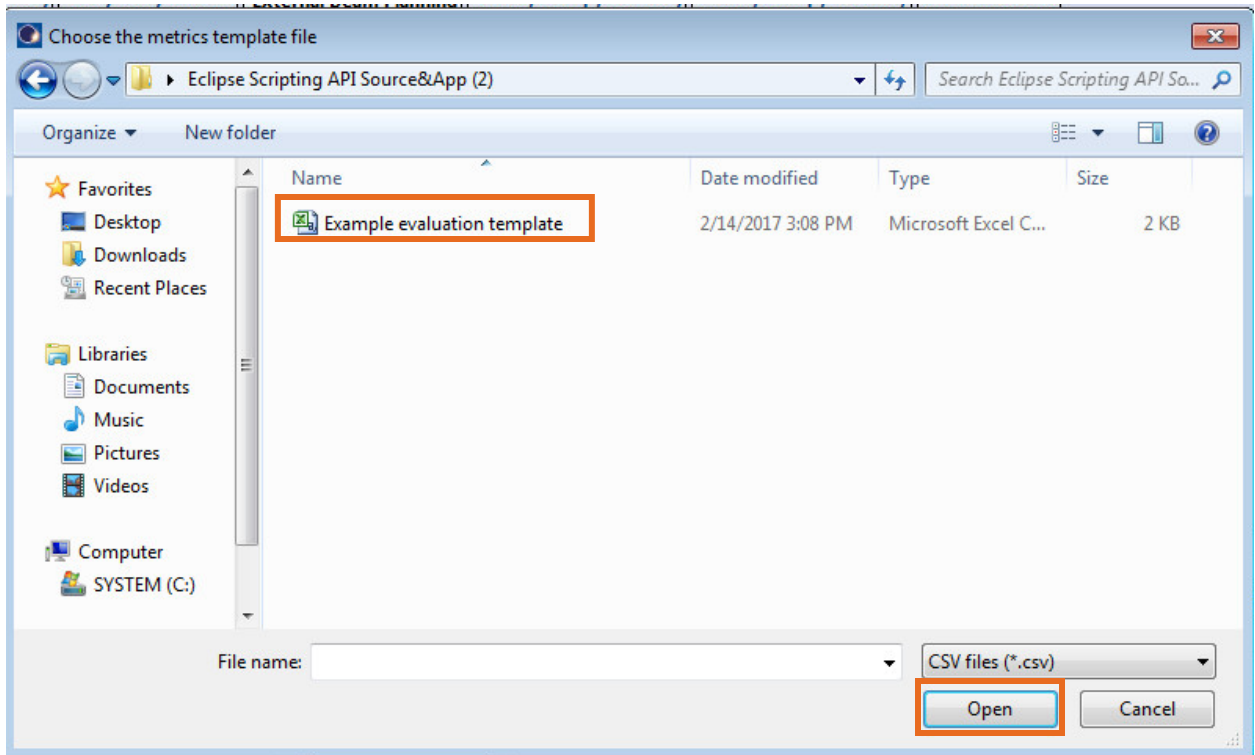


t) Make sure **DVHMetric.cs** is selected.

u) Click **Run**.



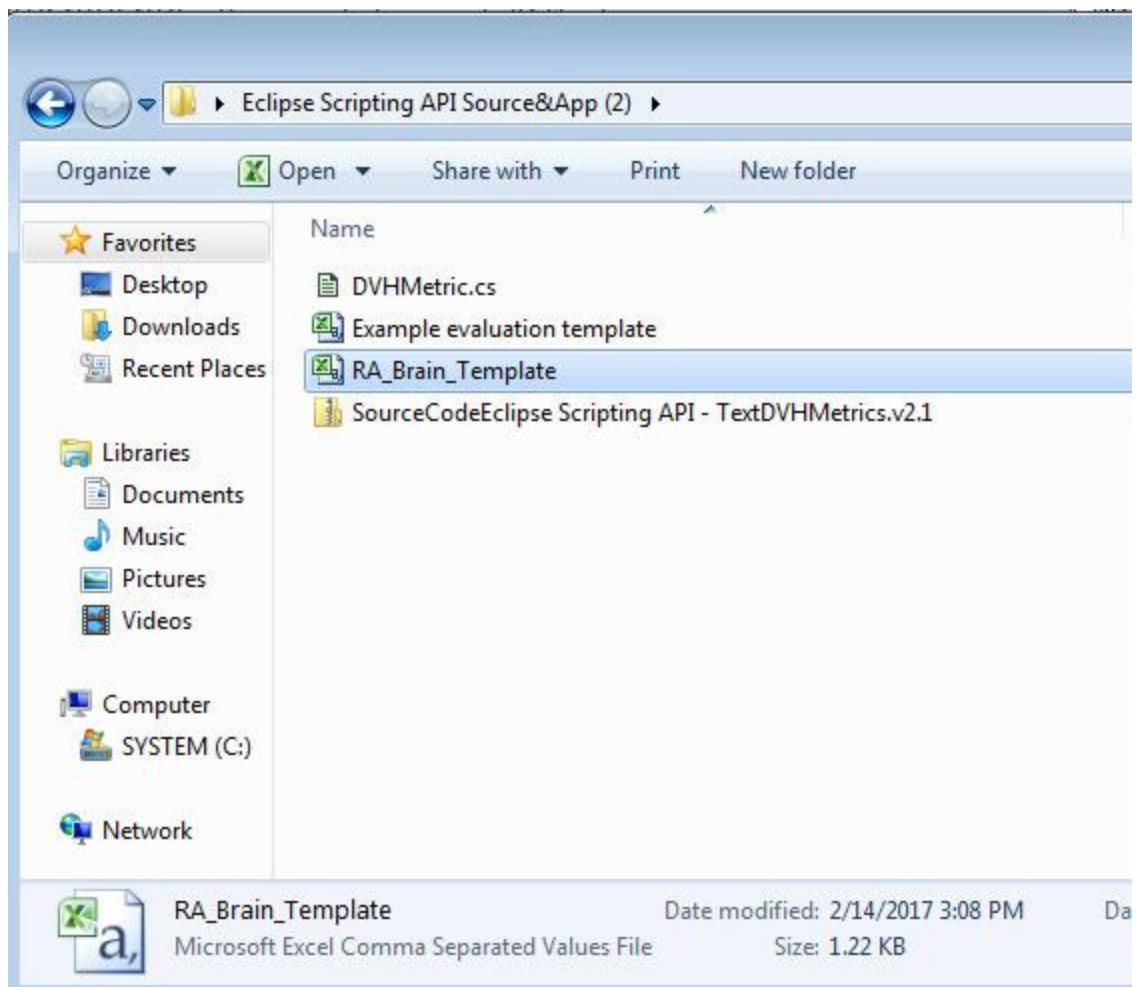
- v) The script will prompt the user to navigate to the metrics template file. Navigate to **Example evaluation template** and click **Open**.



w) An HTML file will then open. Only one structure is evaluated, but the script is working properly.

NRG NRG > Scientific Program x US-EC-2018-4FLD AUTO x								
file:///C:/Users/therapist.ONCOLOGY/AppData/Local/Temp/US-EC-2018-4FLD%20AUTO_NTO-2017-02-14-04-40-56								
Name (ID): RA OPS, BRAIN METS (US-EC-2018)								
Plan or PlanSum ID: 4FLD AUTO_NTO								
Printed :2017-02-14 04:40:56								
Structure ID	Structure Code	Patient Structure	DVH Objective	Evaluator	Variation	Priority	Met	Achieved
PTV_4600			D95%[Gy]	>=46	43.7	2	Not evaluated	Structure not found or empty.
PTV_6000			D95%[cGy]	<=60.75	63	2	Not evaluated	Structure not found or empty.
PTV_6000			D95%[Gy]	>=59.75	57	2	Not evaluated	Structure not found or empty.
PTV_6000			D10%[Gy]	<=63	65.12	2	Not evaluated	Structure not found or empty.
PTV_6000			D0.03cc[Gy]	<=64	66	2	Not evaluated	Structure not found or empty.
PTV_5000			D95%[Gy]	>=50	47.5	2	Not evaluated	Structure not found or empty.
PTV_7500			D95%[Gy]	<=75.75	78.75	2	Not evaluated	Structure not found or empty.
PTV_7500			D95%[Gy]	>=74.25	71.25	2	Not evaluated	Structure not found or empty.
PTV_7500			D10%[Gy]	<=78.7	81.4	2	Not evaluated	Structure not found or empty.
PTV_7500			D0.03cc[Gy]	<=80	82.5	2	Not evaluated	Structure not found or empty.
PTV_7500			Max[Gy]	<=80	82.5	2	Not evaluated	Structure not found or empty.
PTV_7500			Min[Gy]	>=75	82.5	2	Not evaluated	Structure not found or empty.
PTV_7500			Mean[%]	>=100	95.5	2	Not evaluated	Structure not found or empty.
PTV_7500			Volume[cc]			Report		Structure not found or empty.
SpinalCord			D0.03cc[Gy]	<=50	50	1	Not evaluated	Structure not found or empty.
BrainStemCore			D0.03cc[Gy]	<=55	60	2	Not evaluated	Structure not found or empty.
BrainStemSurf			D0.03cc[Gy]	<=55	64	2	Not evaluated	Structure not found or empty.
OpticChiasm_PRV			D0.03cc[Gy]	<=55	60	2	Not evaluated	Structure not found or empty.
OptNrv_L_PRV			D0.03cc[Gy]	<=55	60	2	Not evaluated	Structure not found or empty.
OptNrv_L_PRV			D0.03cc[Gy]	<=55		2	Not evaluated	Structure not found or empty.
OptNrv_L_PRV			D0.03cc[Gy]			Report		Structure not found or empty.
OptNrv_L_PRV			D0.03cc[Gy]	<=0.5		2	Not evaluated	Structure not found or empty.
OptNrv_L_PRV			D0.03cc[Gy]	<=0.5	55	2	Not evaluated	Structure not found or empty.
OptNrv_L_PRV			V2200.0cGy[cc]	<=20	55	2	Not evaluated	Structure not found or empty.
OptNrv_L_PRV			V22.0Gy[%]	<=20	55	2	Not evaluated	Structure not found or empty.
OptNrv_R_PRV			D0.03cc[Gy]	<=55	60	2	Not evaluated	Structure not found or empty.
Retina_L			D0.03cc[Gy]	<=45	50	2	Not evaluated	Structure not found or empty.
Retina_R			D0.03cc[Gy]	<=45	50	2	Not evaluated	Structure not found or empty.
Brain		Brain	D5%[Gy]	<=78.7	81.4	1	Goal	13.226 Gy
Lens_L			D0.03cc[Gy]	<=7	10	2	Not evaluated	Structure not found or empty.
Lens_R			D0.03cc[Gy]	<=7	10	2	Not evaluated	Structure not found or empty.

- x) Return to the location of the Script. There you will find the example template, **Example evaluation template**. Copy/Paste the **Example evaluation template** and rename the file to **RA_Brain_Template**



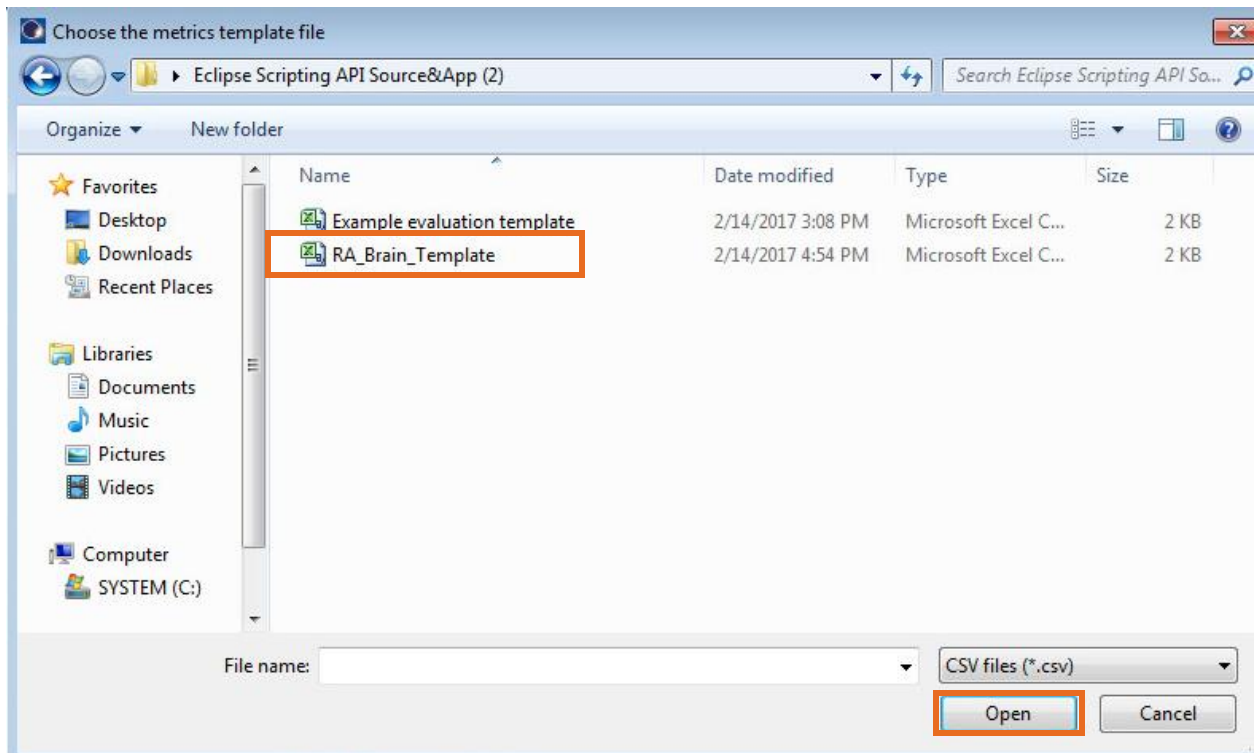
y) Open and modify this template file as follows:

	A	B	C	D	E	F	G
1	Structure ID	Structure	Aliases	DVH Object	Evaluator	Variation	Priority
2	PTV1			D95%[cGy	<=60.75	63	2
3	PTV1			D95%[Gy]	>=59.75	57	2
4	PTV1			D10%[Gy]	<=63	65.12	2
5	PTV1			D0.03cc[G	<=64	66	2
6	PTV2			D95%[cGy	<=60.75	63	2
7	PTV2			D95%[Gy]	>=59.75	57	2
8	PTV2			D10%[Gy]	<=63	65.12	2
9	PTV2			D0.03cc[G	<=64	66	2
10	PTV3			D95%[cGy	<=60.75	63	2
11	PTV3			D95%[Gy]	>=59.75	57	2
12	PTV3			D10%[Gy]	<=63	65.12	2
13	PTV3			D0.03cc[G	<=64	66	2
14	PTV4			D95%[cGy	<=60.75	63	2
15	PTV4			D95%[Gy]	>=59.75	57	2
16	PTV4			D10%[Gy]	<=63	65.12	2
17	PTV4			D0.03cc[G	<=64	66	2
18	PTV5			D95%[cGy	<=60.75	63	2
19	PTV5			D95%[Gy]	>=59.75	57	2
20	PTV5			D10%[Gy]	<=63	65.12	2
21	PTV5			D0.03cc[G	<=64	66	2
22	Spinal Cord			D0.03cc[G	<=50	50	1
23	BrainStem			D0.03cc[G	<=55	60	2
24	OPTIC NERVE_LT			D0.03cc[G	<=55	60	2
25	OPTIC NERVE_RT			D0.03cc[G	<=55		2
26	OPTIC NERVE_LT			D0.03cc[G	<=0.5		2
27	OPTIC NERVE_RT			D0.03cc[G	<=0.5	55	2
28	OPTIC NERVE_LT			V2200.0c	<=20	55	2
29	OPTIC NERVE_RT			D0.03cc[G	<=55	60	2
30	EYE_LT			D0.03cc[G	<=45	50	2
31	EYE_RT			D0.03cc[G	<=45	50	2
32	Brain			D5%[Gy]	<=78.7	81.4	1

z) Save and Close the new Template File.

aa) Return to Eclipse and Click Run on the same DVHMetric.cs file.

bb) Find the new **RA_Brain_Template** file. Click **Open**.



cc) Review the new HTML report.

Name (ID): RA OPS, BRAIN METS (US-EC-2018)
 Plan or PlanSum ID: 4FLD AUTO_NTO
 Printed :2017-02-14 04:56:23

Structure ID	Structure Code	Patient Structure	DVH Objective	Evaluator	Variation	Priority	Met	Achieved
PTV1		PTV1	D95%[cGy]	<=60.75	63	2	Not met	1759.8 cGy
PTV1		PTV1	D95%[Gy]	>=59.75	57	2	Not met	17.598 Gy
PTV1		PTV1	D10%[Gy]	<=63	65.12	2	Goal	18.203 Gy
PTV1		PTV1	D0.03cc[Gy]	<=64	66	2	Goal	18.339 Gy
PTV2		PTV2	D95%[cGy]	<=60.75	63	2	Not met	1754.6 cGy
PTV2		PTV2	D95%[Gy]	>=59.75	57	2	Not met	17.546 Gy
PTV2		PTV2	D10%[Gy]	<=63	65.12	2	Goal	18.128 Gy
PTV2		PTV2	D0.03cc[Gy]	<=64	66	2	Goal	18.309 Gy
PTV3		PTV3	D95%[cGy]	<=60.75	63	2	Not met	1731.2 cGy
PTV3		PTV3	D95%[Gy]	>=59.75	57	2	Not met	17.312 Gy
PTV3		PTV3	D10%[Gy]	<=63	65.12	2	Goal	18.180 Gy
PTV3		PTV3	D0.03cc[Gy]	<=64	66	2	Goal	18.321 Gy
PTV4		PTV4	D95%[cGy]	<=60.75	63	2	Not met	1741.8 cGy
PTV4		PTV4	D95%[Gy]	>=59.75	57	2	Not met	17.418 Gy
PTV4		PTV4	D10%[Gy]	<=63	65.12	2	Goal	18.274 Gy
PTV4		PTV4	D0.03cc[Gy]	<=64	66	2	Goal	18.289 Gy
PTV5		PTV5	D95%[cGy]	<=60.75	63	2	Not met	1757.6 cGy
PTV5		PTV5	D95%[Gy]	>=59.75	57	2	Not met	17.576 Gy
PTV5		PTV5	D10%[Gy]	<=63	65.12	2	Goal	18.319 Gy
PTV5		PTV5	D0.03cc[Gy]	<=64	66	2	Goal	18.310 Gy
Spinal Cord		Spinal Cord	D0.03cc[Gy]	<=50	50	1	Goal	1.769 Gy
BrainStem		Brainstem	D0.03cc[Gy]	<=55	60	2	Goal	3.819 Gy
OPTIC NERVE_LT		OPTIC NERVE_LT	D0.03cc[Gy]	<=55	60	2	Goal	1.698 Gy
OPTIC NERVE_RT		OPTIC NERVE_RT	D0.03cc[Gy]	<=55		2	Goal	1.357 Gy
OPTIC NERVE_LT		OPTIC NERVE_LT	D0.03cc[Gy]	<=0.5		2	Not met	1.698 Gy
OPTIC NERVE_RT		OPTIC NERVE_RT	D0.03cc[Gy]	<=0.5	55	2	Variation	1.357 Gy
OPTIC NERVE_LT		OPTIC NERVE_LT	V2200.0cGy[cc]	<=20	55	2	Goal	0.00 cc
OPTIC NERVE_RT		OPTIC NERVE_RT	D0.03cc[Gy]	<=55	60	2	Goal	1.357 Gy
EYE_LT		EYE_LT	D0.03cc[Gy]	<=45	50	2	Goal	1.246 Gy
EYE_RT		EYE_RT	D0.03cc[Gy]	<=45	50	2	Goal	1.337 Gy
Brain		Brain	D5%[Gy]	<=78.7	81.4	1	Goal	13.226 Gy

- dd) From the web browser, the user may choose to save this as HTML or print to a PDF file using a PDF printer.
- ee) On your own, generate a new template file that will include OARs from another location in the body.