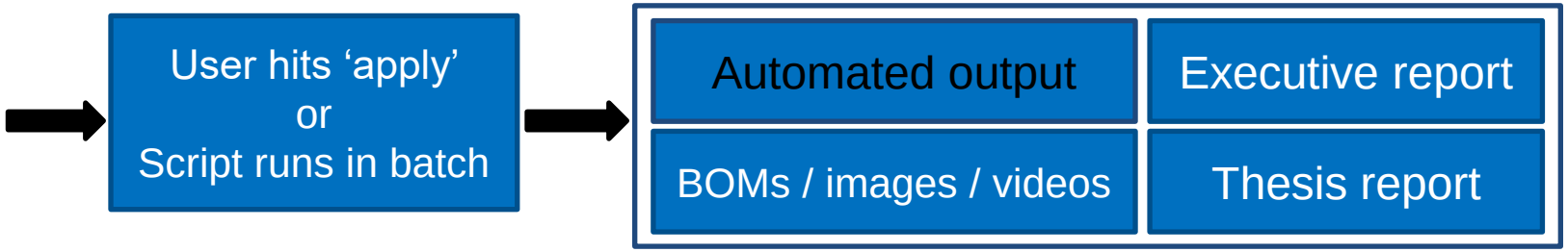
User input, Process flow, and Log file

User input:
- All user input/output variables will come from a 2D MetaDB file
- For 3D data the user will have several options for input to identify critical part groups in the model for BOM, image, and video generation
- For 2D data the user will have several options for input to identify critical curves in the model for image generation

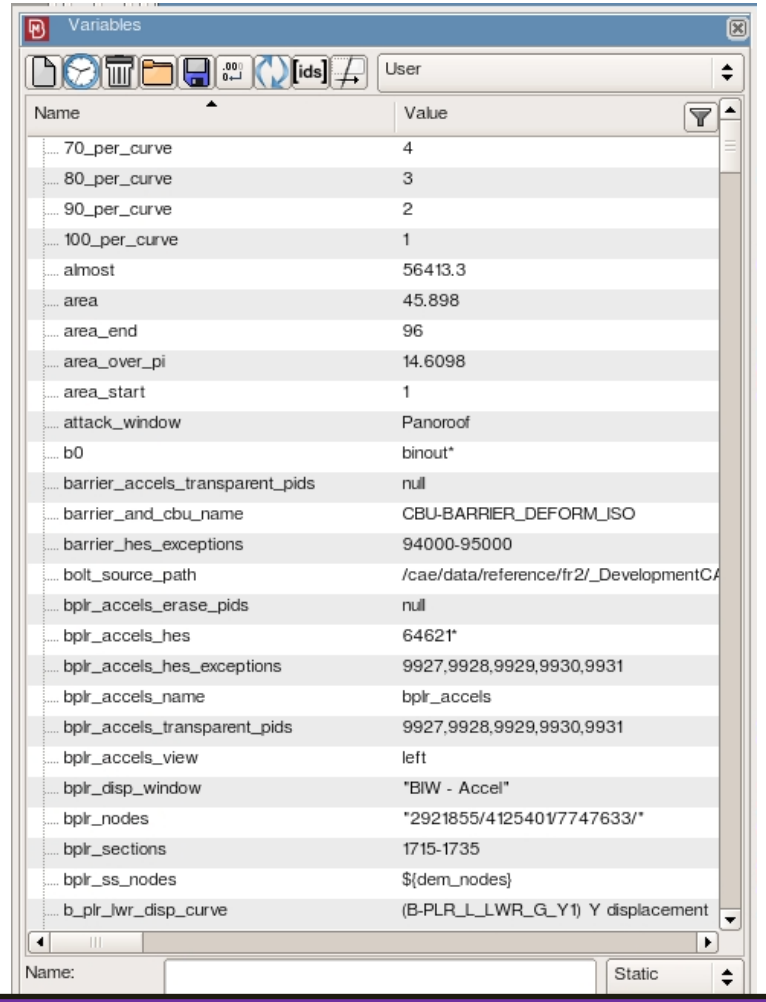
Source files:
1. MetaDB with 2D data and user input/output variables
2. MetaDB with 3D data and keyword information
3. Excel log file with critical statistics from 2D MetaDB file
4. Template pptx/html file where media will be dumped



Log file:
a) Report what images/videos are output, what input information was used, image size in pixels, and output path
   - For 3D data, specify what parts are visible, what view was used, and what state / range of states were used
   - For 2D data, specify what curves are output and what window was output
b) Report how many parts in each BOM file, size of the excel sheet, and output path
c) Report what resources are being consumed for each task and how long each task takes

User input : Input / output variables

Variables in the 2D MetaDB report



- The user will specify the path to the template file to source and the file with the targets
- Output information will be input by the user as to what font to be used and what the images should be sized in the document
- For video output, the user will specify what amount of frames they want per second
- The path to the log file, 2D MetaDB, and 3D MetaDB will be stored in the 2D MetaDBfile

Conclusion : Source the 2D MetaDB report for all user input. If additional variables are needed, please advise, and we can update the process

User input : Critical 3D Data

- HES is a filter used on part name
- HES dosen’t always work so parts need to able to be shown in addition through hes_exceptions
- Sometimes HES grabs parts we don’t want and they need to be hidden through erase_pids
- User might want to make some of the parts transparent or maybe not
- User will need to specify the view (would be great if we could use some vector or something in addition to standard views)
- User will specify what the prefix should be for the media output by the user input for this critical section
- The user may specify an erase box so if a part is mirrored one may erase the unstruck / non-critical part

f28_front_door_erase_box	-10000,0,-10000,10000,100000,10000
f28_front_door_erase_pids	37039
f28_front_door_hes	671*,672*,673*
f28_front_door_hes_exceptions	null
f28_front_door_name	FRONT_DOOR
f28_front_door_transparent_pids	36002
f28_front_door_view	left

```
window active "${picture_window}"
model active ${model}
window size ${picture_size}
or advfilter partoutput add:Parts:name:${search}:Keep All
add pid ${hes_exceptions}
erase advfilter partoutput add:Parts:name:${exclude}:Keep All
erase pid ${erase_pids}
erase shells box ${erase_box}
erase solids box ${erase_box}
view default ${comp_view}
view center
color pid transparency ${transparency_level} ${transparent_pids}
lock store "${comp_name}"
```

Conclusion : This logic will be repeated for several critical regions and then several of these regions will be shown at the same time to get CBU level images / video

HONDA
The Power of Dreams

User input : Critical 2D data

- For critical areas the user will specify curve name / id / filter to use to identify the curves in the MetaDB

rear_femur_upr_disp_curve	ROW2_FEMUR_SPHERE_ Displacement
rear_femur_upr_intrusion_curve	ROW2_FEMUR_SPHERE_ Intrusion
rear_femur_velocity_curve	null
rear_pelvis_disp_curve	ROW2_PELVIS_SPHERE_ Displacement
rear_pelvis_lintrusion_curve	ROW2_PELVIS_SPHERE_ Intrusion
rear_pelvis_velocity_curve	null
rear_shoulder_disp_curve	ROW2_SHOULDER_SPHERE_ Displacement
rear_shoulder_intrusion_curve	ROW2_SHOULDER_SPHERE_ Intrusion

Conclusion : This logic will be repeated for several critical regions and then several of these regions will be shown at the same time to get several macro and trend analysis images

Source files : Data structure

Source files will be available in the run directory either in the immediate folder, one level down, or at a path specified by the user through user input variables

pG – Geometry path
pA – binout path
pD – displacement path
pR – Report path
pT – Target MetaDB path

```
561  $-- RELATIVE PATHS TO SOURCE DATA
562  opt var add pG "${run_directory}/${master_file}"
563  opt var add pA "${run_directory}/${b0}"
564  opt var add pD "${run_directory}/${d0}"
565  opt var add pR "${run_directory}/Session_Report/${save_filename}"
566  opt var add pT "${project_targets_path}/${t0}"
567
```

pM – Working directory for log file
pL – Log file Path

```
328  $-------------------------------------
329  $-- SAVE UPDATED MASTER FILE
330  spreadsheet save ${pM}/${prefix}${TIMESTAMP}.xlsx
331  opt var add pL ${pM}/${prefix}${TIMESTAMP}.xlsx
```

Conclusion : This data structure will be constant, automated through the HPC, and stored as variables in the 2D MetaDB

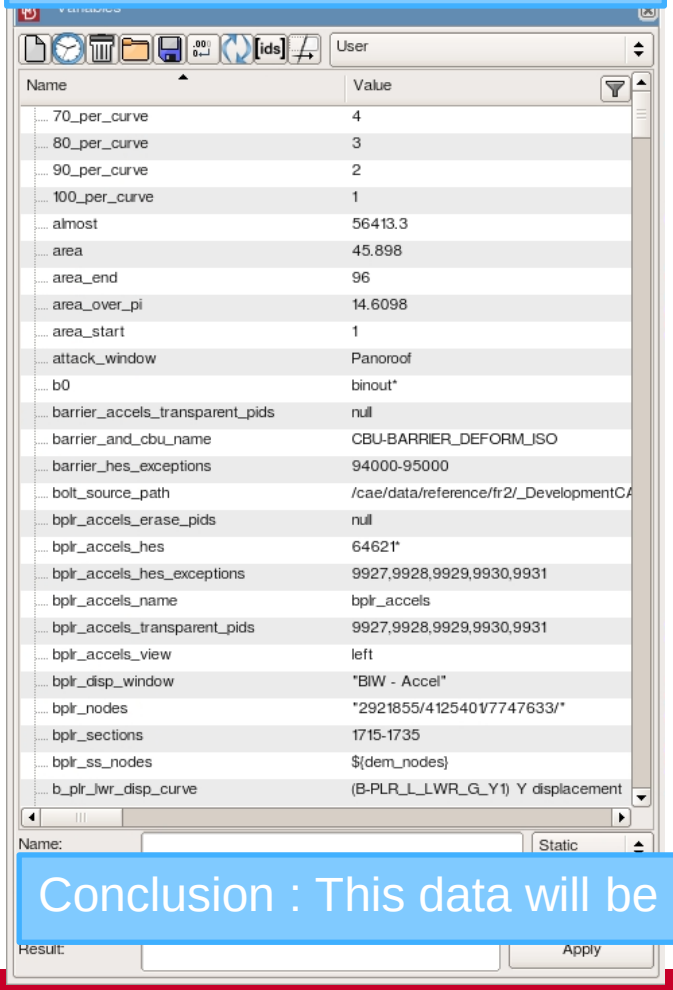
Source files : 2D MetaDB

User input:

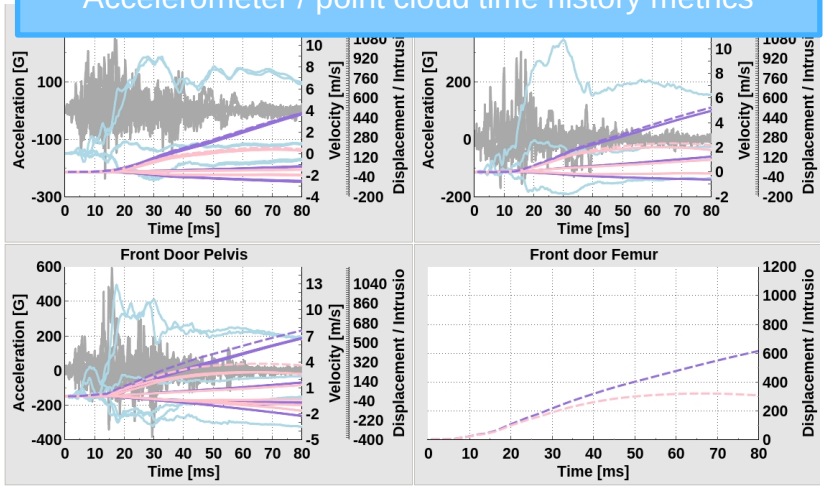
1. MetaDB with 2D data and user input information about model output
2. MetaDB with 3D data and keyword information
3. Excel log file with critical statistics from 2D MetaDB file
4. Template pptx/html file where media will be dumped

MetaDB 2D data file will contain all the critical curve metrics plotted and user input data detailing information about the model output will be stored as variables.

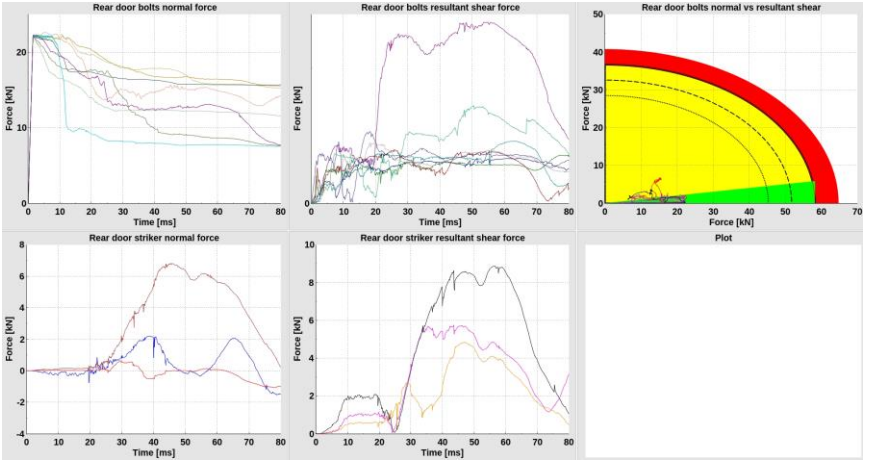
User input and processed variables



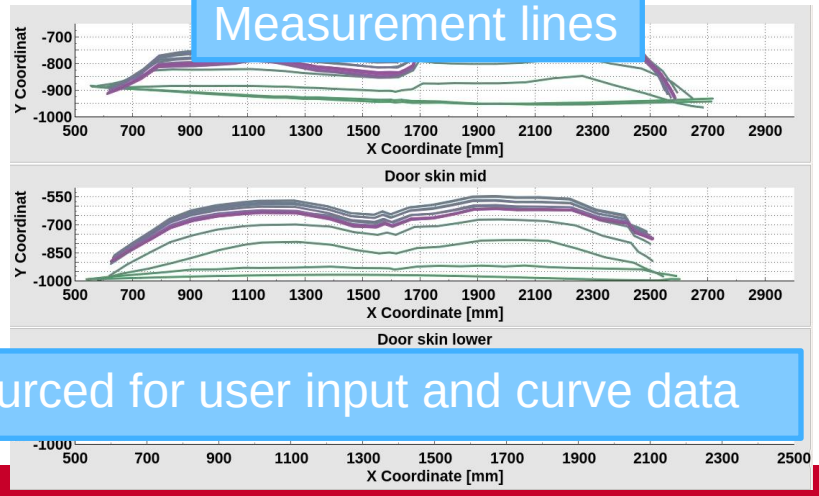
Accelerometer / point cloud time history metrics



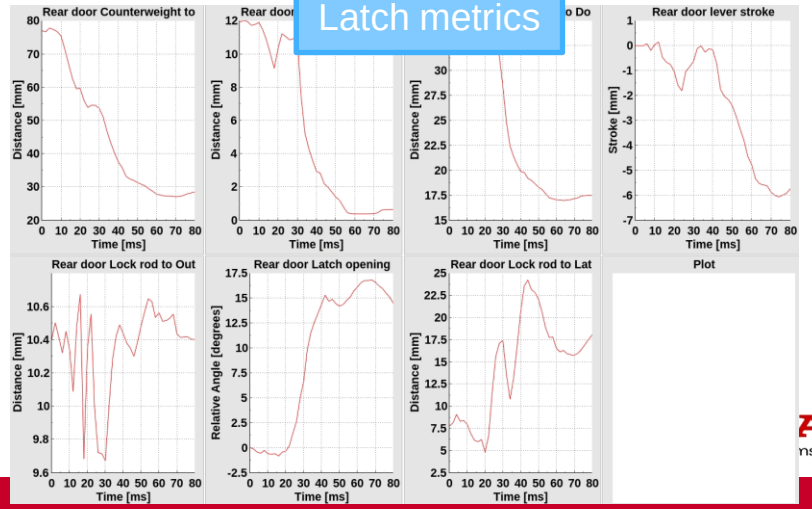
Bolt / striker data



Measurement lines



Latch metrics



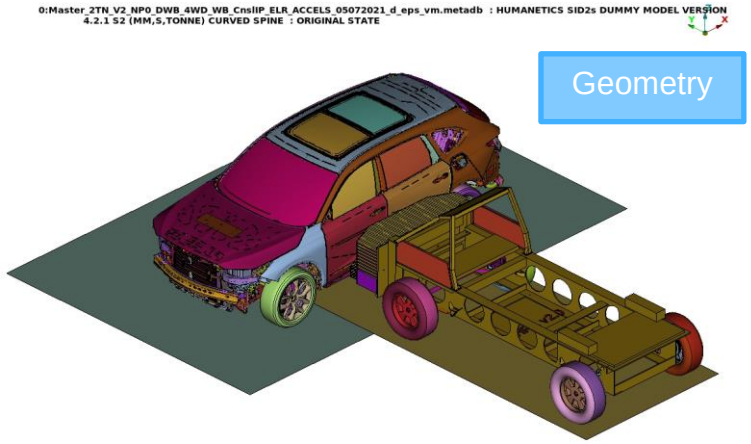
Conclusion : This data will be sourced for user input and curve data

Source files : 3D MetaDB

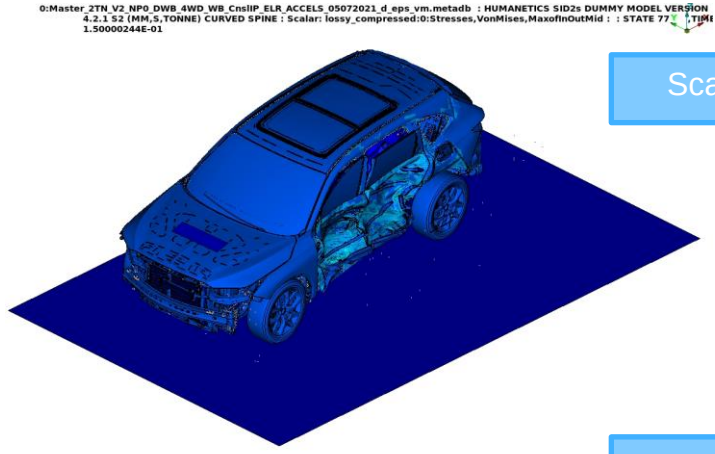
User input:

1. MetaDB with 2D data and user input information about model output
2. MetaDB with 3D data and keyword information
3. Excel log file with critical statistics from 2D MetaDB file
4. Template pptx/html file where media will be dumped

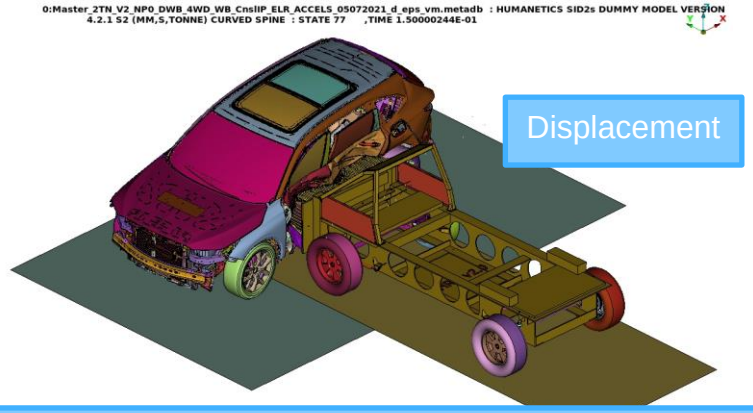
Key file geometry and d3plot displacement data will contain geometry, displacement, scalar, part, and material data.



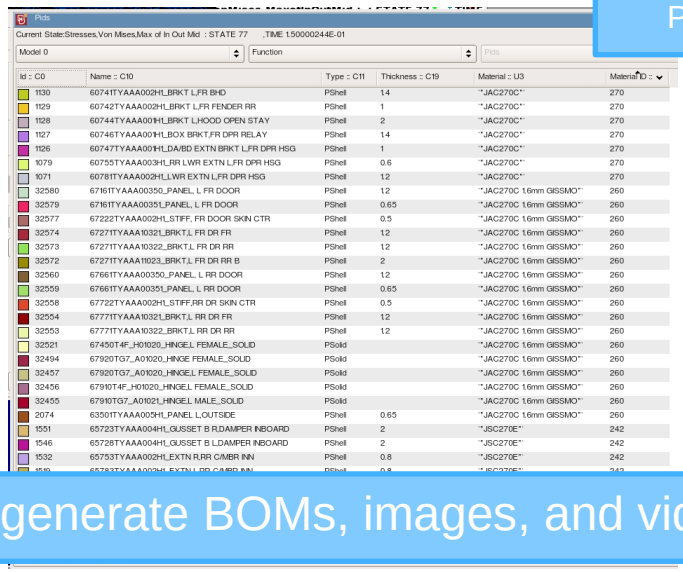
Geometry



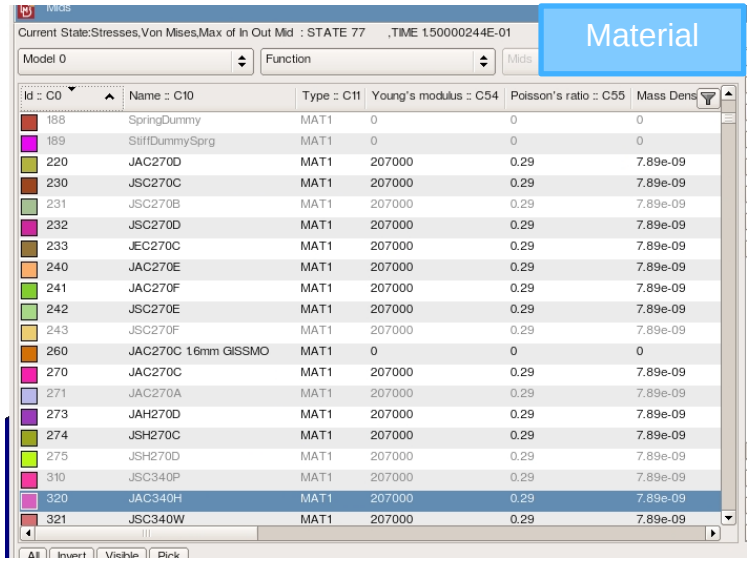
Scalar



Displacement



Part



Material

Conclusion : This data will be sourced to generate BOMs, images, and videos of critical part assemblies.

HONDA
The Power of Dreams

Source files : Critical metrics log file

User input:

1. MetaDB with 2D data and user input information about model output
2. MetaDB with 3D data and keyword information
3. Excel log file with critical statistics from 2D MetaDB file
4. Template pptx/html file where media will be dumped

Excel will be used to track all critical statistics in a log format where the performance will be tracked through a development phase

Excel log file

	A	B	C	D	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	plotting info		System info				level 2 targets			ROW1												ROW1
2	dynamic		initial				biw			Intrusion												Latch
3																						
4	Color	plot?	Run name		Path		SS 150ms	SS peak mm		Shoulder Intrusion 30ms - 80ms						Ribs Intrusion 30ms - 80ms						CW to skin
5	color preview							SS peak time	Run time	Pelvis Intrusion 30ms - 80ms						Femur Intrusion 30ms - 80ms						lockrod to latch patch
6			3nt_sice_co		/cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN		181	133	150	90.94371274	143.0179707	170.2782	190.6431	196.366	183.7286	121.6639	179.2323	208.9438	228.012	231.3048	217.1725	9.422093391
7								64		178.8461005	246.3115049	283.8521	298.7613	299.5265	286.0937	188.0247	258.8318	298.501	315.8793	318.0681	305.7369	0.332861781
8																						

As it stands, this database is in excel because it allows easy communication with other engineers who function in in a windows environment. In the future this may change to some other database which will store critical statistics from the runs.

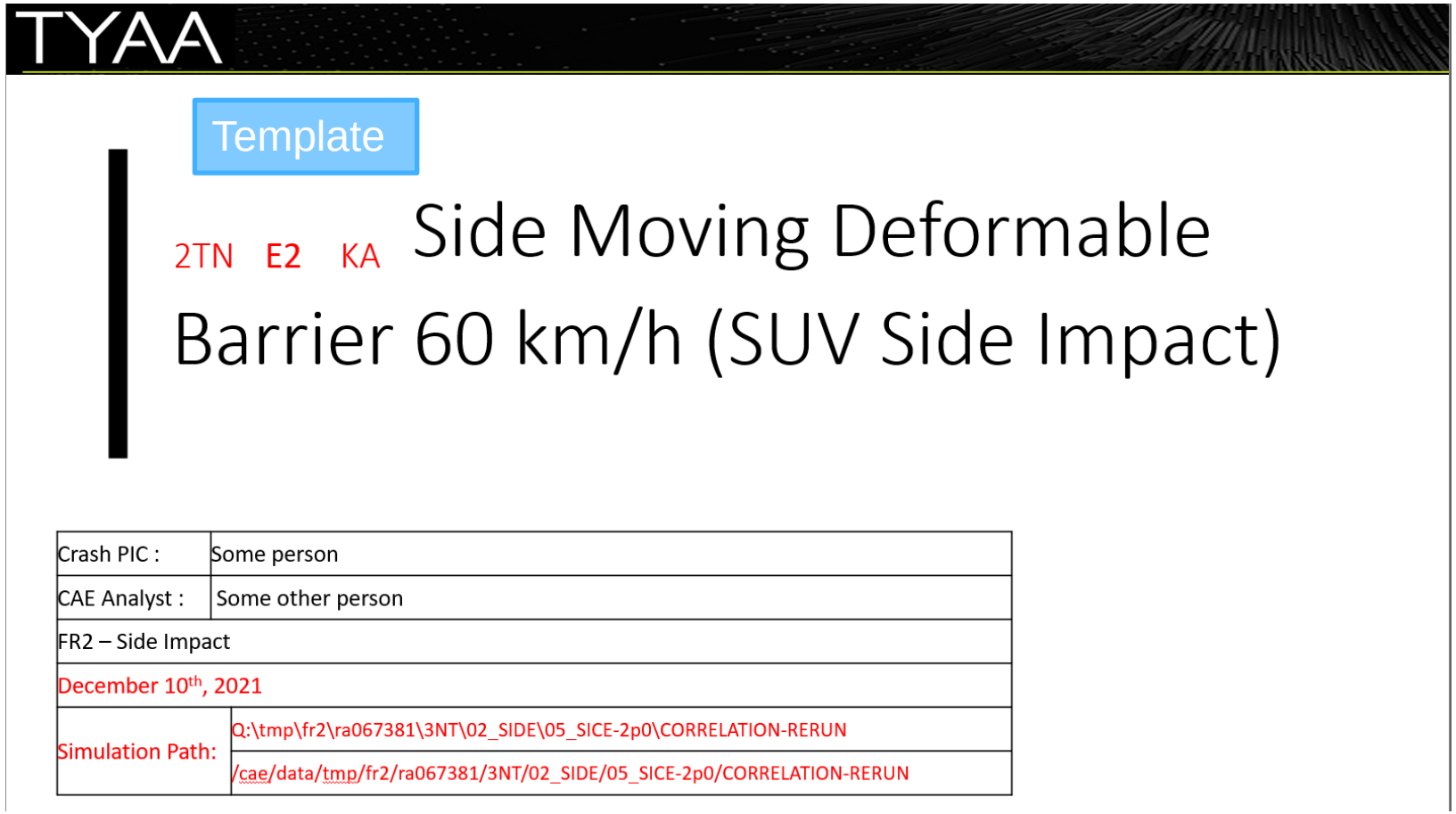
Conclusion : This data will be sourced for critical metrics and tabulated data to present

Source files : Template pptx/html

User input:

1. MetaDB with 2D data and user input information about model output
2. MetaDB with 3D data and keyword information
3. Excel log file with critical statistics from 2D MetaDB file
4. Template pptx/html file where media will be dumped

A template pptx file will be supplied by the user which has the desired report format, number of slides for the thesis, and executive summary formats output by this automation. The report template may have manual modification which need to be carried forward as a project evolves.



Since I cannot generate HTML files in a short amount of time, all I can provide at this time is PPTX files. HTML will be a work in progress and is more of a 'vison' at this current time.

Conclusion : This data will be used as a dumping ground where BOM and image data will be strategically placed

Automated Output : Data structure

All output files should be contained in the ‘Session_Report’ folder. Each form of media should have its own folder where that sort of media is stored. The sourced 2D MetaDB should remain untouched.

```
drwxrwxrwx  7 ra067381 AM_DMA_FR2     12288 Dec 11 10:28 ./
drwxrwxrwx 20 ra067381 AM_DMA_FR2     28672 Dec 11 09:19 ../
drwxrwxrwx  2 ra067381 AM_DMA_FR2      8192 Dec 11 10:25 2d-data-images/
-rwxrwxrwx  1 ra067381 AM_DMA_FR2     23456 Dec 11 09:15 2tn_sice_cae_phase1_v3p0_user-input-variables.ses*
-rwxrwxrwx  1 ra067381 AM_DMA_FR2  43003017 Dec 11 09:19 2tn_side_cae_phase1_v3p0.metadb*
drwxrwxrwx  2 ra067381 AM_DMA_FR2      4096 Dec 11 10:25 3d-data-images/
drwxrwxrwx  2 ra067381 AM_DMA_FR2      4096 Dec 11 10:27 3d-data-videos/
drwxrwxrwx  2 ra067381 AM_DMA_FR2      4096 Dec 11 10:26 excel-bom/
drwxrwxrwx  2 ra067381 AM_DMA_FR2      4096 Dec 11 10:26 reports/
-rwxrwxrwx  1 ra067381 AM_DMA_FR2   6888870 Dec 11 10:15 spotweld_d3hsp_trimmed_data.txt*
[ra067381@vscaelinuxh-020 Session_Report]$ pwd
/cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/Session_Report
```

Conclusion : The Session_Report folder data structure needs to be constant so if this data is to hook into other databases the reference queries can remain constant relative to the run directory.

Automated Output : Excel BOM

BOMs / images / videos

A bill of materials for each critical region will be output by the script which lists PID, PID Name, Material Name, and part thickness

Excel BOM

	A		C	D
1	PID	Name	Material	Thickness
2	32538	67356TGVAA011Y1_BRKT,L CTR_1mm	JSC270C	1
3	32539	67356TYAAA011Y1_SASH, L FR DR ROOF_2.4mm	JSC270C	2.4
4	32540	67356TYAAA011Y1_SASH, L FR DR ROOF_0.8mm	JSC270C	0.8
5	32565	67363TYAAA012Y1_STIFF, L FR DR SKIN UPR	JSC270D	0.5
6	32566	67362TYAAA012Y1_SASH, L FR DR FR OUTER	JSC270D	1
7	32567	67361TYAAA012Y1_STIFF, L FR DR PANEL UP	JSC270D	0.6
8	32568	67357TYAAA012Y1_SASH, L FR DR FR INNER	JSC270D	1
9	32569	67353TYAAA012Y1_SASH, L FR DR CTR OUTER_HEM	JSC270D	2.2
10	32570	67353TYAAA012Y1_SASH, L FR DR CTR OUTER	JSC270D	0.7
11	32571	67352TYAAA012Y1_SASH, L FR DR CTR INNER	JSC270D	0.8
12	32572	67271TYAAA11023_BRKT,L FR DR RR B	JAC270C 1.6mm GISSMO	2
13	32573	67271TYAAA10322_BRKT,L FR DR RR	JAC270C 1.6mm GISSMO	1.2
14	32574	67271TYAAA10321_BRKT,L FR DR FR	JAC270C 1.6mm GISSMO	1.2
15	32575	67271TYAAA10220_BEAM,L FR DOOR SKIN	USIBOR_1500P	1.8
16	32576	67252T2AAA001H1_PATCH,L FR DOOR HINGE UP	JAC270C	1.6
17	32577	67222TYAAA002H1_STIFF, FR DOOR SKIN CTR	JAC270C 1.6mm GISSMO	0.5
18	32578	67212S3N_3001___PATCH,FR DOOR HINGE UP	JAC270C	1
19	32579	67161TYAAA00351_PANEL, L FR DOOR	JAC270C 1.6mm GISSMO	0.65
20	32580	67161TYAAA00350_PANEL, L FR DOOR	JAC270C 1.6mm GISSMO	1.2
21	32581	67151TYAAA002H1_SKIN,L FR DOOR_HEM4	JAC340H	2
22	32582	67151TYAAA002H1_SKIN,L FR DOOR_HEM3	JAC340H	2.7
23	32583	67151TYAAA002H1_SKIN,L FR DOOR_HEM2	JAC340H	2.5
24	32584	67151TYAAA002H1_SKIN,L FR DOOR_HEM	JAC340H	2.15
25	32585	67151TYAAA002H1_SKIN,L FR DOOR	JAC340H	0.75

Outputting BOM's for several critical regions allows for easy understanding for all stakeholders what exactly was used in the run

Conclusion : This data will be used by CAE, Test, and Design PIC's so it needs to be an easy-to-understand windows based solution will all critical information about each part in the critical areas

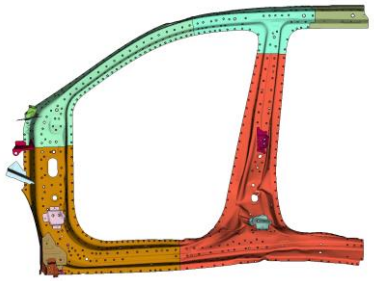
Automated Output : Images

BOMs / images / videos

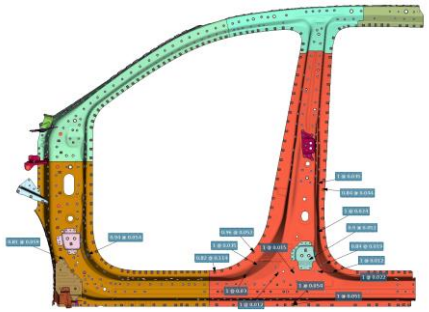
Images for critical sections will be output based on user input to determine what components are viewable and from what view the image is taken. Several images will be output as detailed below.
Use default rendering properties supplied by ADC

Initial state images

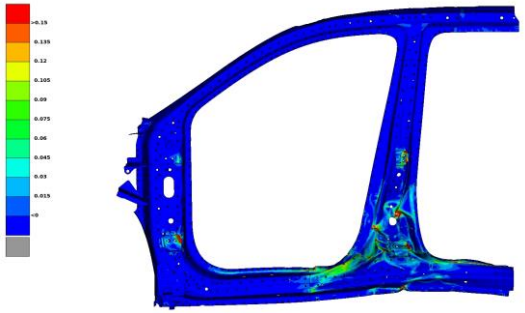
Peak / Target state images PID color



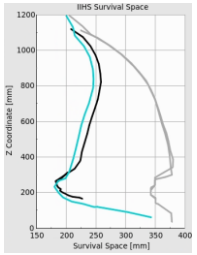
Spotweld failure images

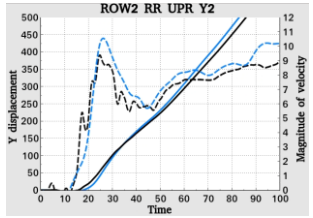


Peak / Target contour images

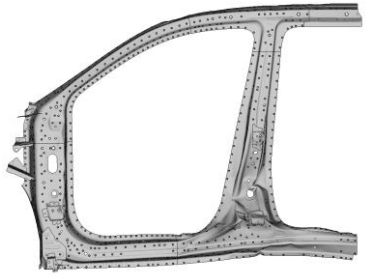


Curve images

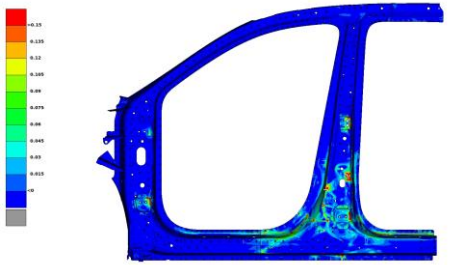




Peak / Target state images model color



Peak / Target contour images no deformation



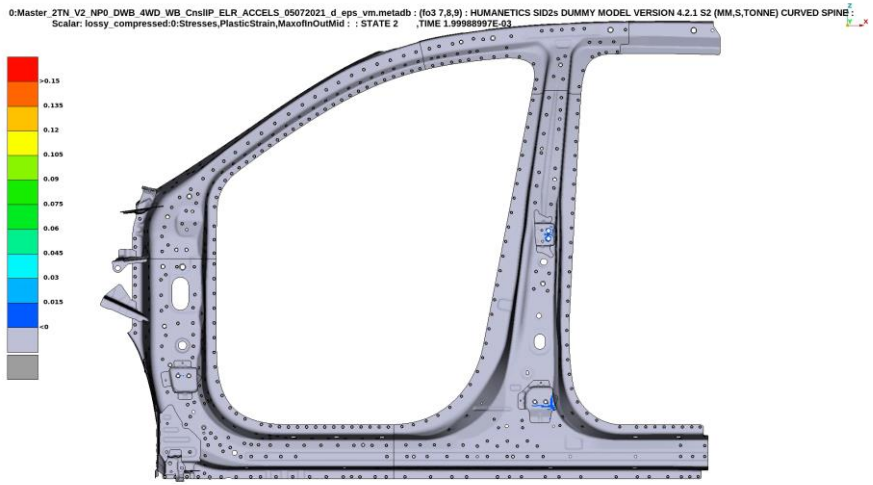
Conclusion : This data will be used by CAE and Test associates who want to refactor the data or try to show something from a different point of view. All images need to be high resolution.

Automated Output : Video

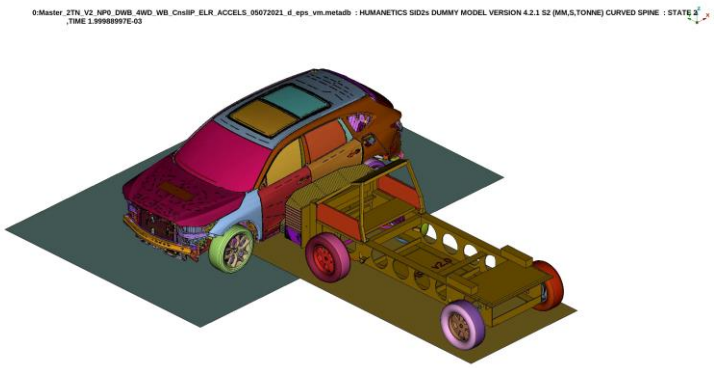
BOMs / images / videos

While no video will be in the pptx documents… they are still useful when an associate is attempting to refactor the data or show something unique. Like images, user input will be provided detailing what should be in the video and what the view is. Several videos will be output as detailed below.
Use default rendering properties supplied by ADC

Component fringe videos



CBU and Barrier



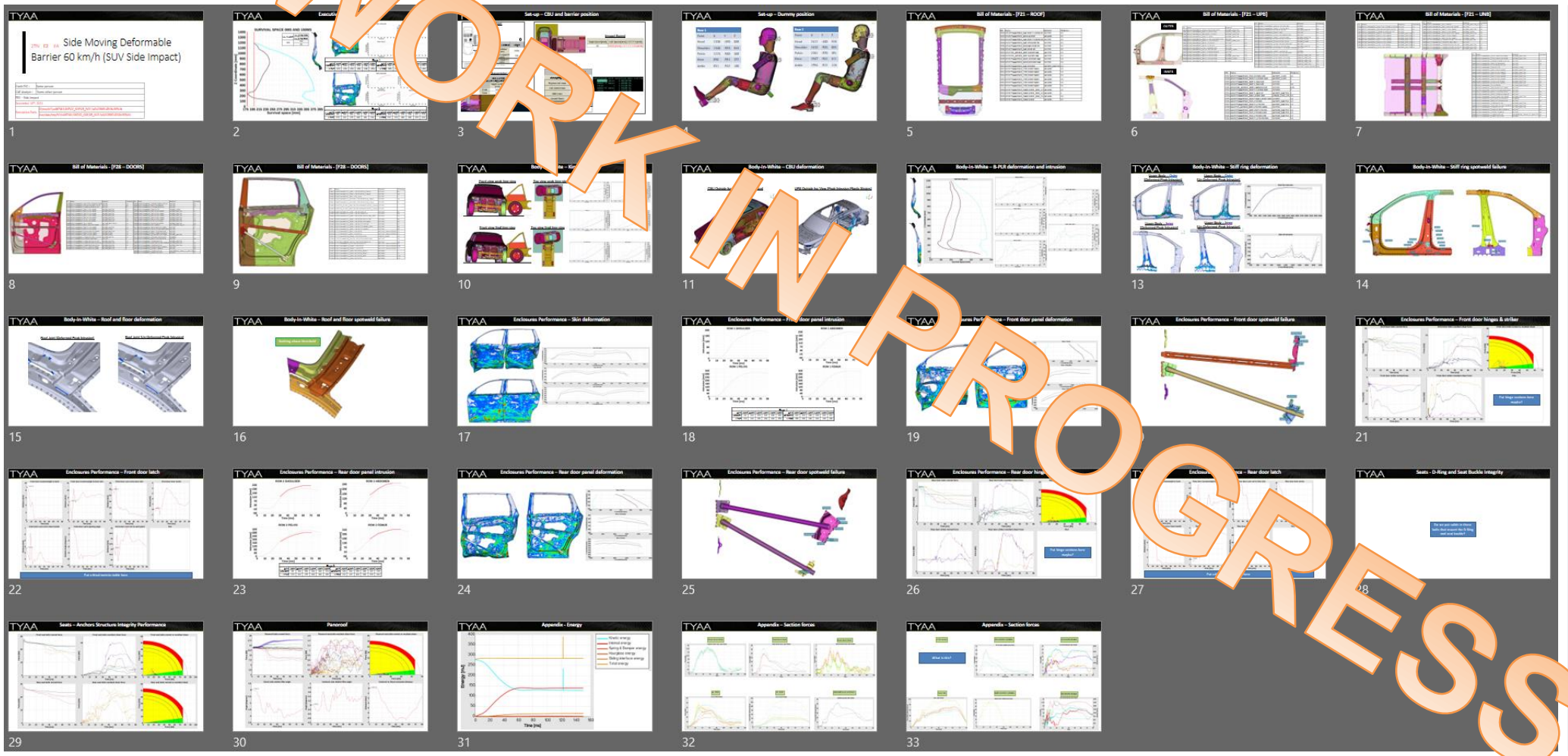
CBU videos

Conclusion : This data will be used by CAE and Test associates who want to refactor the data or try to show something from a different point of view. All videos need to be high resolution.

Automated Output : Thesis report

Thesis report

A large pptx/html file will be output containing BOMS, images, and tabulated critical metrics. Based on the value of tabulated critical metrics conditional formatting will be applied



WORK IN PROGRESS

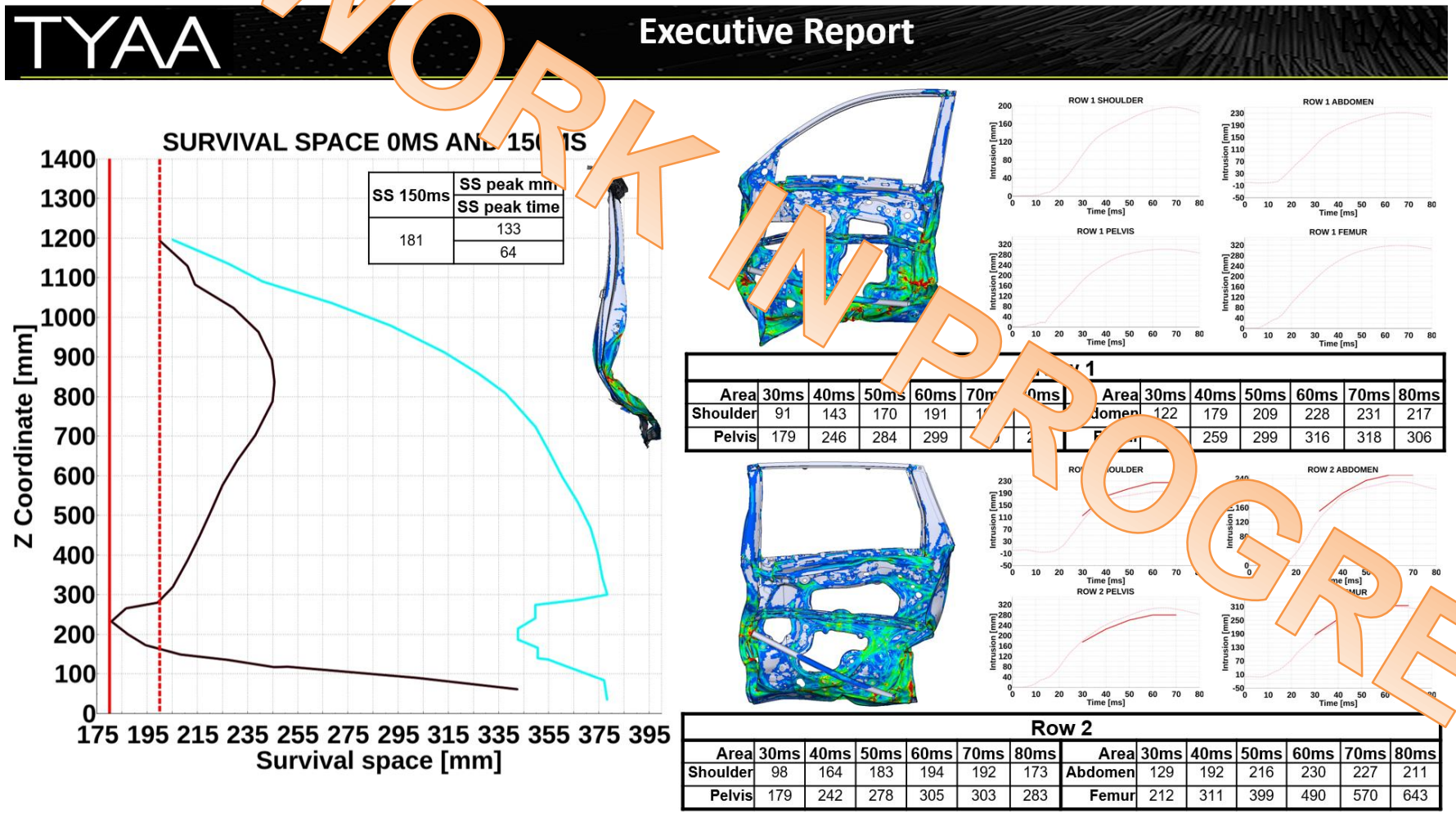
Can this template and logic be malleable?

Conclusion : This report will present in-depth analysis about the performance of the product simulated

Automated Output : Executive report

Executive repo

A small pptx/html file will be output showing only what is required for conditional formatting



Area	30ms	40ms	50ms	60ms	70ms	80ms	Area	30ms	40ms	50ms	60ms	70ms	80ms
Shoulder	91	143	170	191			Abdomen	122	179	209	228	231	217
Pelvis	179	246	284	299			Femur		259	299	316	318	306

Row 2

Area	30ms	40ms	50ms	60ms	70ms	80ms	Area	30ms	40ms	50ms	60ms	70ms	80ms
Shoulder	98	164	183	194	192	173	Abdomen	129	192	216	230	227	211
Pelvis	179	242	278	305	303	283	Femur	212	311	399	490	570	643

WORK IN PROGRESS

Add target lines in excel tables

Area for a conclusion

Automated conditional formatting?

If the target exists it would be nice

Cleaner excel formatting

Show IIHS color chart

Labels for the curves

Conclusion : This report will present only the metrics used to make a judgement of the product simulated

Log file : 3D data processing information

Log file:

a) Report what images/videos are output, what input information was used, image size in pixels, and output path
   - ❖ For 3D data, specify what parts are visible, what view was used, and what state / range of states were used
   - ❖ For 2D data, specify what curves are output and what window was output

b) Report how many parts in each BOM file, size of the excel sheet, and output path

c) Report what resources are being consumed for each task and how long each task takes

```
--- 3D MODEL IMAGE GENERATOR

SOURCE WINDOW : MetaPost
SOURCE MODEL : 0
STATE : ORIGINAL STATE
PID NAME SHOW FILTER : ${f21_roof_hes}
ADDITIONAL PID'S SHOWN : ${f21_roof_hes_exceptions}
PID NAME ERASE FILTER : ${f21_roof_hes_exceptions}
PID'S TO ERASE : ${f21_roof_erase_pids}
ERASE BOX : ${f21_roof_erase_box}
IMAGE VIEW : ${f21_roof_view}
TRANSPARENCY LEVEL : 50
TRANSPARENT PID'S : ${f21_roof_transparent_pids}
COMP NAME : ROOF
OUTPUT IMAGE SIZE (PIXELS) : 2146x2467
OUTPUT MODEL IMAGES :
/cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/Session_Report/MetaPost_ROOF_RAW.jpeg
/cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/Session_Report/MetaPost_ROOF_RAW_TITLED.jpeg
```

Conclusion : Having this information is useful if the user wants to try and debug what is occurring when the 3D image is being created and compare it to previous log files where this data may be validated

Log file : 2D data processing information

Log file:

a) Report what images/videos are output, what input information was used, image size in pixels, and output path
   - ❖ For 3D data, specify what parts are visible, what view was used, and what state / range of states were used
   - ❖ For 2D data, specify what curves are output and what window was output

b) Report how many parts in each BOM file, size of the excel sheet, and output path

c) Report what resources are being consumed for each task and how long each task takes

```
CURVE USER INPUT : ROW2_SHOULDER_SPHERE_ Intrusion | FROM VARIABLE : rear_shoulder_intrusion_curve | SOURCE WINDOW : Rear Door -Accel
1 CURVES IDENTIFIED FROM USER INPUT!
USED FULL CURVE NAMES TO IDENTIFY CURVES!
OUTPUT CURVE STRING : 1519
OUTPUT IMAGE SIZE (PIXELS) : 1418x798
OUTPUT CURVE IMAGES :
/cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/Session_Report/Rear Door -Accel_row_2_shoulder.jpeg
/cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/Session_Report/Rear Door -Accel_row_2_shoulder_TITLED.jpeg
/cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/Session_Report/Rear Door -Accel_row_2_shoulder_LEGEND.jpeg
```

Conclusion : This data is useful to a CAE associate when they are debugging the output of a 2D image or want to source the data for another image which they manually generate overlaying several curves

Log file : Excel BOM processing information

Log file:

a) Report what images/videos are output, what input information was used, image size in pixels, and output path
   - ❖ For 3D data, specify what parts are visible, what view was used, and what state / range of states were used
   - ❖ For 2D data, specify what curves are output and what window was output

b) Report how many parts in each BOM file, size of the excel sheet, and output path

c) Report what resources are being consumed for each task and how long each task takes

```
GENERATING BOM : ROOF
Number of parts identified =  21
OUTPUT BOM : /cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/Session_Report/ROOF_BOM.xlsx
CELLS WITH DATA : A1:D22
```

Conclusion : Having this information is useful if the user wants to try and debug what is occurring when the BOM is being created and compare it to previous log files where this data may be validated

Log file : Resource consumption information

Log file:

a) Report what images/videos are output, what input information was used, image size in pixels, and output path
   - ❖ For 3D data, specify what parts are visible, what view was used, and what state / range of states were used
   - ❖ For 2D data, specify what curves are output and what window was output

b) Report how many parts in each BOM file, size of the excel sheet, and output path

c) Report what resources are being consumed for each task and how long each task takes

```
--------------
---HDMA VISIBLE SPOTWELD ANALYSIS---
START TIME : 2021-12-11-09-40-22

THRESHOLD : 0.8 | SOURCE MODEL ID : 0 | SOURCE WINDOW NAME : MetaPost | OUTPUT WINDOW NAME : upb_outer_spotweld_failure

---D3HSP TO SMALL SPOTWELD FILE CONVERTER
SEARCH COMMAND : grep -r "Spotweld ID:" //cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/decomp_d3hsp -A 3 >> //cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/spotweld_d3hsp_trimmed_data.txt
OUTPUT TRIMMED FILE : //cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/spotweld_d3hsp_trimmed_data.txt
PREP TIME : 6.682381786056794

SOURCE FILE FOR SPOTWELD ID'S : //cae/data/tmp/fr2/ra067381/3NT/02_SIDE/05_SICE-2p0/CORRELATION-RERUN/spotweld_d3hsp_trimmed_data.txt
ENVIRONMENT PREP TIME : 8.414033371955156 SECONDS
SPOTWELD ID IDENTIFICATION AVERAGE TIME : 0.6407238264551359 SECONDS
SPOTWELD CLUSTER LIST GENERATION AVERAGE TIME : 7.745669453393623e-05 SECONDS
SPOTWELD CLUSTER GROUP GENERATION AVERAGE TIME : 0.2003214279666354 SECONDS
CURVE EXTRACTION TIME : 2.863405675976537 SECONDS
CURVE MAX DETERMINATION AVERAGE TIME : 3.6871955153665904e-05 SECONDS
ANNOTATION GENERATION AVERAGE TIME : 0.938495110898443 SECONDS
PROCESSED WELDS : 996 | WELDS ABOVE THRESHOLD : 17 | WELD IDENTIFICATION TIME : 886.2276673630113 SECONDS
```

Conclusion : Showing the user what operations are resource intensive allows them to understand what processes to optimize or change to get the results in a timely manner

Error reporting & Verification

Error reporting:

A. **If any variable is not input correctly tell the user specifically what is the problem of what error occurred through a try >> except function in python**
B. If any of the input files cannot be input properly report what caused the error when importing the data
C. If write issues occur specify what was trying to be saved out, where it tried to save it, and the current drive capacity of the region it attempted to write the file

Error reporting is not expanded on in this report since it was hard to visualize how this would play out. Error reporting is likely to evolve as these concepts become visual

Verification:

1. Load the 2D MetaDB report in the GUI. Validate all outputs
2. Load the 2D MetaDB in batch mode and execute some session. Validate all outputs
3. Run a simulation on the ADC cluster that executes the reporting session through the qscript flow with no user modification after job submission. Validate all outputs
4. Change the report template resolution, run the tool, see if it adapts to new slide size
5. Change image size, run the tool, see if it adapts to the new image size
6. Change all the user variables and validate the right data is output based on the new user variables
7. Map out what resources are required to execute start to finish in < 45 minutes
8. Validate the log file outputs all critical information for all variable scenarios
9. Validate all error reporting operates as intended and there is no scenario where a python error may occur
10. Validate the session still runs and outputs the data it can even if input / user input errors are present

Verification will be a team effort by both ADC & BETA associates who will work together to document all verification items listed.