
EVALUATION OF Auto ROI AUTOMATED REGION OF INTEREST GENERATION TOOL IN AlignRT: PRELIMINARY FINDINGS FROM A TESTING SITE

TANITH LOTT & ROB NOLAN

BEACON HOSPITAL, DUBLIN, IRELAND

PROJECT TEAM: ORLA SMITH, CLAIRE DAY, TANITH LOTT, LUKE ROCK, ROB NOLAN



alignrt® @ Beacon Hospital

Year	Development
2014	Cranial SRS
2017	Extremities/thorax/abdomen/pelvis
2018/19	Tattooless + breast DIBH
2019	Tattooless
2019/2020	SABR abdomen and thorax
2021	AlignRT Advance



Varian EDGE (2019)



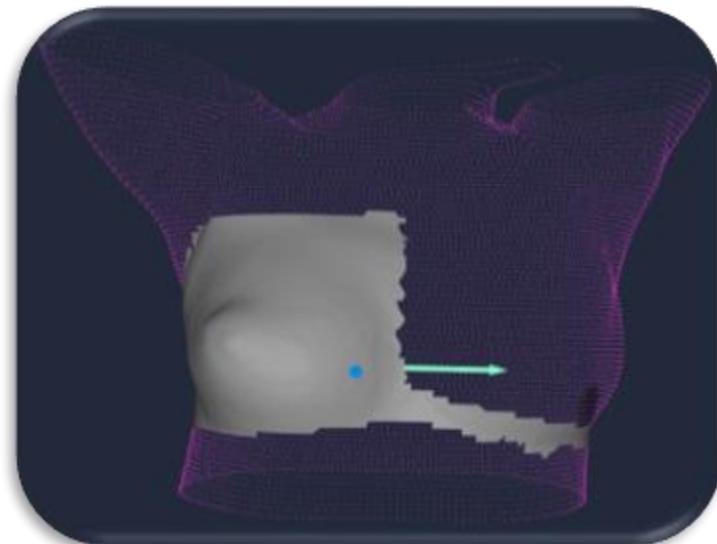
**Varian TrueBeam
(2025)**

ROIs IN SGRT

- ROI selection can directly affect patient setup, and therefore OAR and target dose (Peng *et al.* 2023)
- Lower rotational error in breast patients with T-shaped ROI compared to O- or B-shaped ROI (Laaksomaa *et al.* 2021)

Should be accurate surrogate for target

Should contain salient topographic landmarks

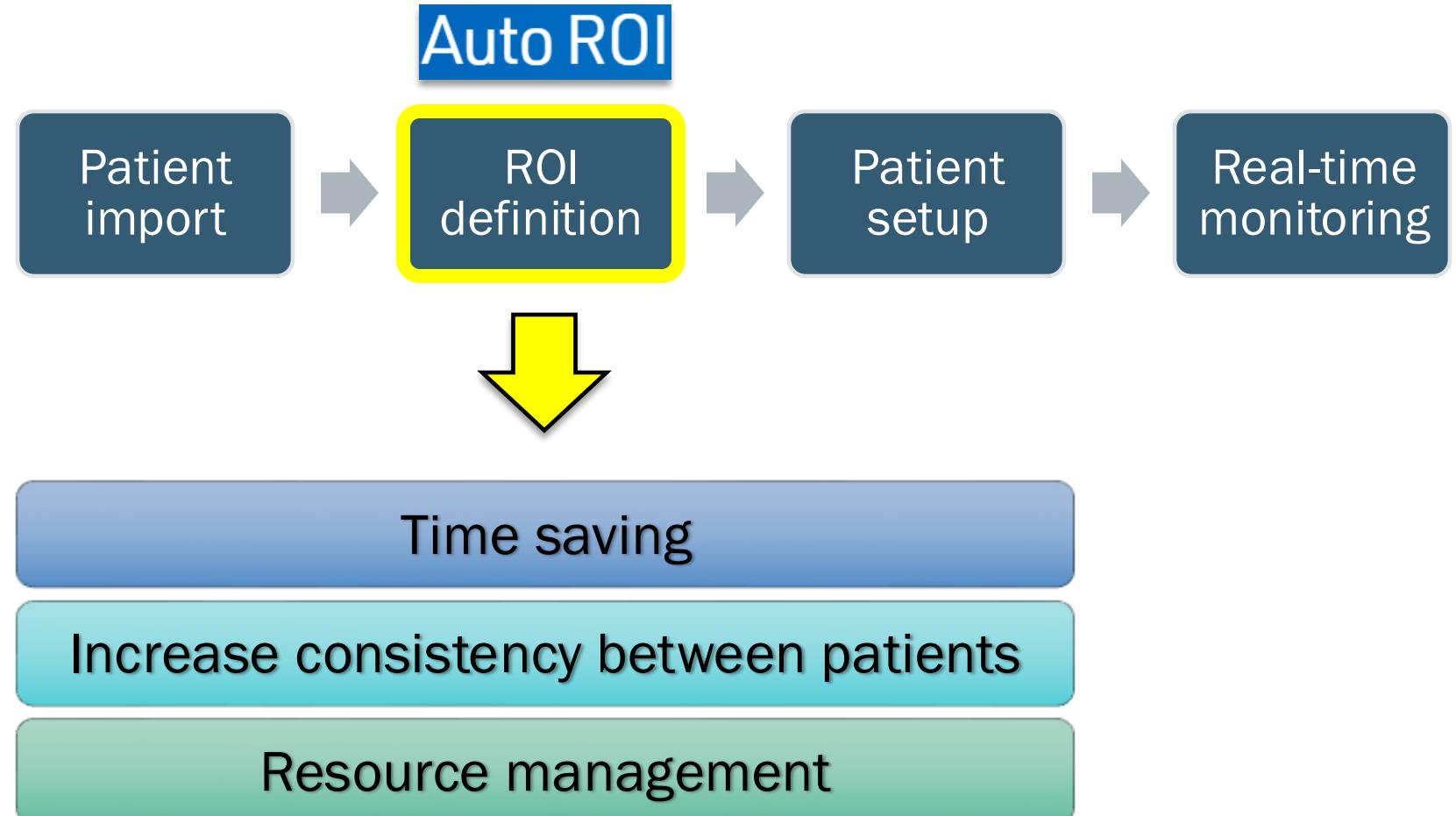


Too large = low frame rate + insensitive to local changes

Too small = insufficient topography + camera obstruction

MOTIVATION FOR AUTOMATION

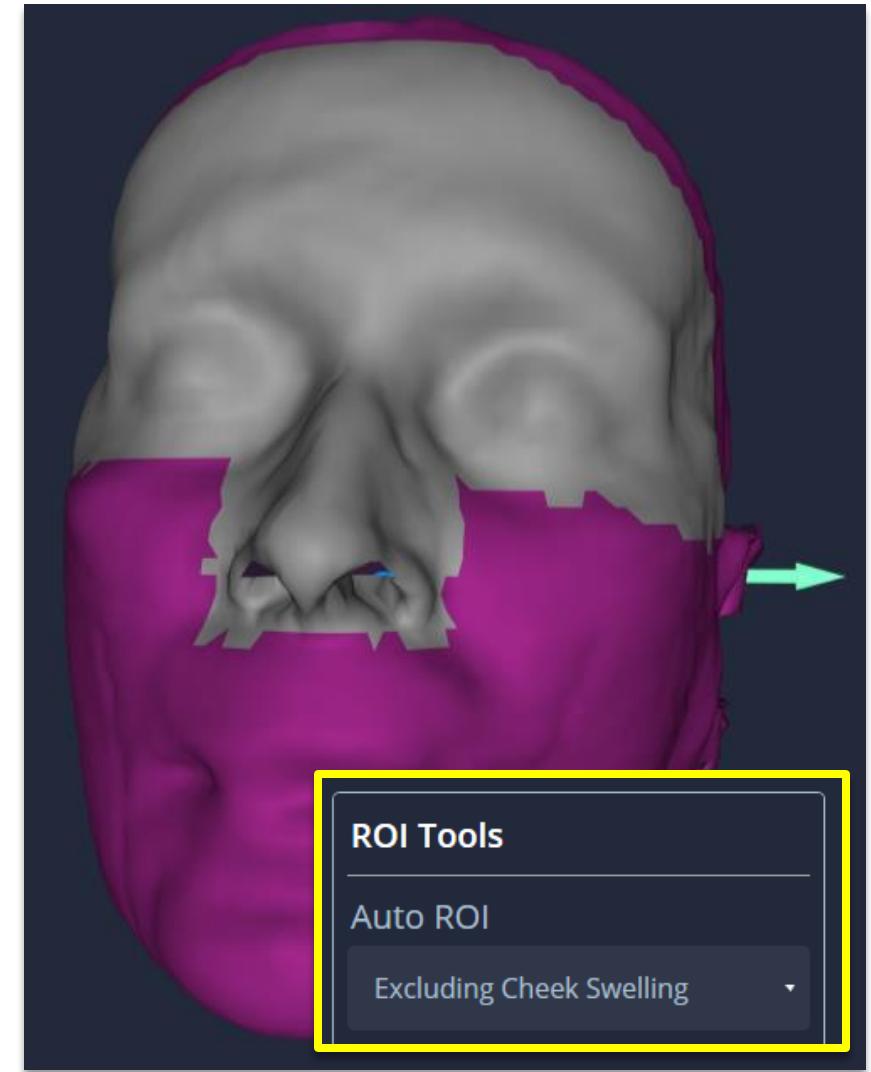
alignrt®



Auto ROI™ Module

SIM PLAN TREAT DOSE

- Automatically defines ROIs for most sites (pelvis, breast, brain, chest, abdomen)
- Based on deep feedback from multiple clinical sites and adaptive modelling based on successful ROIs (not AI)

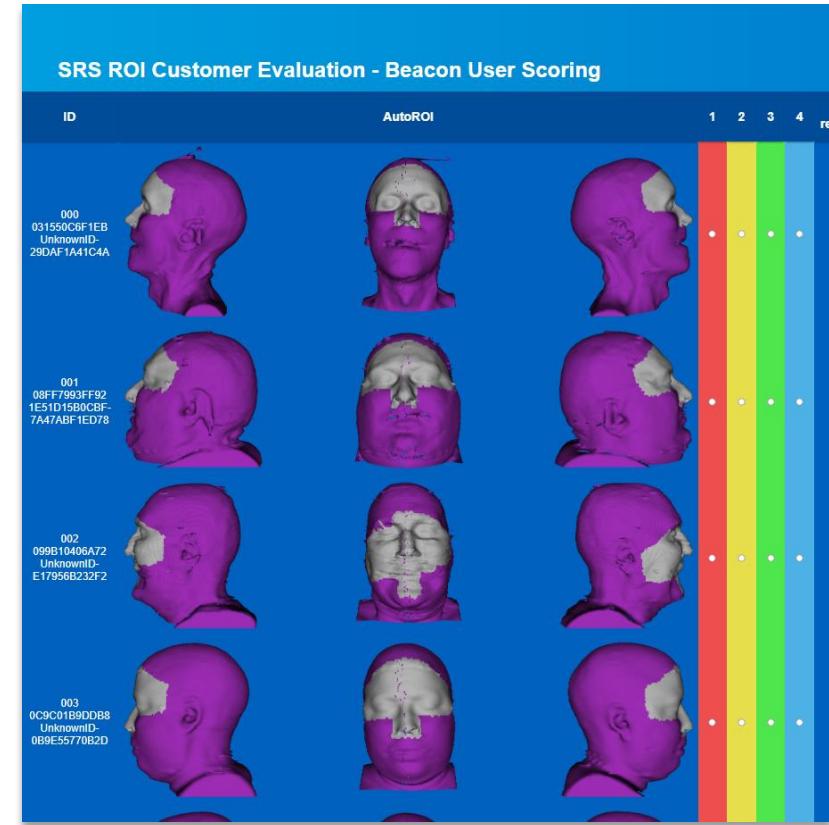


SCHEDULE OF PROTOTYPE TESTING

Part 1 – Standard sites (Nov 2024 – Jan 2025)

GUID	Protocol	Auto ROI rating	ROI used for treatment	Deltas (Manual)						Deltas (Edited Auto)					
				Vrt (cm)	Lat (cm)	Lng (cm)	Rot (°)	Pitch (°)	Roll (°)	Vrt (cm)	Lat (cm)	Lng (cm)	Rot (°)	Pitch (°)	Roll (°)
D44634A6	Pelvis	3 - Minor edits required	Auto	0.1	0.0	0.0	0.0	0.0	0.1						
D90F7E96	Pelvis	3 - Minor edits required	Manual	-0.1	-0.6	0.1	0.4	2.2	1.1		-0.1	-0.5	0.1	0.3	
BA47366C	Pelvis	3 - Minor edits required													
7BFF4A43	Breast	3 - Minor edits required	Manual	0.3	0.5	0.9	0.3			0.2	0.4	0.8	0.5		
06D93178	Pelvis	4 - Useable as is	Manual	0.0	0.0	-0.2	0.1	-0.4	-1.4	0.0	0.0	-0.2	0.1		
57A31C47	Breast	3 - Minor edits required	Manual	0.0	0.0	0.1	0.3	0.3	0.2						
F6E513D7	Breast	3 - Minor edits required													
E5532F94	Breast	3 - Minor edits required													
964C7F24	Breast	3 - Minor edits required	Manual	0.1	0.1	0.2	0.2								
03F827DE	Breast	3 - Minor edits required	Manual	0.1	0.1	-0.1	2.2	0.1	-0.1	-0.2	0.5	-0.1	2.2		
7767689C	Breast	3 - Minor edits required													
AF8B053F	Pelvis	3 - Minor edits required	Auto	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8A8EC5DC	Pelvis	3 - Minor edits required	Auto	-0.3	0.3	0.1	-0.2	0.1	1.0	-0.3	0.4	0.2	-0.1		
8097fee6(Phase 1)	Pelvis	3 - Minor edits required	Auto	0.3	-0.2	0.2	0.2	-0.1	-1.9						
4F6CCD05(Phase 1)	Pelvis	3 - Minor edits required	Auto	0.2	0.2	0.1	-0.1	0.3	1.1						
1005D379	Pelvis	3 - Minor edits required													
8097fee6(Phase 2)	Pelvis	3 - Minor edits required													
CC1CFB58	Pelvis	3 - Minor edits required													
087BF6CE	Pelvis	3 - Minor edits required	Auto	-0.2	-0.2	0.3	-0.2	0.9	1.1						
1767F7E6	Pelvis	3 - Minor edits required	Auto	-0.3	0.1	0.1	0.0	1.3	1.0						
920FBDOB	Pelvis	3 - Minor edits required	Auto	-0.1	-0.2	-0.2	1.3	0.6	-0.4						
C2F639EF	Pelvis	3 - Minor edits required	Auto	-0.2	-0.1	-0.1	0.3	0.2	1.4						
F8D3CCD5	Pelvis	3 - Minor edits required	Auto	-0.1	0.1	0.2	0.7	-0.7	-2.1						
F29B5C2	Pelvis	3 - Minor edits required	Auto	-0.2	0.1	0.1	-0.5	0.2	2.0						
1A0A8F46	Pelvis	3 - Minor edits required	Auto	-0.2	0.4	-0.1	-1.7	-1.0	-0.8						
F9F37257	Pelvis	3 - Minor edits required	Auto	-0.1	-0.1	-0.1	-1.0	0.6	-2.7						
7E2A2274	Pelvis	3 - Minor edits required	Auto	-0.1	-0.1	0.1	-1.8	3.0	-0.9						
9D101060	Pelvis	3 - Minor edits required	Auto	-0.2	0.4	0.0	-2.0	0.3	-0.5						
CE008E78	Pelvis	4 - Useable as is	Auto	0.2	0.3	0.4	1.0	0.1	-0.3						
CA0DAE60	Chest	2 - Significant edits required													
7E2A2274	Pelvis	3 - Minor edits required	Auto	0.0	0.0	-0.2	-0.5	1.5	-0.8						
2ACFEC69	Pelvis	3 - Minor edits required													
5D4E4099	Breast	3 - Minor edits required	Auto	0.2	0.0	0.3	0.5	-1.4	-1.9						
3B4D83A9	Breast	3 - Minor edits required													
F29B5C2	Pelvis	3 - Minor edits required	Auto	-0.1	0.0	0.1	-0.9	0.4	1.4						
EDA7F426	Breast	4 - Useable as is	Auto												

Part 2 – SRS (June – July 2025)



Search Patients...

Patient List

NOT FOR CLINICAL USE

therapist

?

Home

Patient Name	Patient ID	DoB	Last Modified	Patient Status
Breast1	AutoROI_Breast1	01/01/2000	10/11/2025 16:38	Active
Breast2	AutoROI_Breast2	01/01/2000	10/11/2025 16:51	Active
Breast3	AutoROI_Breast3	01/01/2000	10/11/2025 16:52	Active

Filters

Show Patients:

Active

Inactive

Manually Created

New Plans Received

Modified After:

dd/MM/yyyy

Clear Filters

Preparation Report Edit

+ Add Patient

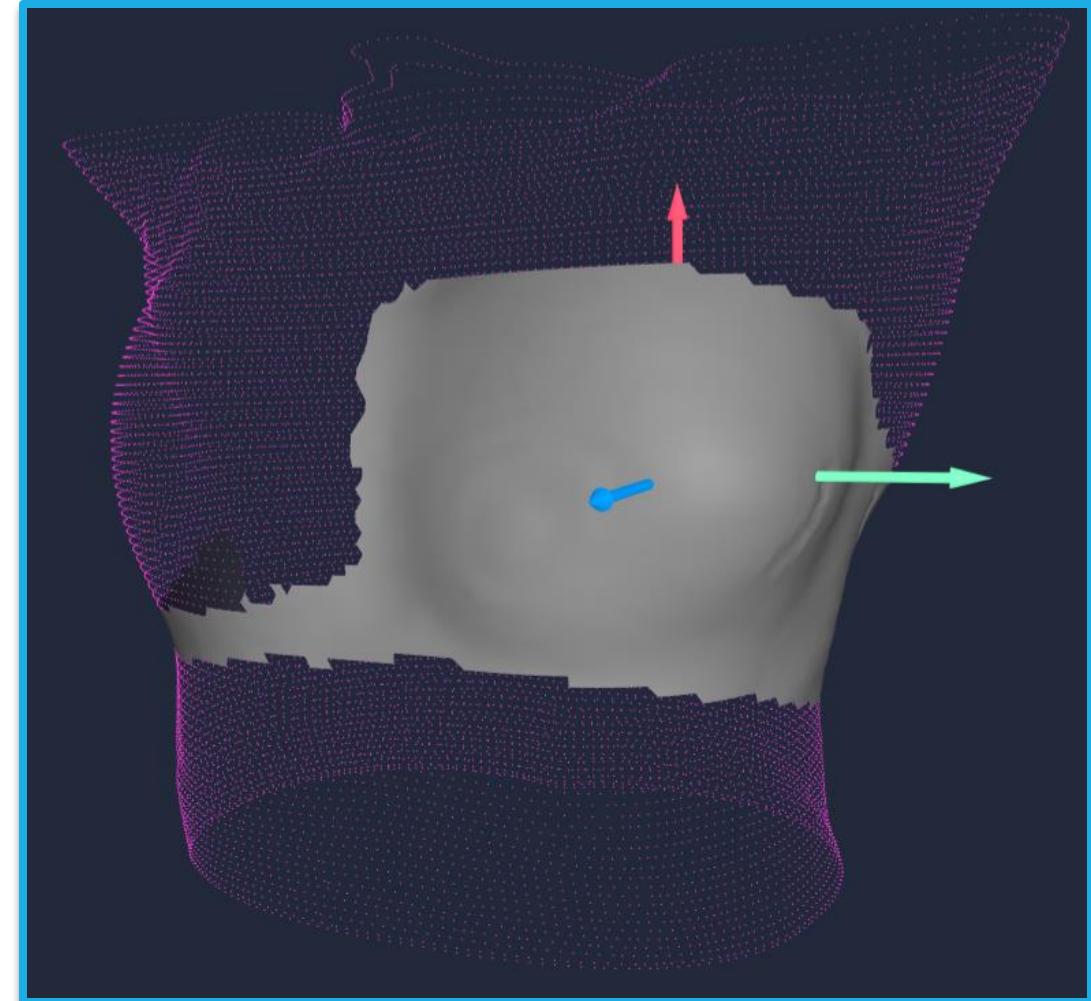
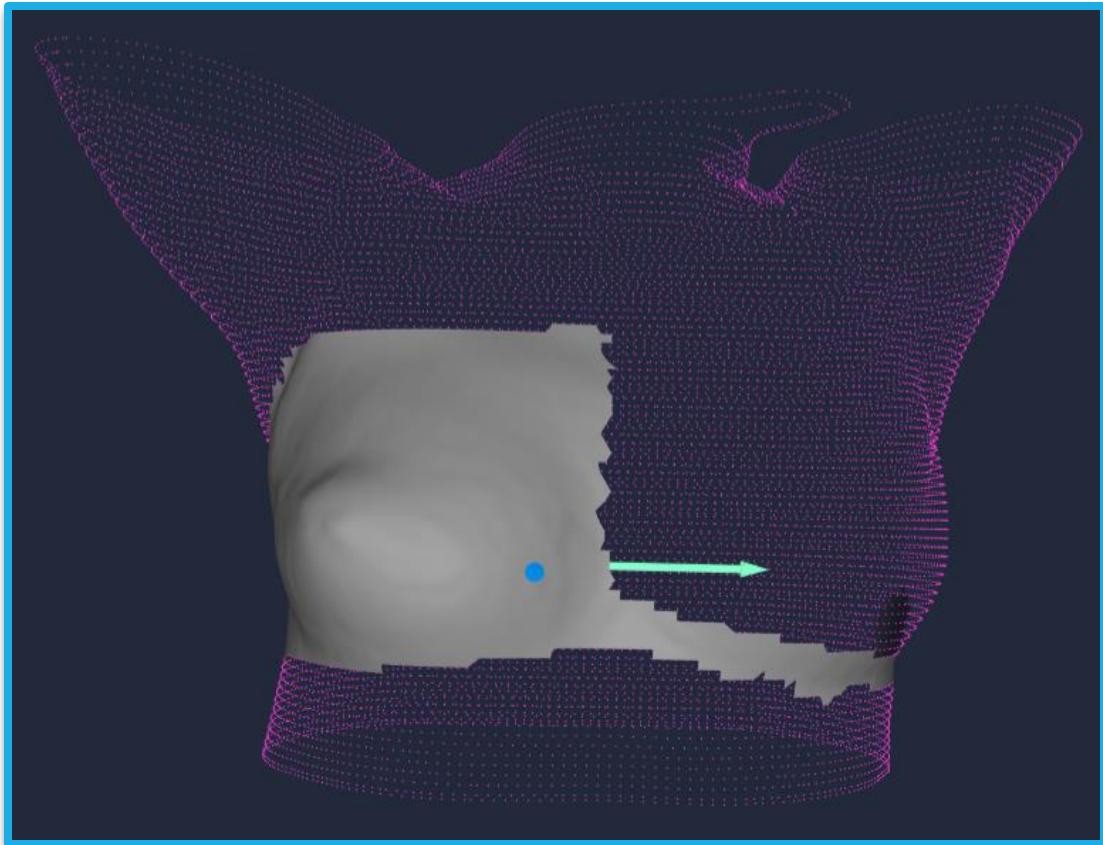
alignrt® | Database Storage softlock was unlocked

| System Status | 10/11/2025 16:52

CURRENT AVAILABLE AUTO ROI MODELS

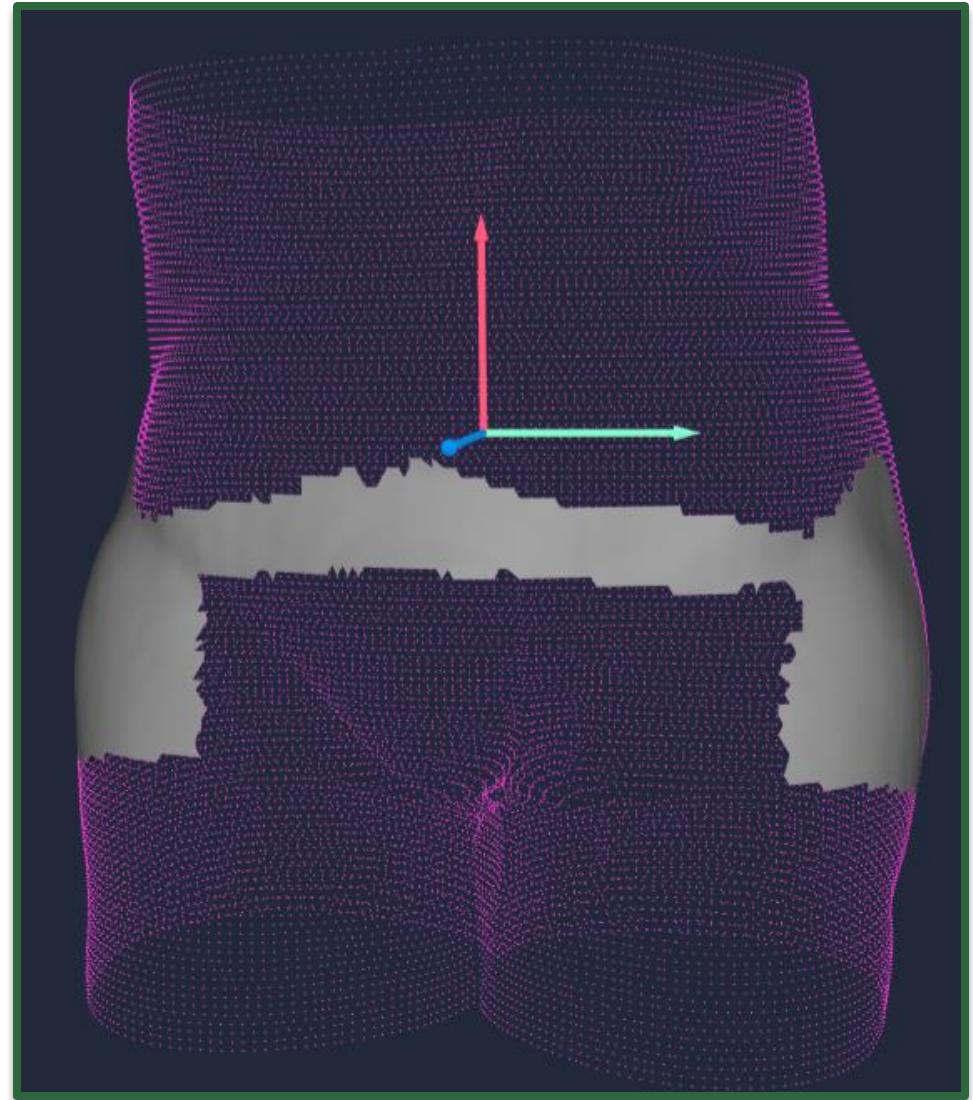
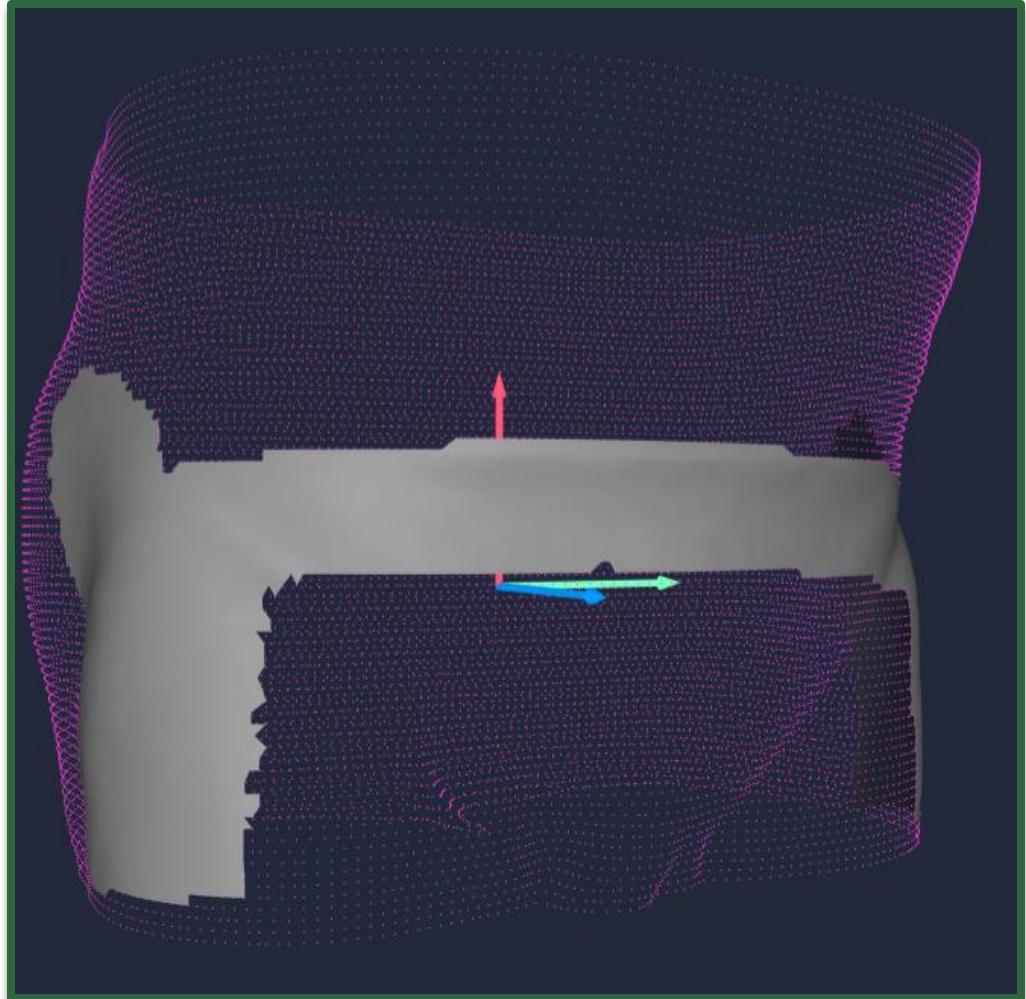
Abdomen (Upper)	Pelvis/Abdomen (Lower)	Brain/Intracranial SRS	Chest Wall DIBH/Chest Wall/Chest	Breast DIBH/Breast
Chest Band	Pelvis	Brain	Chest Band	Breast Band
Chest With Ribs	Pelvis Inbore	Excluding Cheek Swelling	Chest Band With Sternum	Chest Inverted T
Chest With Ribs And Sternum	Pelvis Legs Only		Chest With Sternum	Breast
	Pelvis Inbore Legs Only			Chest Wall Excluding Breast
				Breast With Contralateral Strip
				Breast With SCF

AUTO ROI EXAMPLES - BREAST



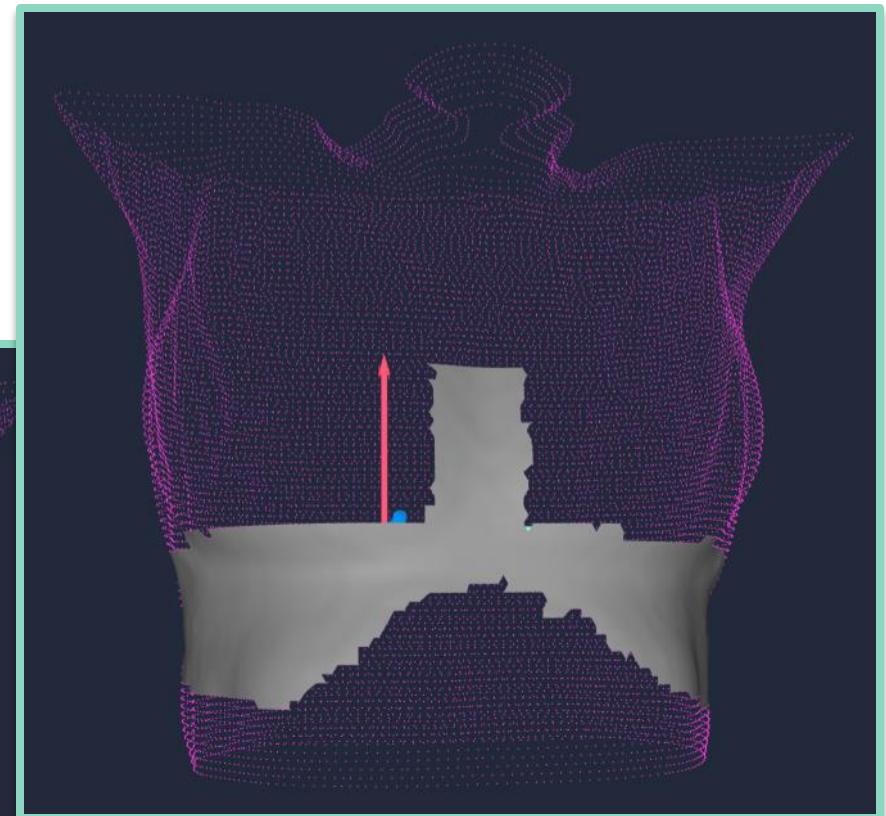
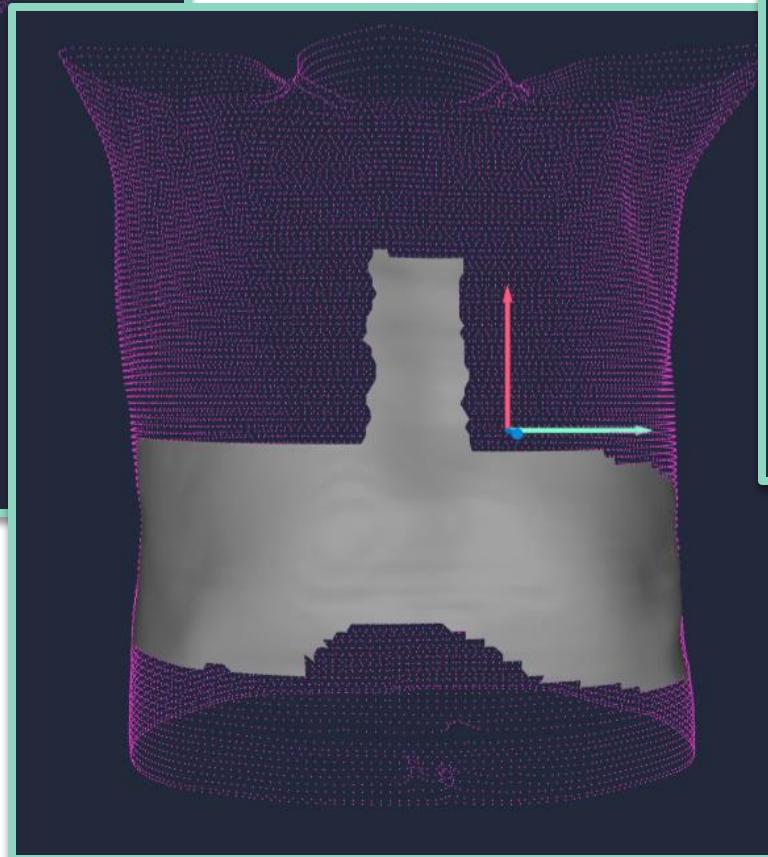
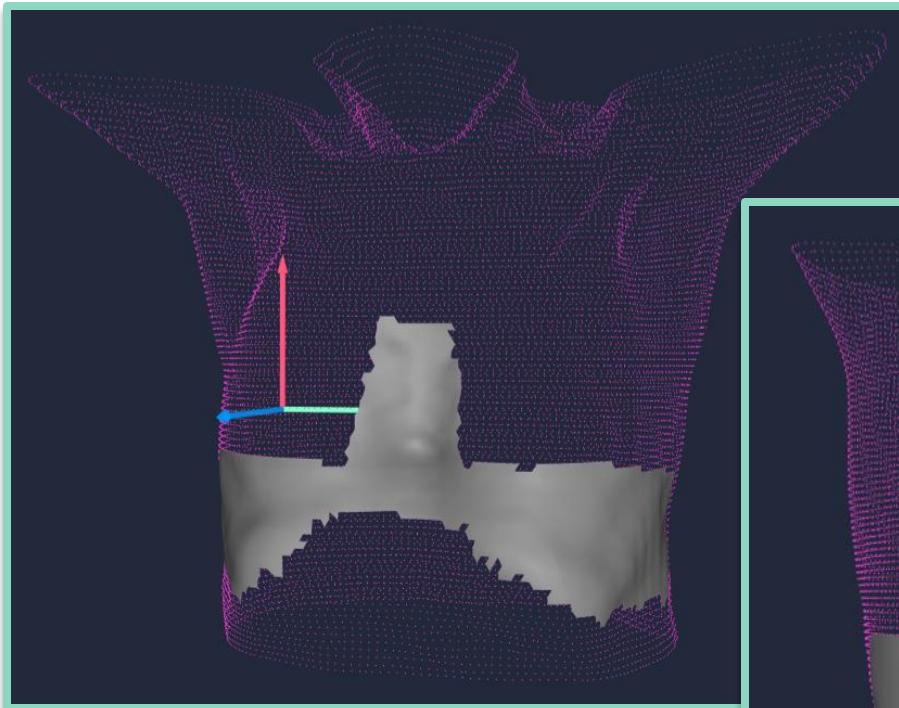
Examples are from clinical version

AUTO ROI EXAMPLES - PELVIS



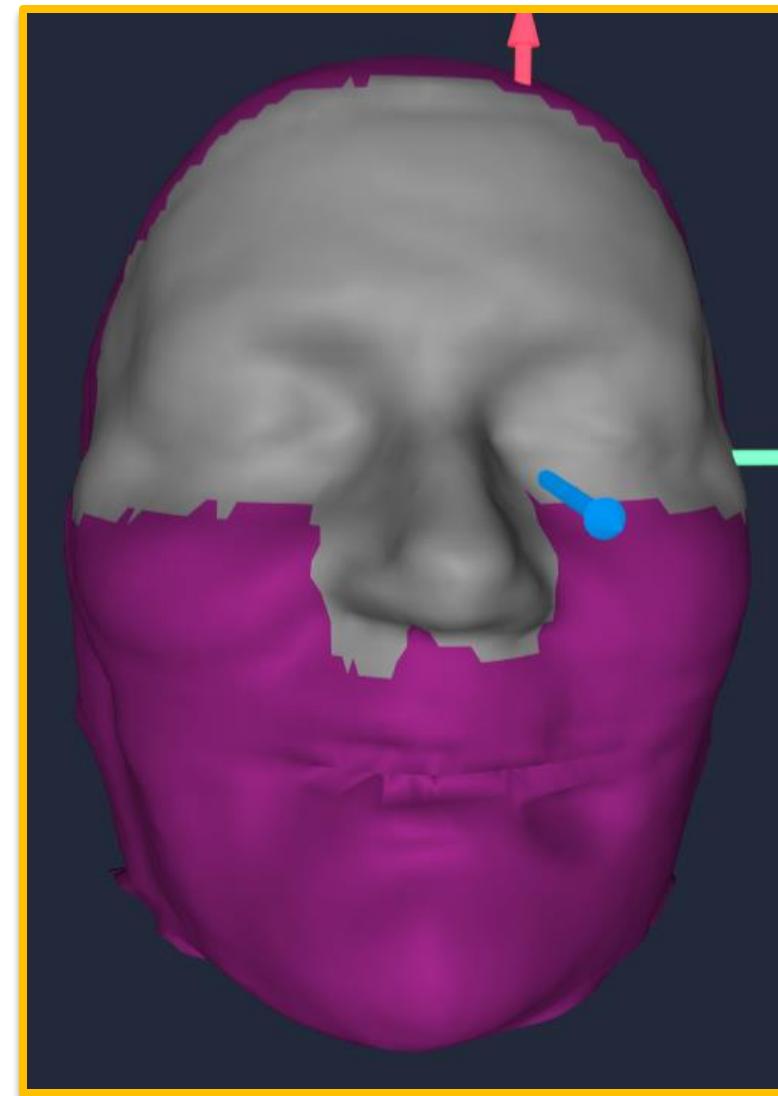
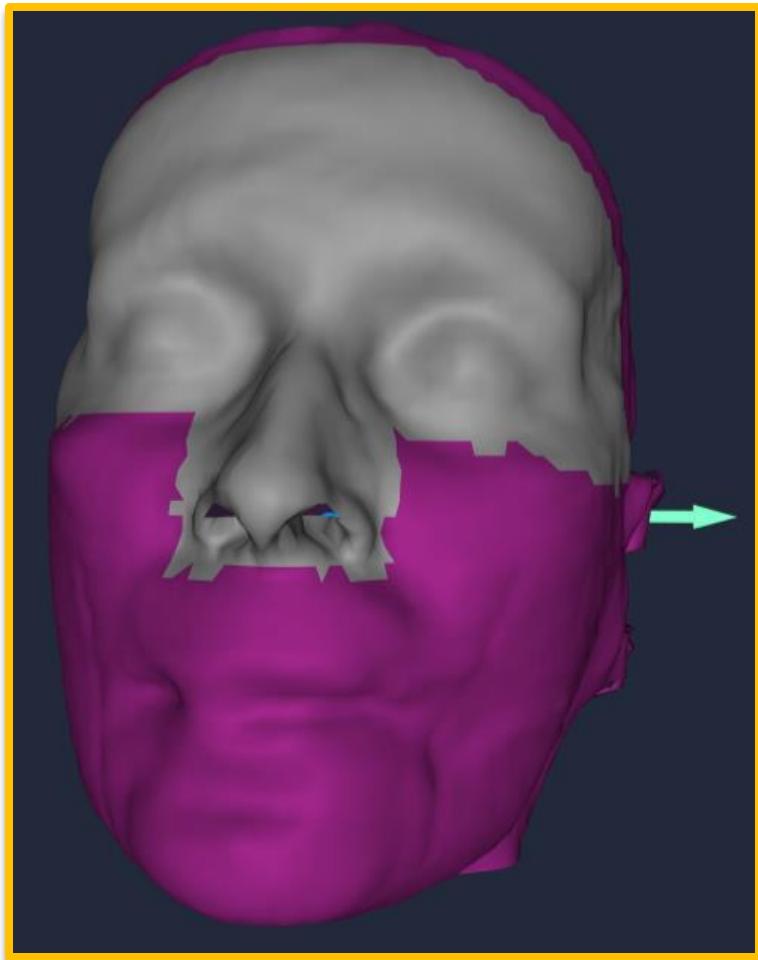
Examples are from clinical version

AUTO ROI EXAMPLES - THORAX



Examples are from clinical version

AUTO ROI EXAMPLES - BRAIN



Examples are from clinical version

STANDARD SITES EVALUATION (NOV 2024 – JAN 2025)

GUID	Protocol	Auto ROI rating	ROI used for treatment	Deltas (Manual)						Deltas (Edited Auto)						Deltas (Auto)					
				Vrt (cm)	Lat (cm)	Lng (cm)	Rot (°)	Pitch (°)	Roll (°)	Vrt (cm)	Lat (cm)	Lng (cm)	Rot (°)	Pitch (°)	Roll (°)	Vrt (cm)	Lat (cm)	Lng (cm)	Rot (°)	Pitch (°)	Roll (°)
D44634A6	Pelvis	3 - Minor edits required	Auto	0.1	0.0	0.0	0.0	0.0	0.1							0.1	0.0	0.1	0.0	0.0	0.0
D90F7E96	Pelvis	3 - Minor edits required	Manual	-0.1	-0.6	0.1	0.4	2.2	1.1	-0.1	-0.5	0.1	0.3	2.5	0.8	0.0	1.2	0.3	0.1	2.3	1.5
BA47366C	Pelvis	3 - Minor edits required																			
7BFF4A3	Breast	3 - Minor edits required	Manual	0.3	0.5	0.9	0.3			0.2	0.4	0.8	0.5								
06D93178	Pelvis	4 - Useable as is	Manual	0.0	0.0	-0.2	0.1	-0.4	-1.4	0.0	0.0	-0.2	0.1	-0.4	-1.4	0.0	0.0	-0.2	0.1	-0.4	-1.4
57A31C47	Breast	3 - Minor edits required	Manual	0.0	0.0	0.1	0.3	0.3	0.2							0.0	0.0	0.1	0.2	0.0	0.3
F6E513D7	Breast	3 - Minor edits required																			
E5532F94	Breast	3 - Minor edits required																			
964C7F24	Breast	3 - Minor edits required	Manual	0.1	0.1	0.2	0.2									0.2	0.2	0.2	0.2		
03F827DE	Breast	3 - Minor edits required	Manual	0.1	0.1	-0.1	2.2	0.1	-0.1	-0.2	0.5	-0.1	2.2	0.5	-0.8	-0.3	0.6	0.0	2.3	0.9	-1.0
77676B9C	Breast	3 - Minor edits required																			
AF8B053F	Pelvis	3 - Minor edits required	Auto	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.1	
8A8EC5DC	Pelvis	3 - Minor edits required	Auto	-0.3	0.3	0.1	-0.2	0.1	1.0	-0.3	0.4	0.2	-0.1	-0.2	-0.5	-0.3	0.3	0.1	-0.4	0.1	2.0
8097fee6(Phase 1)	Pelvis	3 - Minor edits required	Auto	0.3	-0.2	0.2	0.2	-0.1	-1.9							0.2	0.1	0.1	0.1	-0.9	-0.2
4F6CCD05(Phase 1)	Pelvis	3 - Minor edits required	Auto	0.2	0.2	0.1	-0.1	0.3	1.1							0.2	0.1	0.0	-0.2	0.2	1.1
1005D379	Pelvis	3 - Minor edits required																			
8097fee6(Phase 2)	Pelvis	3 - Minor edits required																			
CC1CFB58	Pelvis	3 - Minor edits required																			
087BF6CE	Pelvis	3 - Minor edits required	Auto	-0.2	-0.2	0.3	-0.2	0.9	1.1							-0.4	-0.5	0.4	0.5	0.4	0.0
1767F7E6	Pelvis	3 - Minor edits required	Auto	-0.3	0.1	0.1	0.0	1.3	1.0							-0.3	0.2	0.1	0.7	1.5	1.0
920FBDOB	Pelvis	3 - Minor edits required	Auto	-0.1	-0.2	-0.2	1.3	0.6	-0.4							-0.1	-0.2	-0.2	1.2	0.6	0.9
C2F639EF	Pelvis	3 - Minor edits required	Auto	-0.2	-0.1	-0.1	0.3	0.2	1.4							-0.2	-0.1	-0.1	-0.1	0.1	0.7
F8D3CCD5	Pelvis	3 - Minor edits required	Auto	-0.1	0.1	0.2	0.7	-0.7	-2.1							-0.2	-0.2	0.1	0.4	-0.7	-2.0
F29BE5C2	Pelvis	3 - Minor edits required	Auto	-0.2	0.1	0.1	-0.5	0.2	2.0							-0.2	-0.1	0.0	-0.1	0.2	2.2
1A0A8F46	Pelvis	3 - Minor edits required	Auto	-0.2	0.4	-0.1	-1.7	-1.0	-0.8							-0.3	0.1	-0.1	-1.3	-1.0	-1.4
F9F37257	Pelvis	3 - Minor edits required	Auto	-0.1	-0.1	-0.1	-1.0	0.6	-2.7							-0.2	0.0	0.1	-0.3	1.0	-2.2
7E2A2274	Pelvis	3 - Minor edits required	Auto	-0.1	-0.1	0.1	-1.8	3.0	-0.9							-0.1	-0.3	0.0	-2.1	3.2	-0.9
9D101060	Pelvis	3 - Minor edits required	Auto	-0.2	0.4	0.0	-2.0	0.3	-0.5												
CE008E78	Pelvis	4 - Useable as is	Auto	0.2	0.3	0.4	1.0	0.1	-0.3							0.1	0.0	0.1	1.2	0.5	-0.1
CA0DAE60	Chest	2 - Significant edits required																			
7E2A2274	Pelvis	3 - Minor edits required	Auto	0.0	0.0	-0.2	-0.5	1.5	-0.8							-0.1	-0.2	-0.2	-0.9	1.5	-0.9
2ACFEC69	Pelvis	3 - Minor edits required																			
5D4E4099	Breast	3 - Minor edits required	Auto	0.2	0.0	0.3	0.5	-1.4	-1.9							0.2	0.1	-0.1	-0.5	-1.0	-1.3
3B4D83A9	Breast	3 - Minor edits required																			
F29BE5C2	Pelvis	3 - Minor edits required	Auto	-0.1	0.0	0.1	-0.9	0.4	1.4							-0.1	-0.1	0.0	-0.5	0.5	0.7
EDA7F426	Breast	4 - Useable as is	Auto																		

EVALUATION APPROACH

ROI rating	Description
1	Unusable
2	Significant edits required
3	Minor edits required
4	Useable as is
5	Perfect

Qualitative

- Gave auto ROIs rating from 1-5

Quantitative

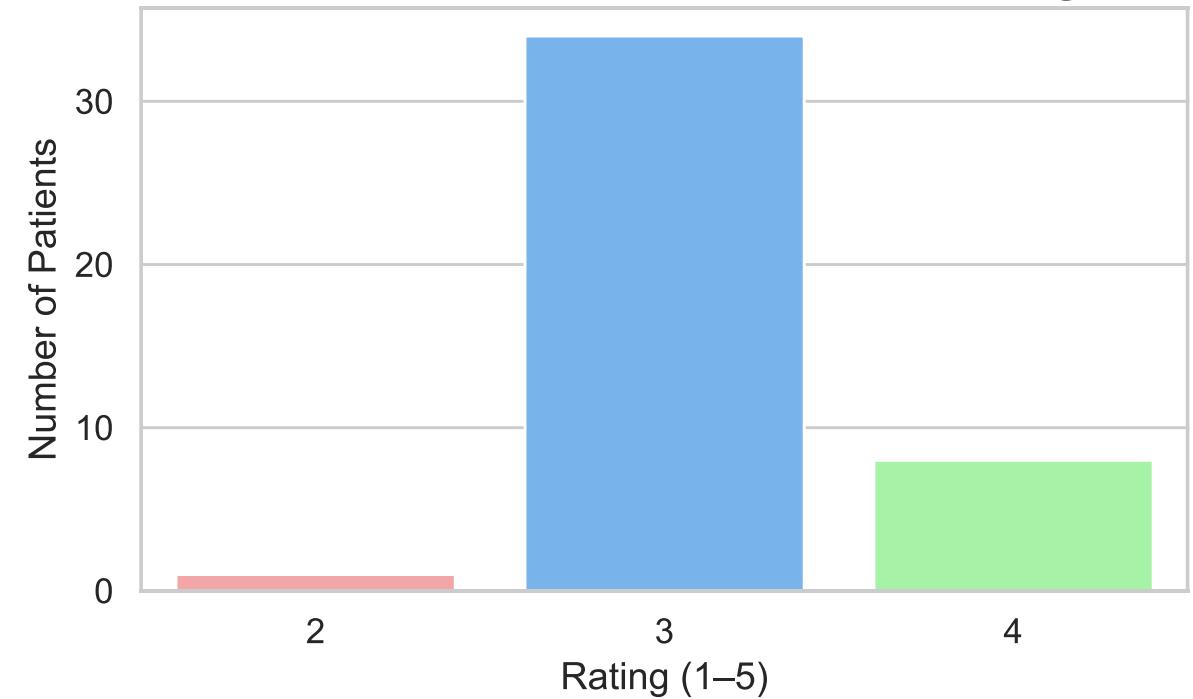
- Compared AlignRT delta values for manual and auto ROIs

STUDY COHORT

Site	No. patients	Avg ROI rating
Breast	11	3.2
Chest	1	2.0
Pelvis	31	3.2

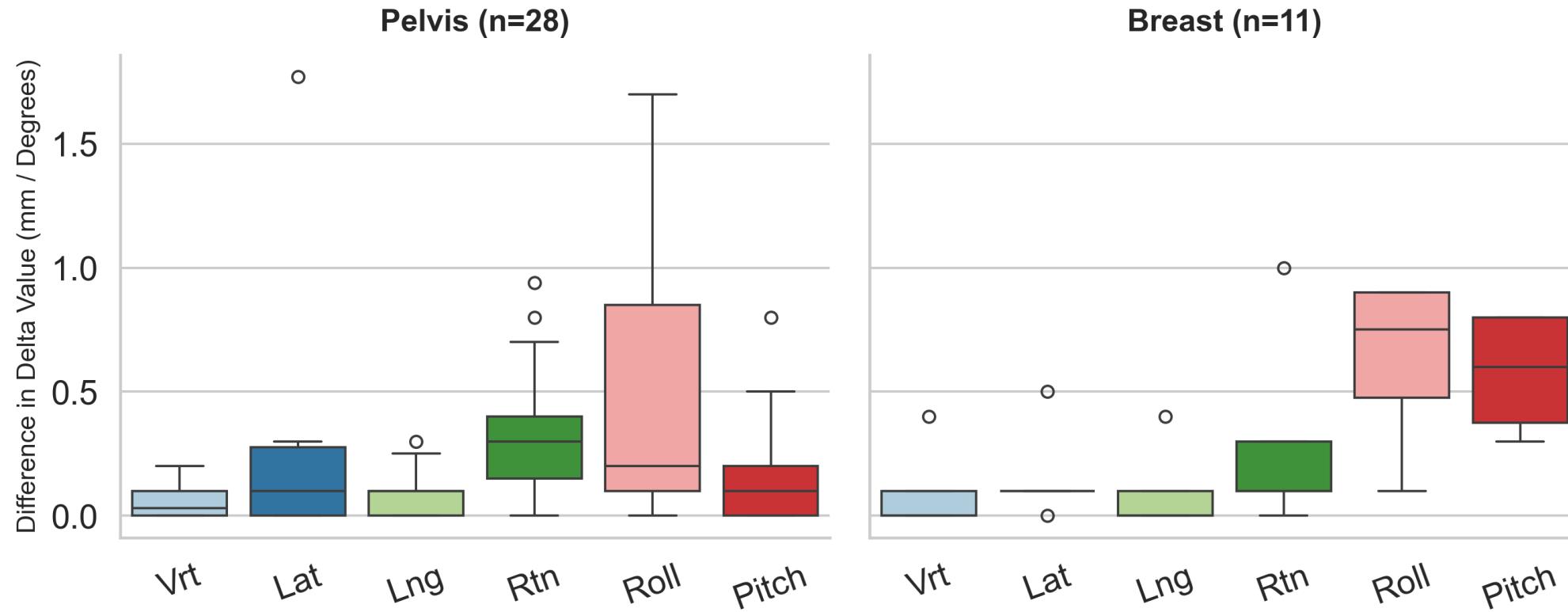
(Prototype version)

Overall Distribution of Auto ROI Ratings



1 - Unusable, 2- Sig. edits req'd, 3- Minor edits req'd, 4 - Usable as is, 5 - Perfect

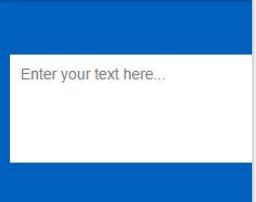
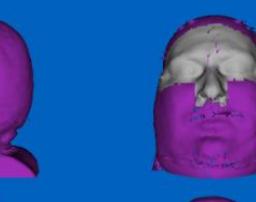
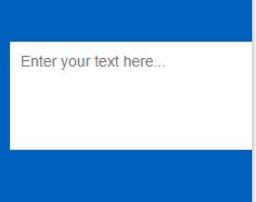
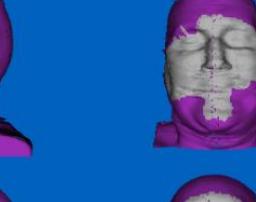
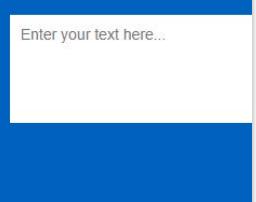
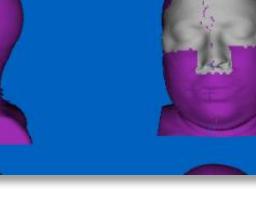
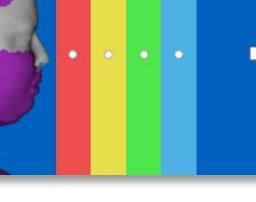
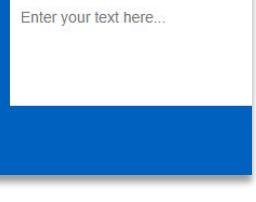
Differences in Deltas Between Auto and Manual ROI by Site



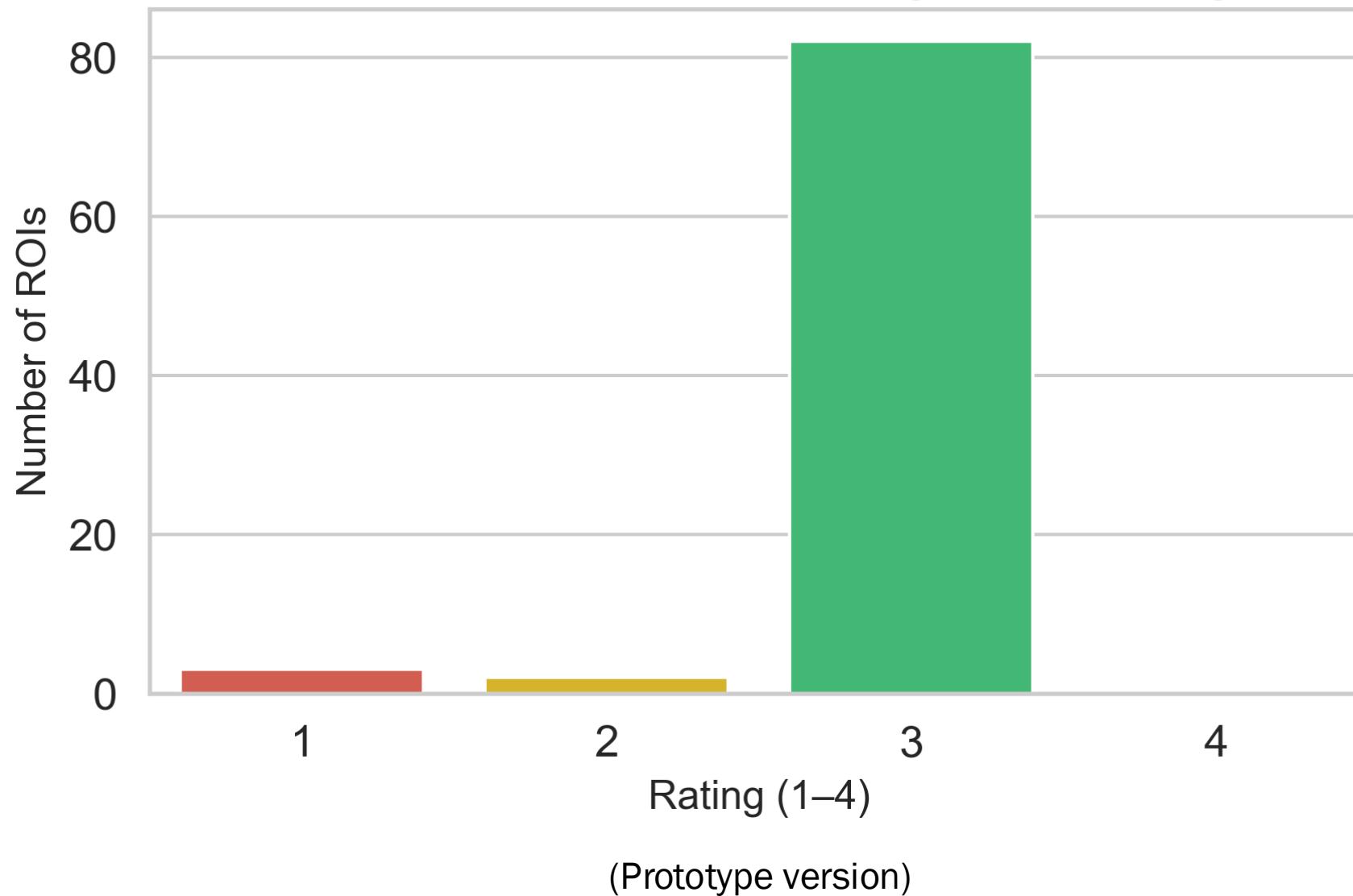
Each boxplot shows the absolute difference in positional delta values for the same patient when using the Auto ROI compared with the manually drawn ROI.

(Prototype version)

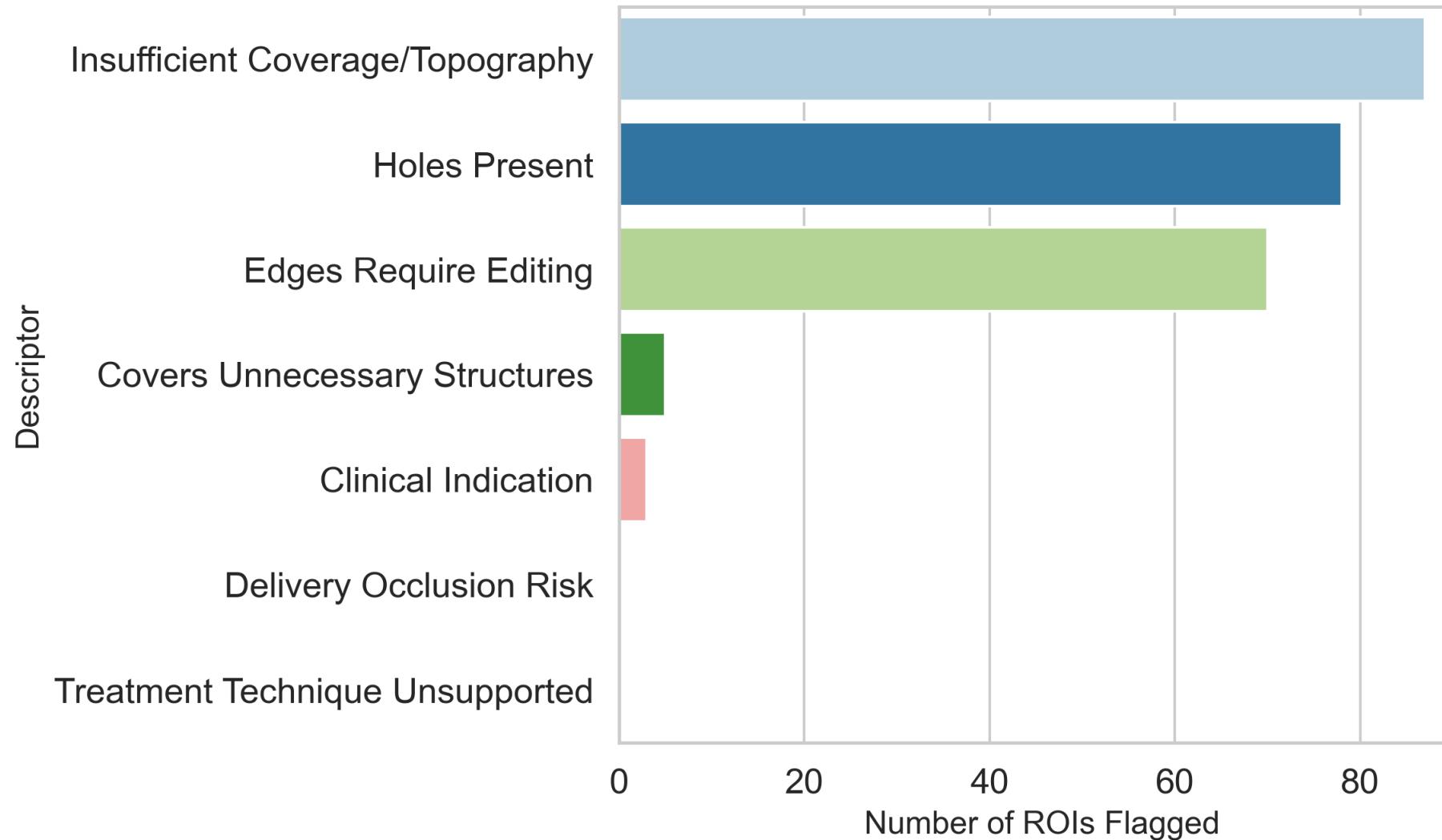
SRS EVALUATION (JUNE – JULY 2025)

SRS ROI Customer Evaluation - Beacon User Scoring											Export to JSON		
ID	AutoROI	1	2	3	4	ROI edges require editing	Holes present on ROI	Insufficient coverage/topography	Coverage of unnecessary structures	Clinical indication	Beam delivery/occlusion risk	Treatment technique unsupported	Other Reasons
000 031550C6F1EB UnknownID- 29DAF1A41C4A													
001 08FF7993FF92 1E51D15B0CBF- 7A47ABF1ED78													
002 099B10406A72 UnknownID- E17956B232F2													
003 0C9C01B90DB8 UnknownID- 0B9E55770B2D													

Distribution of SRS Auto ROI Ratings (n = 87, Avg = 2.91)

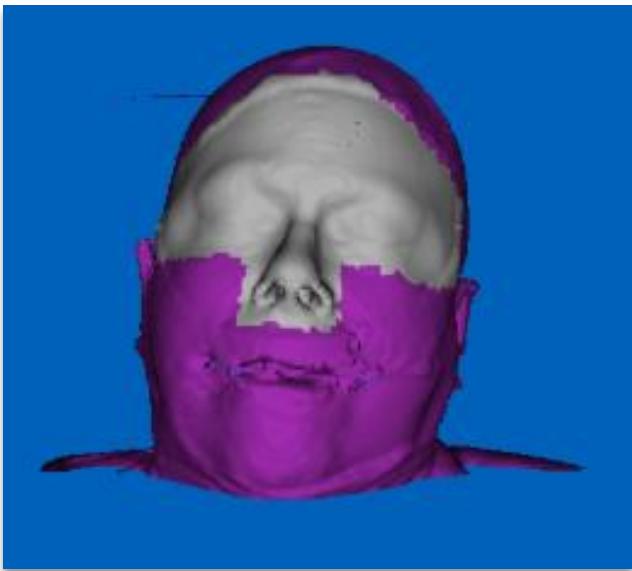


Frequency of Descriptors in SRS Auto ROIs (n = 87)

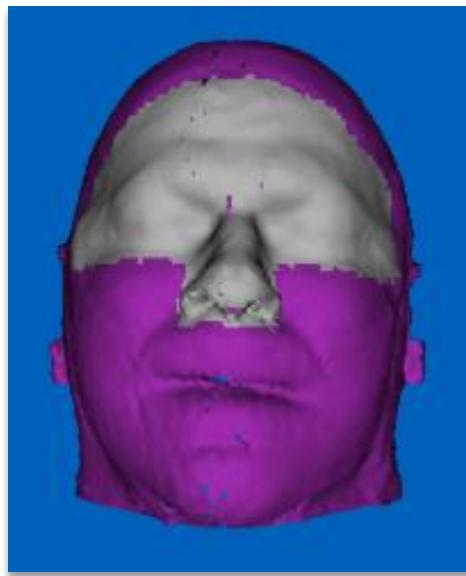


(Prototype version)

EXAMPLES OF MINOR EDITS REQUIRED



Part of mask included
superiorly



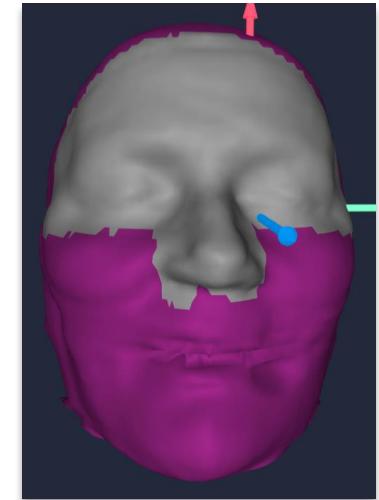
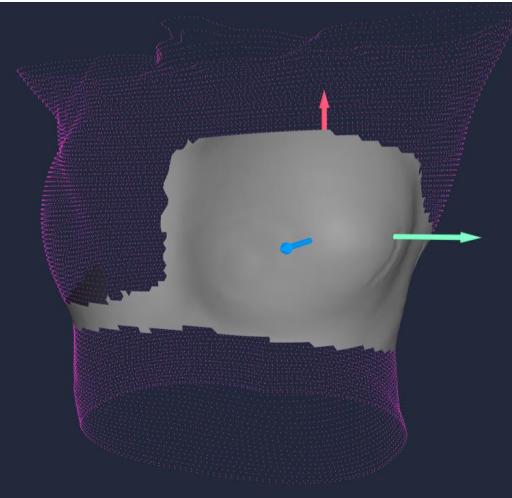
Small holes in ROI
(Prototype version)



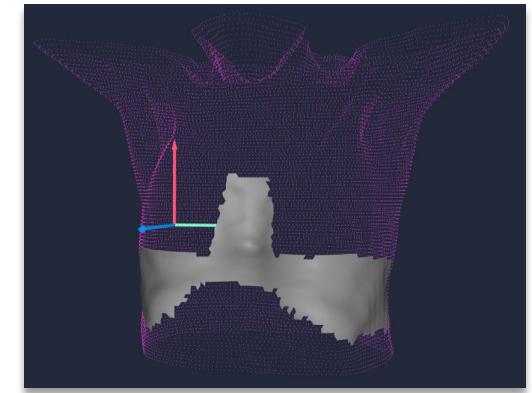
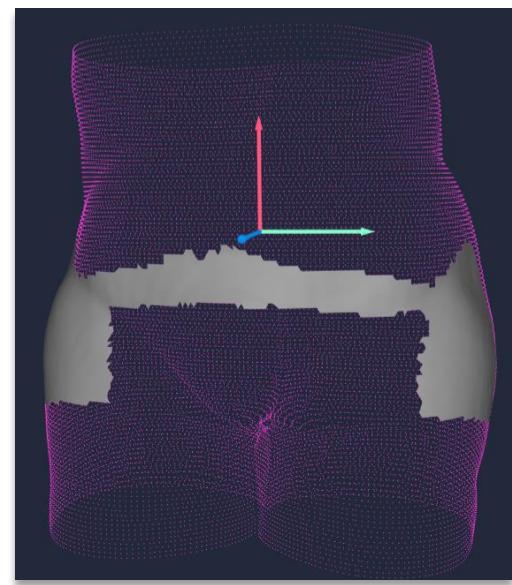
Too much of the
cheek included

EARLY OBSERVATIONS

Prototype testing shows vast majority of Auto ROIs only require minor edits



Good performance of Auto ROI is consistent across sites



Insufficient coverage/topography and holes in ROI are most commons reasons for edits

NEXT STEPS

Upgrade to AlignRT Version 8.0 in December

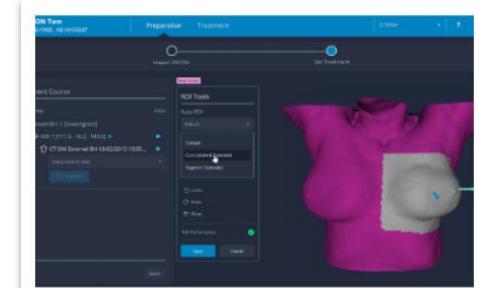


Perform testing



Implement Auto ROI clinically for all sites

alignrt®



Auto ROI™

With AlignRT's new Auto ROI™ module, regions of interest (ROI) for the most common body sites are defined automatically.



ACKNOWLEDGEMENTS

- Project team: Orla Smith, Claire Day, Luke Rock
- VisionRT : Conny Ruiz, Andy Davies, Glendale Leon, Nik Harding, Menna Creed, Diego Ortiz De Lejarazu, Thomas Klinge



Beacon Hospital

**THANKS FOR
LISTENING!**

