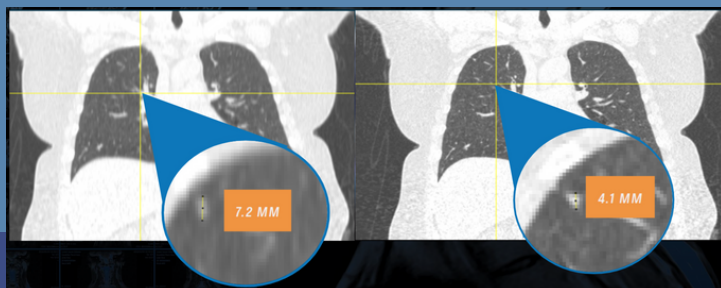# RadUnity

The Problem

The image below shows two scans of **one** patient's lungs created on the **same day.** Erroneous differences in the measured nodule size in this case were caused by non-uniformity in Computer Tomography (CT) scanner reconstruction parameters.

7.2 MM

4.1 MM

Current Practice

Currently, images are created by modality units supplied by various vendors, reconstructed based on a variety of imaging protocols.[1] These diverse images are then sent to radiologists to hang and interpret.

LUNG
THIN SOFT TISSUE
10 MM MIP
CO LUNG

Hundreds of parameters to set per indication

HI RES CHEST
CHEST B32
MIPS
HI RES CO

Hundreds of parameters to set per indication

1 MM CHEST
2 MM ST LCS
CO LCS

Hundreds of parameters to set per indication

RadUnity's solution

RadUnity™ addresses the problem of inconsistency in medical imaging by centralizing the management of image creation,[2] enabling a site to create a standardized image presentation for any CT study.

LUNG
THIN SOFT TISSUE
10 MM MP
CO LUNG

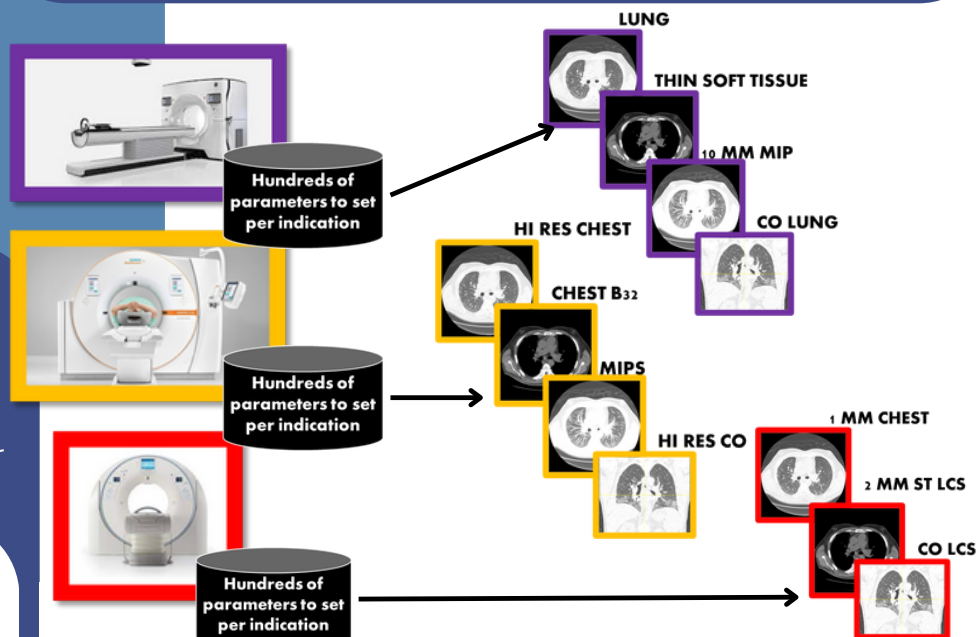RadUnity

GE

SIEMENS Healthineers

Canon
CANON MEDICAL
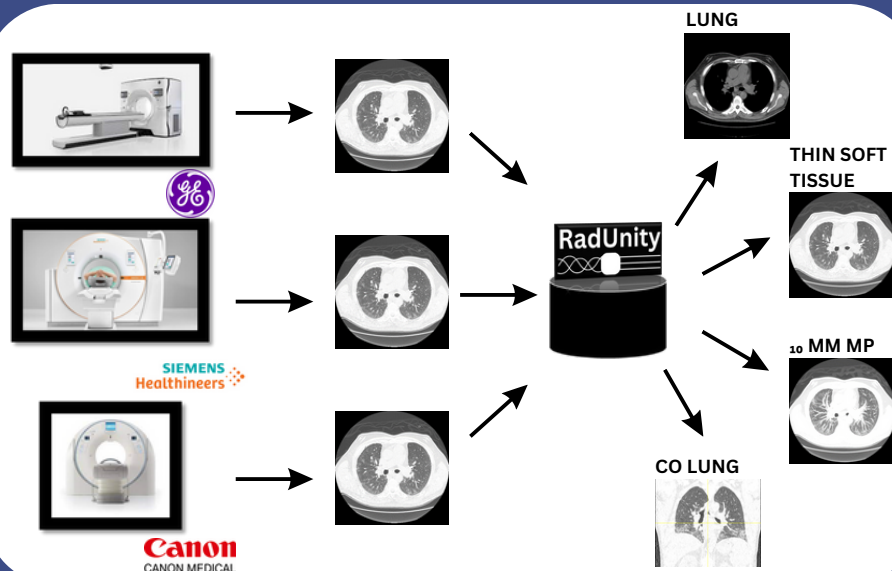
[1] Szczykutowicz, T. P., Rubert, N., Belden, D., Ciano, A., Duplissis, A., Hermanns, A., ... & Saldivar, E. J. (2016). A wiki-based solution to managing your institution's imaging protocols. Journal of the American College of Radiology, 13(7), 822-824.

[2] Szczykutowicz, T. P. (2019) *System for Harmonizing Medical Imaging Presentation* (US10964074B2). USTPO Patent. https://patents.google.com/patent/US10964074B2/en?oq=10964074

I have to fix all these reconstruction settings so my AI engine can assess this indication.

My hanging protocols never work.

I hate when techs rotate to a new scanner, they always have issues creating formats the way I like.

Did that nodule actually grow or was it just reconstructed differently?

The ED is so busy, I wish someone else could help the ED tech make their reformats.

This is frustrating, all these OEM protocol management solutions are scanner specific.

The RadUnity™ Workflow

SCAN
User performs the necessary protocoling, prepping, and scanning of the patient based on the order received, acquiring raw data.

CENTRALIZED MANAGEMENT
Reconstructed DICOM data is sent through RadUnity's gateway to a secure environment for centralized reformatting based on an indication-specific profile.
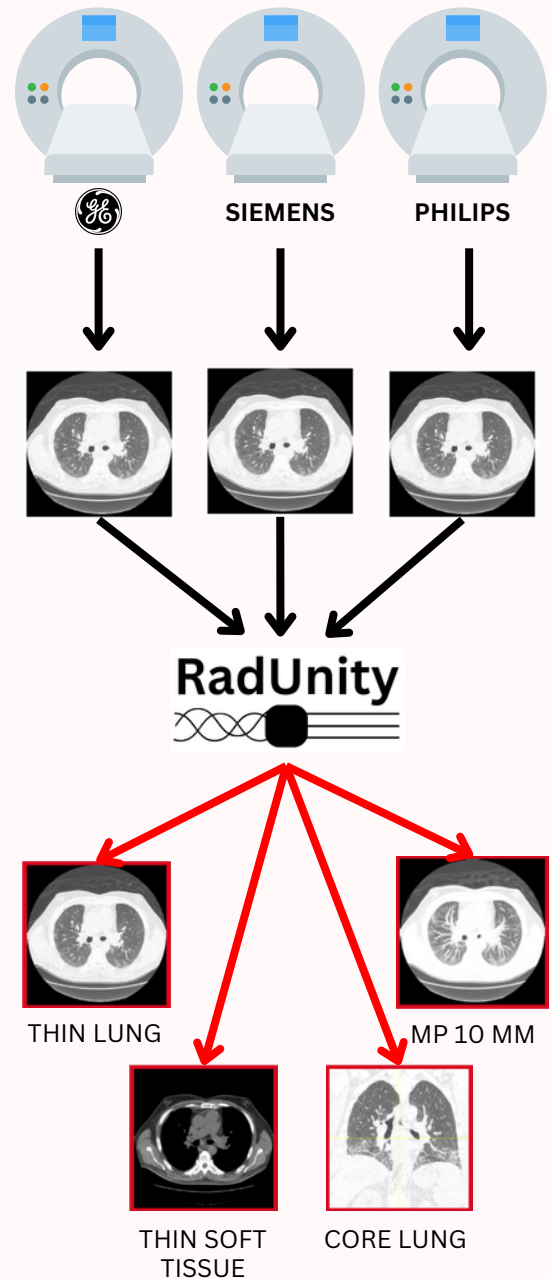
REFORMAT
User launches RadUnity's web-based platform. Users then select the appropriate order and then choose from predefined profiles. The profiles are indication specific and define image plane, name, image type, etc., for radiologist interpretation and post-processing needs.

PACS
Images reformatted on the cloud will then populate in a site's respective PACS server for viewing.

INTERPRETATION
Radiologists can now view images on PACS with the same look and feel coming from all the scanners they read from.

GE SIEMENS PHILIPS

RadUnity

THIN LUNG   MP 10 MM

THIN SOFT TISSUE   CORE LUNG

Our Software-as-a-Service (SaaS) solution enables a site to tailor image reformatting in a customised manner from any location. Therefore, RadUnity's solution can be applied to images from outside one's institution, as well as on images previously acquired.

Szczykutowicz, T. P. (2019) *System for Harmonizing Medical Imaging Presentation* (US10964074B2). USTPO Patent. https://patents.google.com/patent/US10964074B2/en?oq=10964074
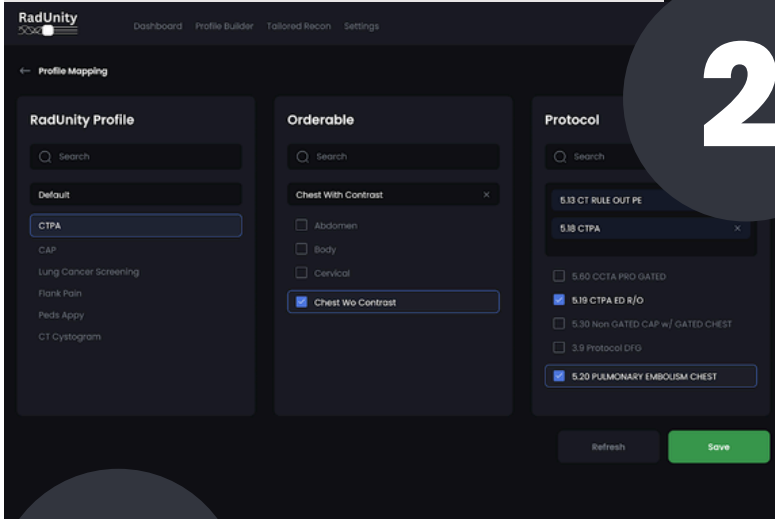
RadUnity™

1

Create an indication specific profile to define the image "look and feel" (i.e., the names, planes, kernels, slice thicknesses, etc.) for selected image volumes per indication.
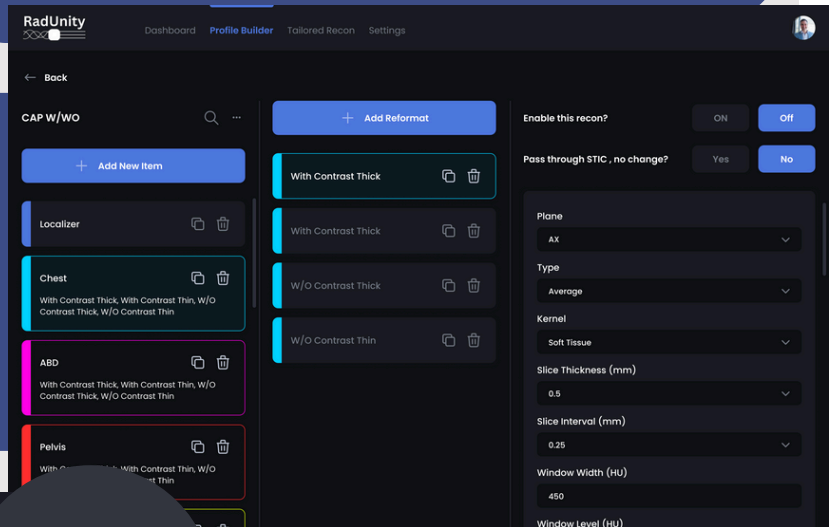
2

Link a RadUnity™ profile to a study description and protocol names so RadUnity™ can associate the correct image reformat profile with the correct exam.

3

At scan time, scanning (i.e., data acquisition) is unchanged with the RadUnity solution. Only a thin high-resolution (i.e., a bone or lung kernel) image volume is reconstructed on a CT scanner and sent to RadUnity™ for processing.
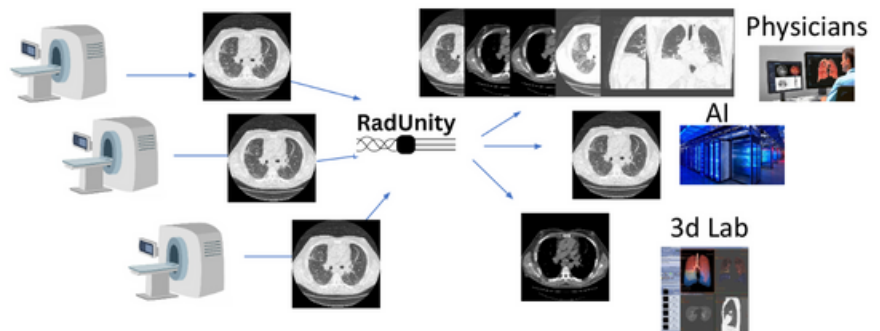
RadUnity™

why it works

Modern CT scanners can make very high-resolution thin images. These images are far too noisy for human interpretation. Historically, we "thicken them up" and "blur them" to make images palatable for human interpretation. CT OEMs do this via filtering projection data using kernels.
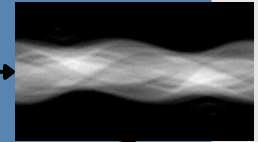
The scanner can make thin, high-resolution images like this.

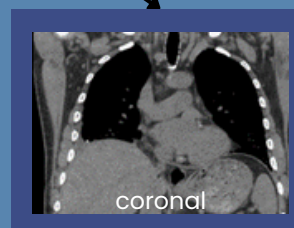Radiologists prefer thicker, lower resolution images for most indications.
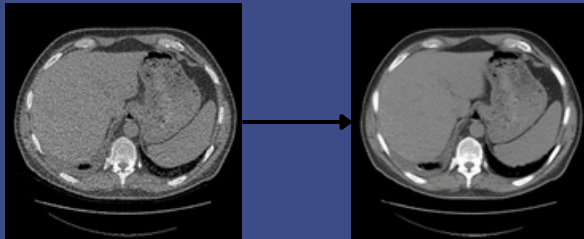
We don't need a CT scanner to transform a high-resolution image into an image suitable for radiologist interpretation. One can quickly and easily filter a high-resolution image (i.e., bone or lung) into a lower resolution image (i.e., soft tissue).

A thin image volume can be reformatted into other planes. This is exactly what RadUnity™ does to make non-axial images and thicker axial image volumes.[1]

Going from a high resolution source image to a lower resolution image is easy, one just has to apply a blurring filter. This is ubiquitous on most 3D processing workstations and PACS systems. RadUnity™ duplicates CT OEM projection filtering using image space filtering.[2]

thick soft tissue

thin soft tissue

coronal

sagittal

All descriptions and examples of solutions and technologies presented in this pamphlet represent technology in development and ongoing research efforts. RadUnity Corp. does not currently offer a product, and the solutions and technologies presented here may never become products. No solutions or technologies described on the RadUnity website are approved or cleared by any regulatory body in the United States of America or globally.

[1] Szczykutowicz, T. P. (2019) System for Harmonizing Medical Imaging Presentation (US10964074B2). USTPO Patent. https://patents.google.com/patent/US10964074B2/enoq=10964074

[2] Schaller, S., Wildberger, J. E., Raupach, R., Niethammer, M., Klingenbeck-Regn, K., & Flohr, T. (2003). Spatial domain filtering for fast modification of the tradeoff between image sharpness and pixel noise in computed tomography. IEEE transactions on medical imaging, 22(7), 846-853.

RadUnity™ is a platform that uniformly presents images from diverse CT data tailored for any radiologist, researcher, or AI tool. Its cloud-based software as a service platform allows centralized specification and management of image reformatting according to predefined user preferences.

Patients
Patients benefit from reduced instances of repeat imaging and fewer diagnostic errors. This is particularly valuable in low-resource medical centers, where patients are often referred to advanced academic medical centers for care.

Technologists
RadUnity™ enables users to tailor the extent of their interaction with the software, automating repetitive tasks without disrupting the established workflow.

Radiologists
RadUnity™ has the potential to allow radiologists to reclaim time and mental space, providing customizable tools that work in the background to improve user experience with image interpretation and diagnosis.

Same Image Viewing Experience

Technologists
RadUnity™ software provides more consistency in image reconstruction, as well as the flexibility to automate hanging protocols. This software can support technologists so they may focus more on patient care, rather than image organization.

Site Administration
Centralized data management and a consistent viewing experience fosters confidence in providers and patients alike, helping to reduce burnout and mitigate guesswork resulting from nonuniformity.
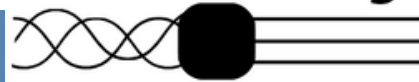
Radiologists
The RadUnity™ platform allows providers have access to the same image presentation from any location. This should translate into reduced guesswork and repetitive tasks so radiologists can do what they trained to do: practice medicine.

Centralized Management

RadUnity

Technologists
RadUnity™ software assists in load balancing through the real-time status dashboard. During busy times, users can support one another by performing manual tasks needed for others' scans, regardless of location.

Radiologists
RadUnity™ can optimize onboarding protocols with our solution for nonuniformity in image reconstruction, enabling new radiologists and technologists to redirect their attention from machine-specific reconstructions so they can focus more on their patients.

Site Administration
RadUnity™ has an integrated status dashboard may act as a tool that allows providers to maintain control of scan orders, easily prioritize cases, and enhance resource allocation. This software as a service platform has the potential to boost efficiency, reduce turnover, and optimize resource utilization.

Real-Time Reporting

Normalized Data

AI Vendors
The consistency RadUnity™ offers AI vendors contributes to optimizing their algorithms related to medical imaging.

Radiologists
RadUnity™ software can normalize data from new and previous scans alike, creating a consistent image viewing experience, no matter the source.

Site Administration
RadUnity™ fosters uniformity in the image viewing workflow, allowing for easier intra- and intercommunication within and among sites.

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