CURRICULUM VITAE

OUTLINE

1 Digitalisasi dalam Radiologi

Tantangan dalam Pelayanan Radiologi

- Kekurangan staf: dokter ahli radiologi, radiografer, dan fisika medis

- Peningkatan julah pasien.

- Peningkatan jumlah data: akibat digitalisasi modalitas radiologi dan implementasi sistem informasi kesehatan, peningkatan data perawatan kesehatan dari tahun ke tahun adalah sekitar 48%[1].

- Kebutuhan akan diagnosis yang lebih cepat dan tepat serta solusi inovatif.

[1] Stanford Medicine 2017 Health Trends Report

Data-Information-Knowledge Hierarchy

focus

adjust

compare

sample

observe

Wisdom

Knowledge

Information

Data

Facts

Measurements
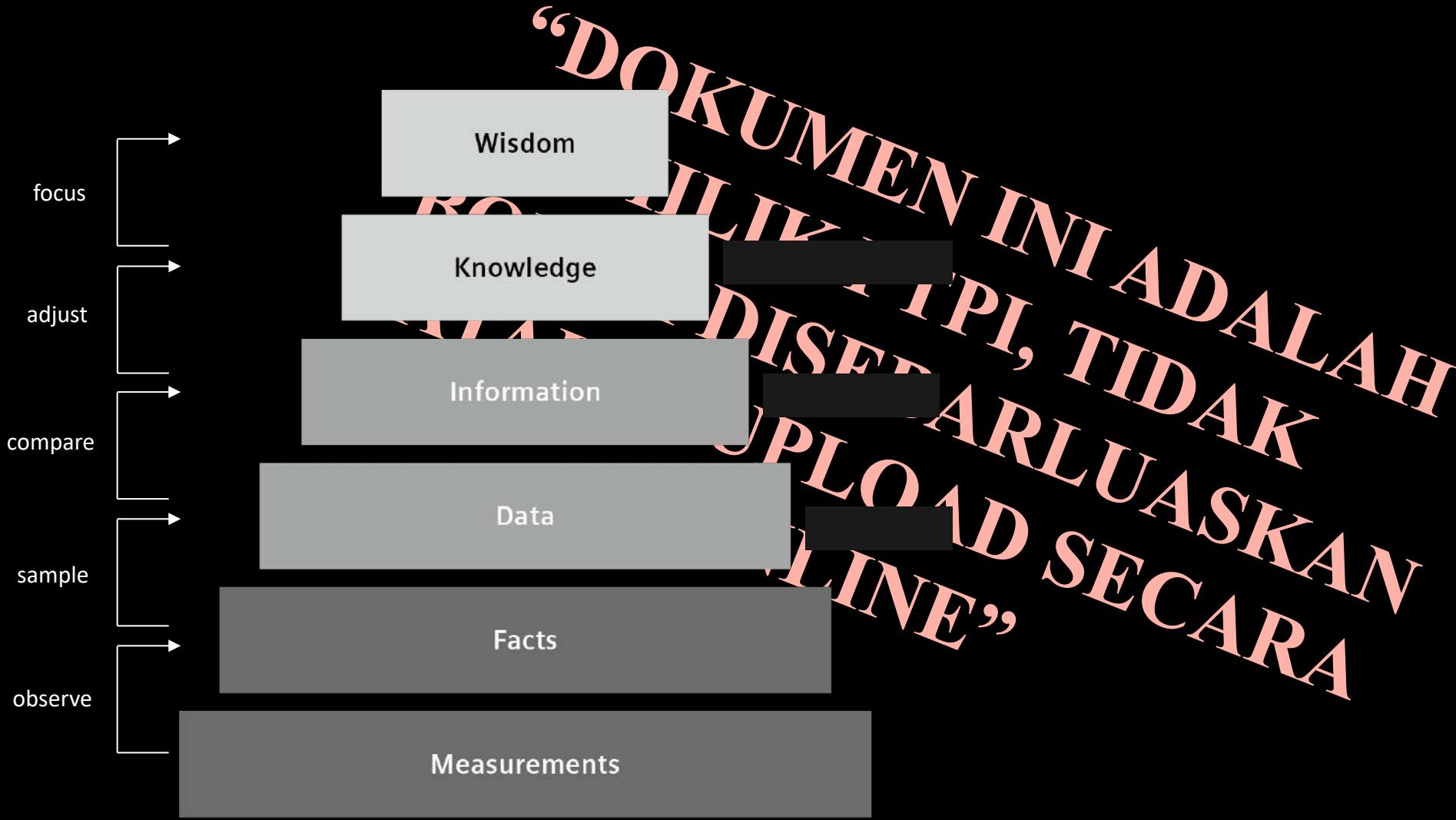
Transformasi Digital - Apa artinya bagi radiologi?

- Digitalisasi akan mengubah data menjadi informasi.

- Membantu untuk menghasilkan keputusan yang tepat.
  - Meningkatkan efisiensi.
  - Meningkatkan kinerja klinik.
  - Mendukung untuk membuat keputusan klinis yang personal bagi pasien.

- Digitalisasi dalam layanan radiologi akan berdampak pada:
  - **Pencitraan cerdas**: otomatisasi pelaksanaan pemeriksaan hingga menghasilkan citra yang siap untuk dianalisis.
  - **Penyederhanaan operasional layanan radiologi**: peningkatan produktivitas dan optimalisasi pemanfaatan aset.
  - **Keputusan klinis yang didukung kecerdasan buatan**: untuk memandu pengambilan keputusan di sepanjang perjalanan pasien.

Dari PACS menuju ODIS

- Integrasi data pelayanan Kesehatan.

- ODIS (*Outcome Driven Imaging System*) menghasilkan pengetahuan dengan menyediakan lingkungan klinis yang sangat efisien, berkualitas tinggi, dan dioptimalkan, membuka berbagai kemungkinan dalam interpretasi gambar, pelaporan, implementasi kecerdasan buatan (AI), manajemen data, pengarsipan dan migrasi, termasuk akses unik ke platform inovasi, fungsionalitas *open source* dan pihak ketiga dan perangkat lunak terbaru yang tersedia.

Turning data into information and information into knowledge

Reading & Reporting Physician (Radiologist)

Physician Access EMR-embedded

Patient Access (web-based)

eHealth Network Access

cloud digital health platform (e.g. teamplay, AIRC)

IHE XDS-I

Open Image and Data Manager

Laboratory Instruments

ASCII through RS232C/USB

DICOM

HL7, FHIR   Archiving

External patient data

DICOM sources

Multimedia data

Departmental systems

Encounter-based imaging

Patient Sensor

Source: Adapted from Marketing Materials Siemens Healthineers (2022)

Syngo Carbon – Many into one

One Workspace
- Harmonized User Interface
- 2D/3D Reading
- Cinematic Visualization
- Clinical demo (Collaboration)

Artificial Intelligence
- Automation
- Computer Aided Detection
- AI-Rad Companion
- Similar Patient Search

Innovation & Research
- Digital Marketplace
- Research
- Pneumonia

Advanced Visualization
- Ologies
- 3D/4D reading
- Pre-processing

Access clinical information
- EMR
- Patient Jacket
- Non-DICOM

Actionable Reporting
- Actionable results
- Smart Reporting
- (Nuance PowerScribe One)
- Structured reporting

Decision to Image	Scanning	Acquisition	Processing	Reasoning	Reporting	Communication
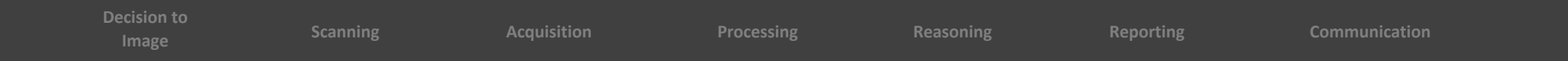
Syngo Carbon consists of several products which are (medical) devices in their own right. Some products are under development and not commercially available. Future availability cannot be ensured.

2

AI pada Pencitraan Medis

Pencitraan cerdas

- Pencitraan cerdas untuk menghasilkan data berkualitas tinggi dengan memanfaatkan keseluruhan potensi dari sistem.

- Inovasi sangat penting untuk membantu dalam akuisisi data.

- Solusi cerdas memungkinkan untuk menghasilkan data yang akurat dan interpretasi gambar yang lebih cepat, sehingga menciptakan wawasan yang dapat ditindaklanjuti.

- Kemungkinan digitalisasi membantu pengguna secara efisien mencapai hasil yang dapat direproduksi – dengan membimbing operator melalui prosedur pencitraan, sehingga mereka dapat berinteraksi dengan mudah dan alami dengan pasien dan teknologi.

- Pada akhirnya pencitraan cerdas berdampak dalam pengopersian modalitas secara efisien.

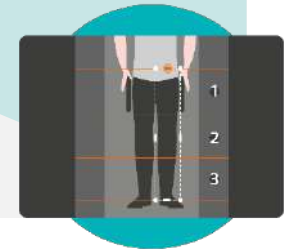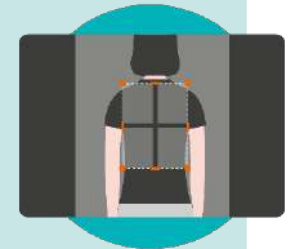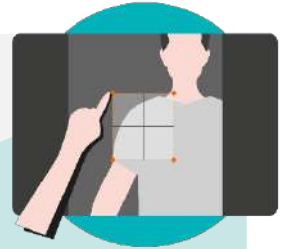# Optimal support during examinations
3D Camera

Keep the patient in focus at all times and provide reassurance.

Enables **automatic collimation,** with three pioneering functionalities:

- **Virtual Collimation**[1] – for touchscreen collimation that revolutionizes the way X-ray exams are performed

- **Auto Thorax Collimation**[1] – for AI-based thorax detection, tube alignment, and collimation support

- **Smart Virtual Ortho**[1] – for less guesswork and more accuracy in orthopedic exams

YSIO X.pree has the potential to speed up your workflows.

[1] Option
YSIO X.pree is not commercially available in all countries. Its future availability cannot be guaranteed.
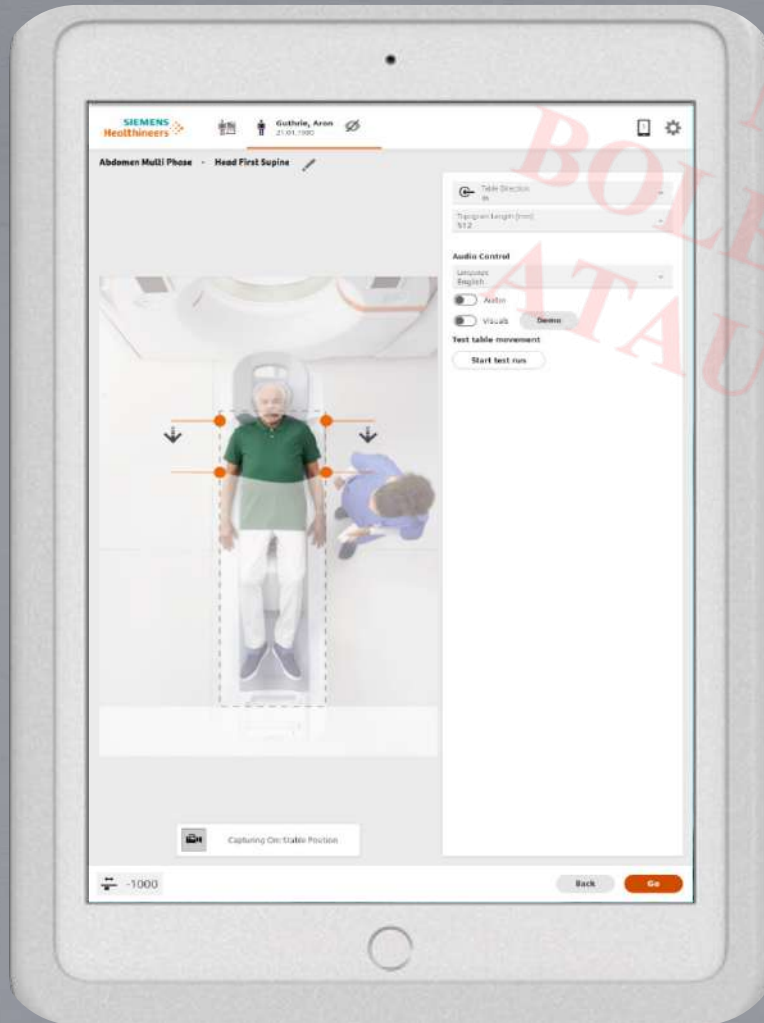Please contact your local Siemens Healthineers organization for further details..

Position patients precisely with the FAST 3D Camera[1]

FAST 3D Camera
For standard positioning powered by AI

FAST Isocenter
for right dose modulation

FAST Range
for correct body region

FAST Direction
for right scan direction

© Siemens Healthineers, 2021

High efficiency throughout the entire patient workflow – AI powered push-button exams

Powered by
Artificial Intelligence

30% faster[1]
patient positioning with intelligent body model

Push-button
planning & scanning with myExam Assist & Cockpit

Zero click
fully automated inline processing

Ready-to-read results
with post-processing at the scanner

Select&GO

myExam Companion[2]

Recon&GO

View&GO

Acquisition with myExam Assist[1] for push-button whole-spine exams – even in challenging anatomy
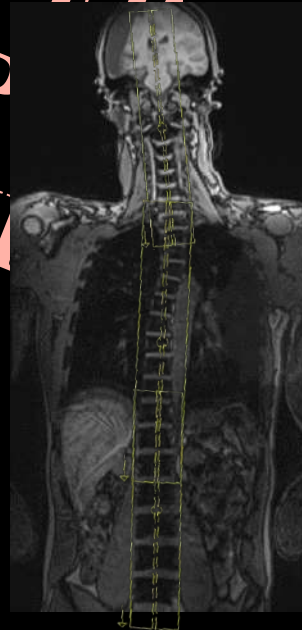
AI-based technologies for consistent image quality

Increase efficiency in exam planning

1. Automated alignment to anatomy enables consistency
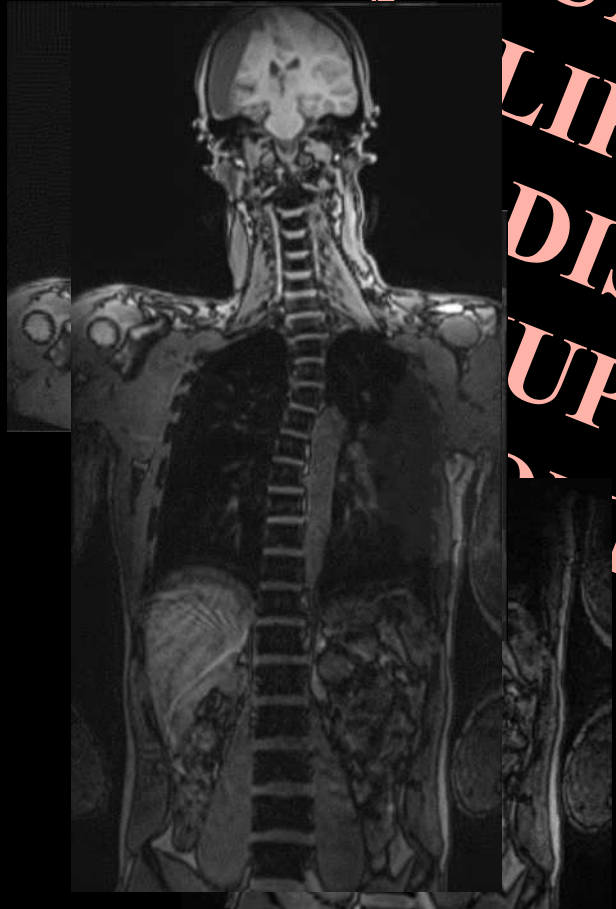
2. Push-button snap-to-disk positioning of axial scans

[1] This term will only be used starting with SW version syngo MR XA50A which is currently pending 510(k) clearance and is not yet commercially available in the United States. Its future availability cannot be guaranteed.

Ready-to-read results with Recon&GO
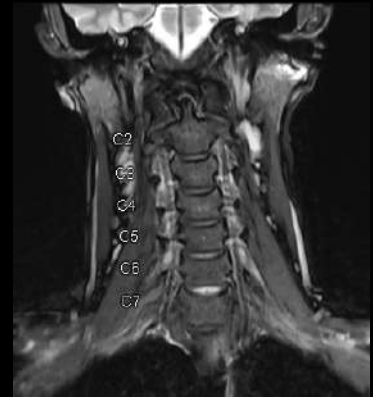# Save time and reduce errors

Automatic composing of whole-spine exams

Automatic spine labeling in all contrasts, slices and orientations

Reconstruction

3

AI pada Operasional Pelayanan Radiologi

Penyederhanaan Operasional Radiologi

- Operasional pelayanan radiologi yang disederhanakan untuk meningkatkan produktivitas dan mengoptimalkan pemanfaatan aset.

- Seiring dengan kekurangan staf, departemen radiologi dan pencitraan di seluruh dunia dihadapkan dengan tekanan tambahan seperti peningkatan beban kerja.

- Digitalisasi dapat membuka tingkat kinerja operasional yang sama sekali baru serta potensi tersembunyi untuk peningkatan operasional layanan radiologi yang lebih efisien.

- Solusi digital seperti perangkat lunak pemindaian jarak jauh dan platform yang memungkinkan keputusan berbasis data di sepanjang jalur pasien dapat membantu menyederhanakan operasi layanan dan membuat alur kerja yang cerdas untuk mengurangi beban kerja dan meningkatkan produktivitas tenaga kerja.

Connect your imaging service line to unlock productivity gains

Application Layer

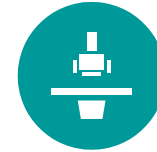teamplay performance management applications overview

- teamplay Dose
- teamplay Usage
- teamplay Protocols
- teamplay Insights
- teamplay Fleet
- teamplay X-ray Dashboard
- teamplay Mammo Dashboard
- teamplay Images

Platform Layer

Secure data access and processing

teamplay digital health platform

The enabler of healthcare providers' digital transformation

Data Layer

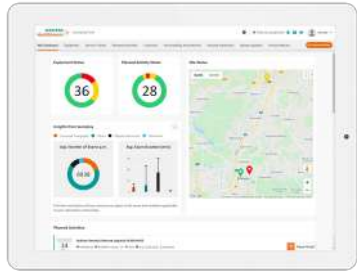Connectivity based on different interoperability standards

Secured access and connectivity to different interoperability standards

Powerful applications[1] for all types of healthcare providers

Standardized guided analysis

... up to customized in-depth analytics

teamplay Fleet
Streamline your modality fleet management and optimize your asset performance holistically

teamplay Dose
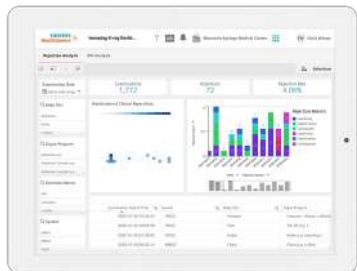Simplify radiation dose management and compliance with national regulations

teamplay Usage
Simplify utilization management to optimize imaging operations and increase efficiency

teamplay Insights
Build intuitive dashboards that give you insights about your hospital's analytics
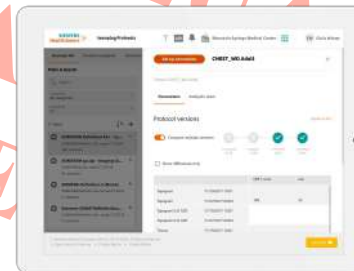

teamplay X-ray Dashboard
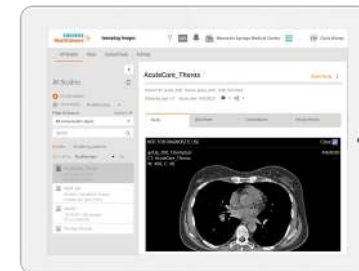Increase quality of X-ray imaging and operational efficiency through transparency

teamplay Mammo Dashboard
Improve your operational efficiency to support a high quality of care in breast imaging

teamplay Protocols
Simplify protocol management to deliver a high quality of care and standardization

teamplay Images[2]
Simplify image sharing and study discussions in a secured environment

1 teamplay products are not commercially available in all countries. Due to regulatory reasons their future availability cannot be guaranteed. Please contact your local Siemens Healthineers organization for further details.

2 Due to regulations data exchange between data center regions is restricted. The products/features/service offerings are not commercially available in all countries. If the services are not marketed in countries due to regulatory or other reasons, the service offering cannot be guaranteed. Please contact your local Siemens organization for further details.
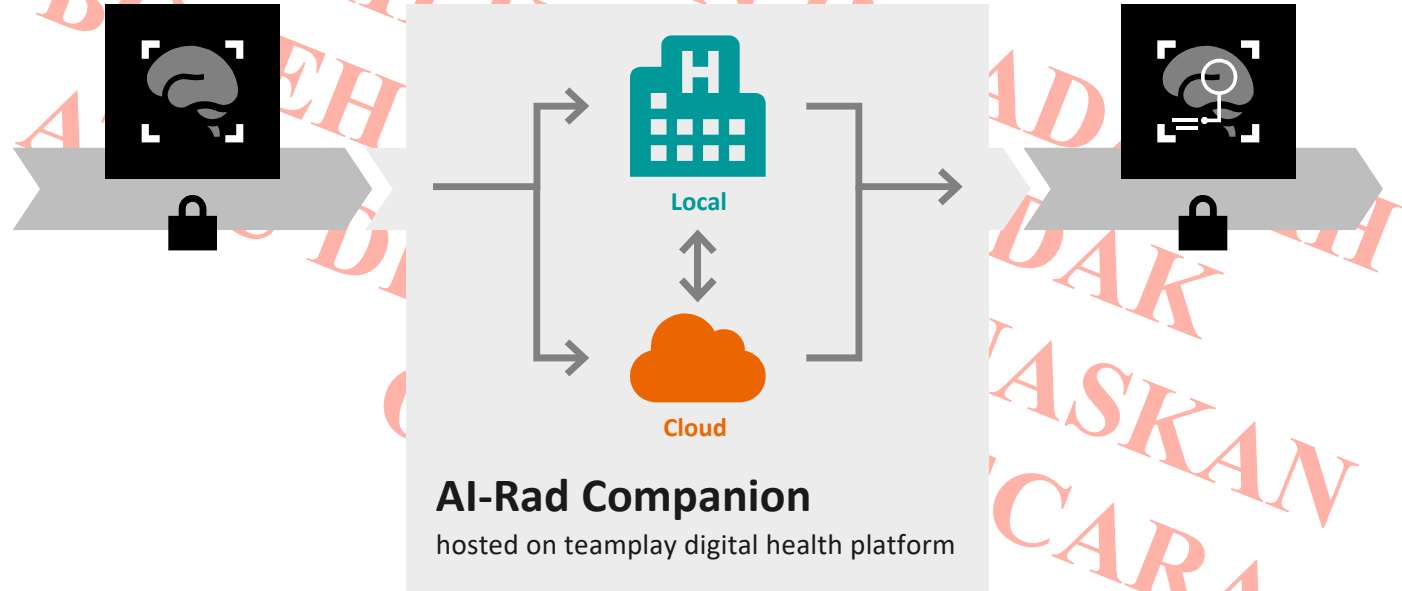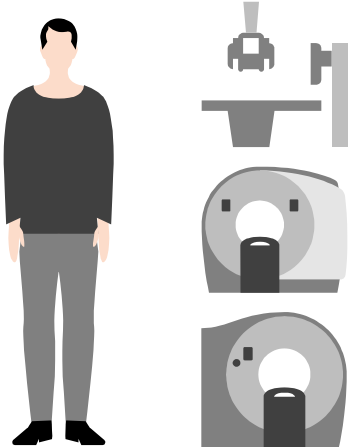
4 AI pada Proses Diagnosis

Kecerdasan Buatan dalam Diagnosis

- Keputusan Klinis yang didukung kecerdasan buatan (AI) untuk memandu pengambilan keputusan di sepanjang perjalanan pasien.
- Salah satu kekhawatiran paling mendesak dalam radiologi saat ini adalah pertumbuhan eksponensial data dan kekurangan staf medis.
- Solusi cerdas mendukung ahli radiologi dalam membuat keputusan klinis yang lebih tepat dan menambah nilai di sepanjang perjalanan pasien.
- Melalui integrasi dan interpretasi data yang unggul dan penciptaan wawasan yang dapat ditindaklanjuti, solusi yang didukung AI membantu ahli radiologi dan dokter dalam membuat keputusan yang tepat untuk setiap pasien.

AI-Rad Companion, seamlessly integrates into your hospital environment – and your workflows

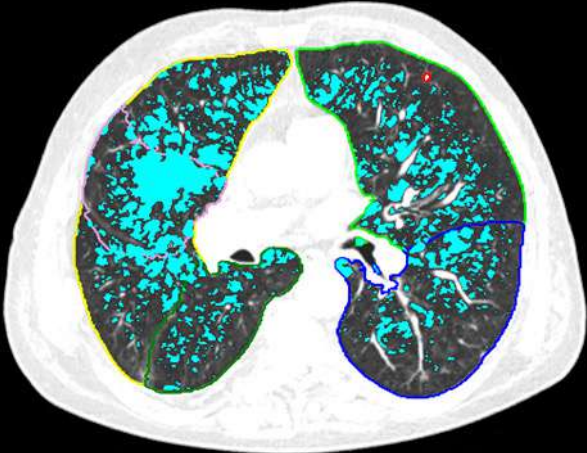**AI-Rad Companion**
hosted on teamplay digital health platform

Local

Cloud

Automated results

Multi-organ approach

- Heart
- Aorta
- Lung
- Vertebra

Functionalities

- Measuring
- Highlighting
- Follow-up³
- Reporting
- Segmentation

25

What does AI confidence mean?

Different factors may impact the image quality or image impression and of course not every finding shows up in the same manner on each x-ray.

The deep learning-based algorithms are trained to look and mark the findings. In addition to the detection, the AI Confidence score is an indication about the likelihood[1] of the finding detected, as a positive finding by the respective AI algorithm.

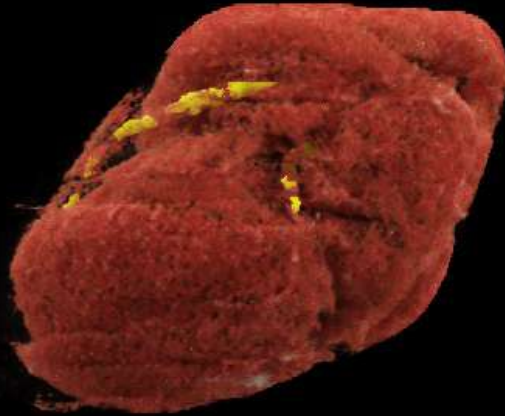# Automated enhanced visualization of anatomies and abnormalities

Highlighting
AI-Rad Companion automatically highlights anatomies and abnormalities including incidental findings.

Segmentation
AI-Rad Companion automatically provides segmentation of heart, aorta and lungs.

"DOKUMEN INI AD... MILIK PTPI, BOLEH DISEBAR... DIUPLOAD ... ONLINE"

Automated enhanced visualization of anatomies and abnormalities

Measuring

AI-Rad Companion automatically measures relevant anatomies and abnormalities, e.g., the diameter of the thoracic aorta as per AHA guidelines.

Reporting

The AI-Rad Companion delivers the results of its analysis in a comprehensive overview (DICOM SC object). This simplifies the reporting process of the radiologist.

Lesions	Lobe	Volume [mm3]	max. Diam. 2D [mm]	max. Diam. 3D [mm]
L1	Left Upper	225,5	10,5	17,8
L2	Left Upper	100,3	10,5	17,8
L3	Right Middle	90,2	10,5	17,8
L4	Left Upper	17,2	9,3	10,5
L5	Left Upper	3,2	5,3	9,7
Tumor Burden			46	

not for diagnosis *)

Lung	LAV950 [%]		LAV950 [%]
Whole Lung	20,5	Right Upper Lobe	25,5
Left Upper Lobe	10,5	Right Middle Lobe	38,5
Left Lower Lobe	5,5	Right Lower Lobe	15,5

Heart	
Heart Volume	883.1 ml
Total Coronary Calcium Volume	70.3 mm³

Spine	Heights [mm] ant. med. post.	Average [HU]	Heights [mm] ant. med. post.	Average [HU]
T1	15 13 15	168	T7	19 18 22	126
T2	18 15 17	141	T8	15 13 21	99
T3	19 17 19	136	T9	16 15 21	109
T4	20 16 18	128	T10	21 19 22	105
T5	20 17 20	132	T11	20 20 23	111
T6	20 18 20	129	T12	23 25 25	90
Spine Category *)				

Aorta	max. Diam. [mm]		max. Diam. [mm]
1 Sin. of Vals.	41	6 Prox. Desc.	34
2 Sinot. Jnct.	40	7 Mid Desc.	30
3 Mid. Asc.	41	8 At Diaphr.	29
4 Prox. Arch	37	9 Abd. Aorta	28
5 Mid Arch	38		
Aorta Category			

Courtesy of Klinikum Nürnberg, Nuremberg, Germany
AI-Rad Companion Chest CT is not commercially available in all countries, and its future availability cannot be ensured.

# Automated enhanced visualization of anatomies and abnormalities

Measuring

AI-Rad Companion automatically detects the thoracic vertebral bodies. After detecting they will be labelled accordingly.

At three different anatomical locations, anterior, mid and posterior the height of each vertebra is measured. Findings based on height deviations between neighboring vertebrae are color-coded.
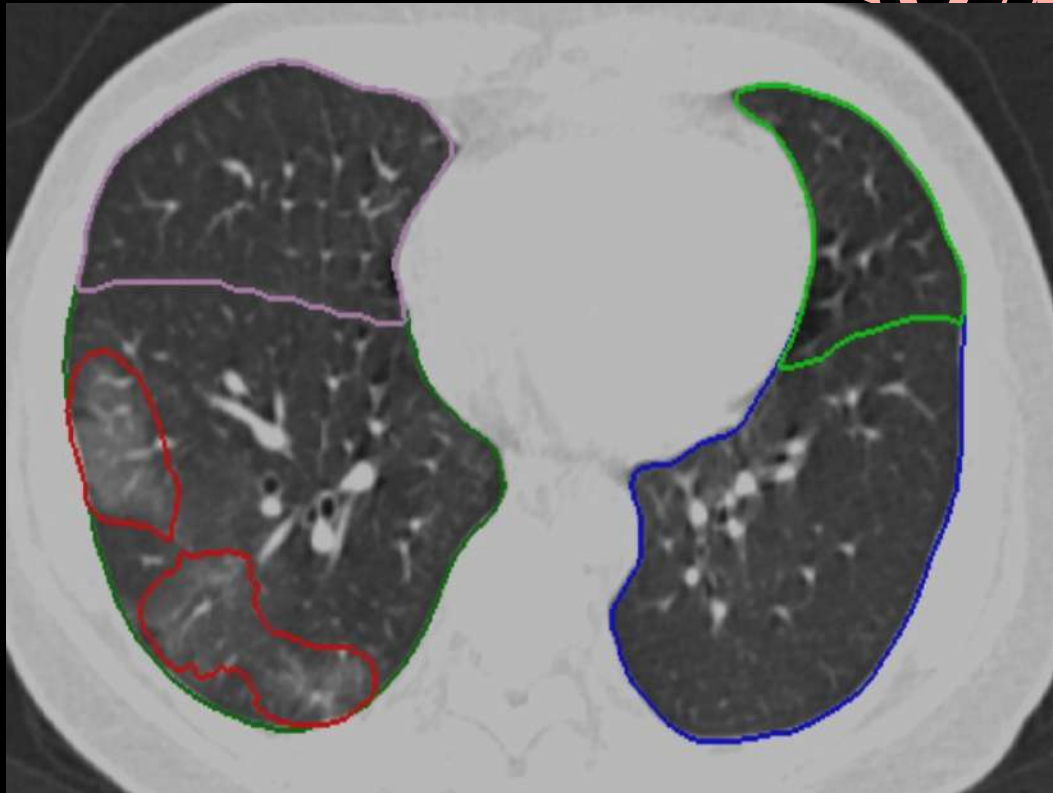
Additionally the bone density [HU] is measured and visualized.
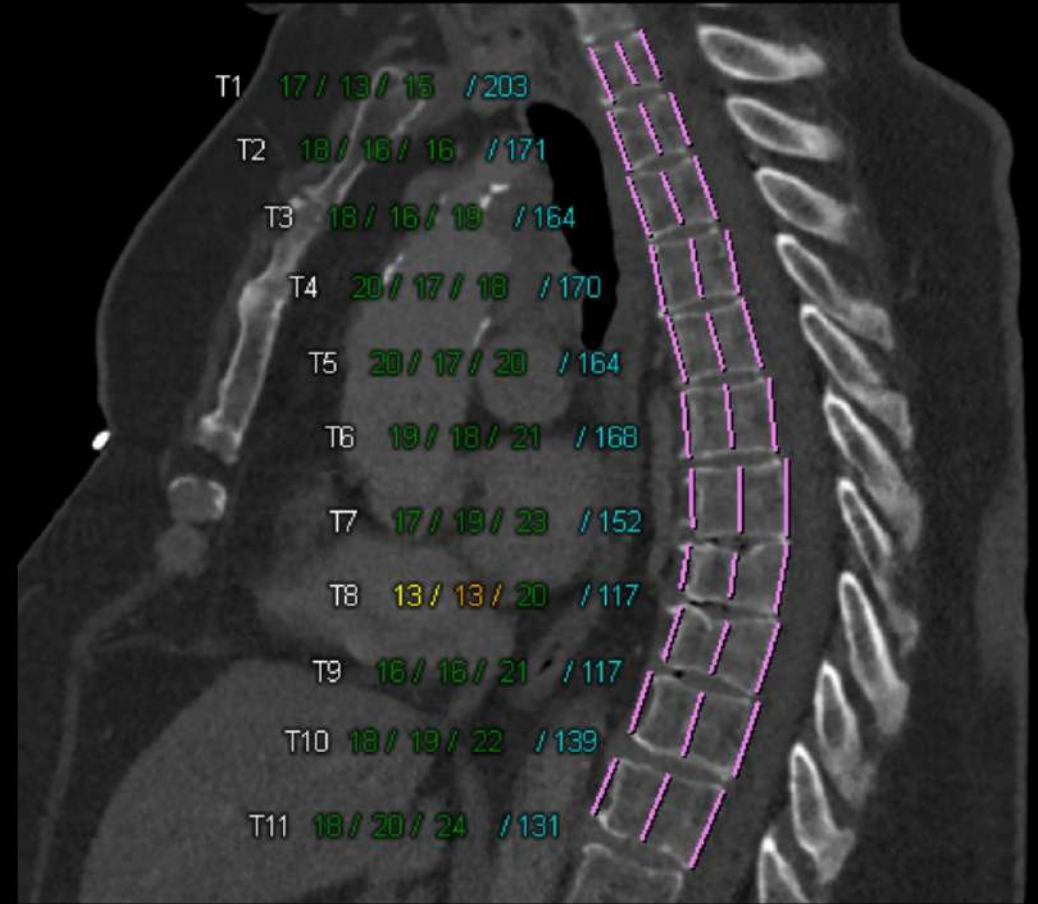
Height (mm): Anterior / Mid / Posterior   / HU

Clinical Example
Pneumonia caused by SARS-CoV-2 virus

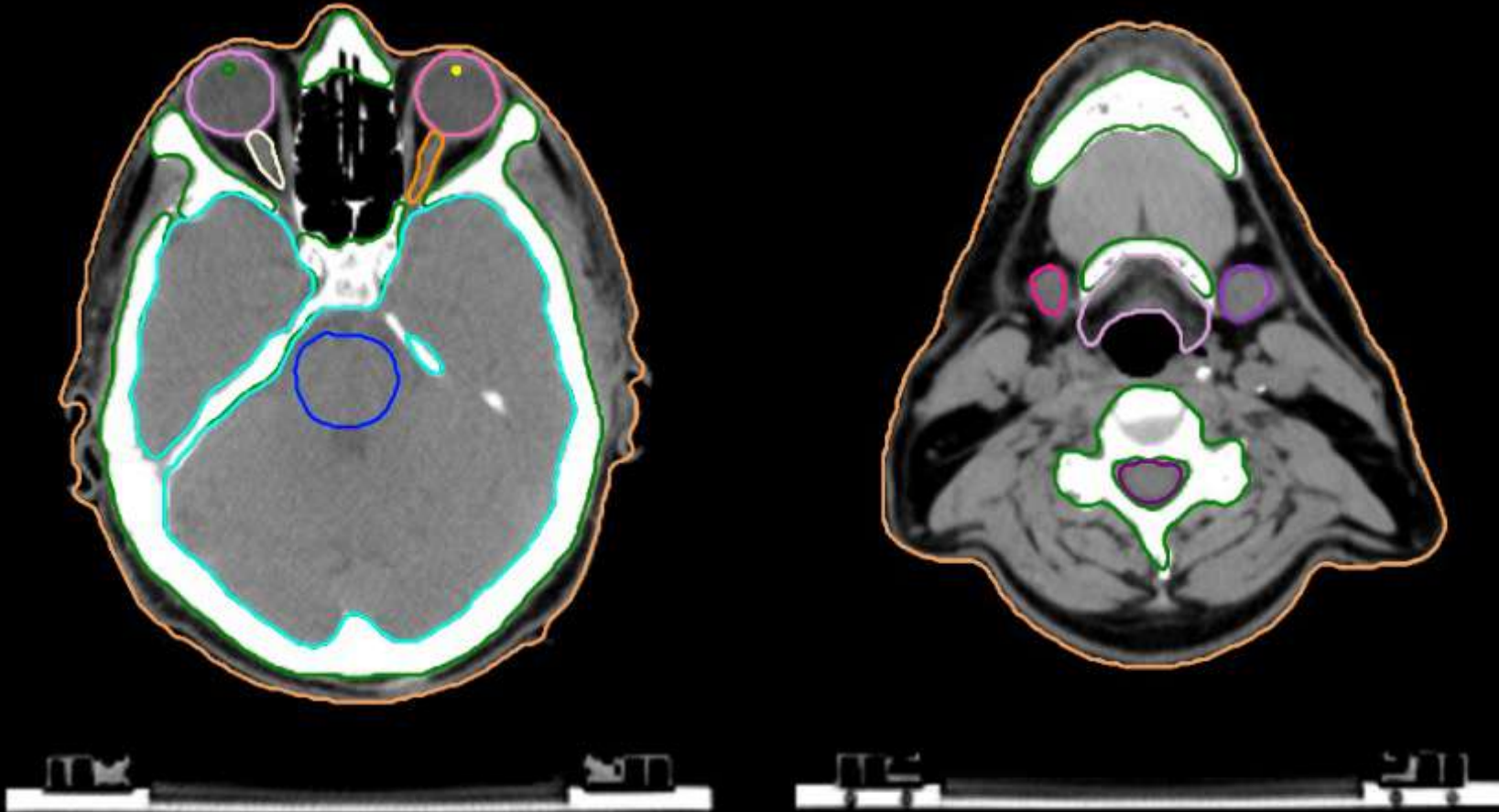For this **sub mSv** CT examination the Tin Filter technology is used.

kV: Sn130 kV, Q. ref mAs: 40 mAs, CTDIvol: 1,38 mGy DLP: 51, Eff. Dose: 0,86 mSv
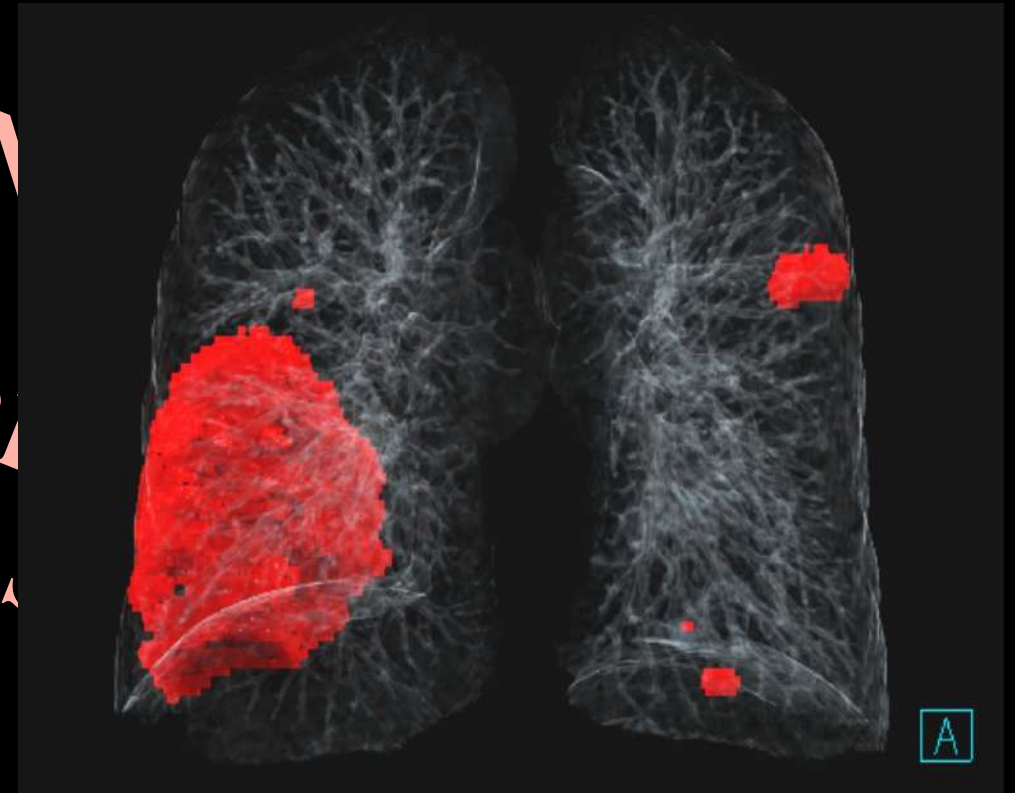
A 360° VRT overview visualizes the affected areas.

Precise contouring of the organs-at-risk in the head-neck area

Contoured organs:
- Skin
- Skeleton
- Brain
- Brainstem
- Both eyes incl. lenses
- Both optic nerves
- Spinal cord
- Larynx
- Submandibular glands
- Mandible

The depicted organs are based on the selected organ template.

Automated enhanced visualization of anatomies and abnormalities

Segmentation
AI-Rad Companion performs an automatic segmentation of 45 different brain structures, including an individual volumetric analysis.

Highlighting
AI-Rad Companion compares the different volumes to a normative database and automatically generates a highlighted deviation map based on user settings, so volumetric changes can manually be monitored.

Reporting
Automatic tissue extraction and classification in a result table with all relevant information at your fingertips.

Courtesy of CHUV, Lausanne, Switzerland, Case 2aaaa1366
AI-Rad Companion Brain MR is not commercially available in all countries, and its future availability cannot be ensured.

5 Kesimpulan

Kesimpulan

- Teknologi digital untuk mengubah data dalam jumlah besar menjadi wawasan akan mendukung diagnosis yang lebih tepat, perawatan yang ditargetkan, dan peningkatan kepuasan pasien.

- Pencitraan Cerdas untuk menghasilkan data berkualitas tinggi dengan memanfaatkan potensi penuh dari sistem.

- Operasional pelayanan radiologi yang disederhanakan untuk meningkatkan produktivitas dan mengoptimalkan pemanfaatan aset.

- Keputusan Klinis yang didukung kecerdasan buatan untuk memandu pengambilan keputusan klinis di sepanjang perjalanan pasien.