

# CORFLOW

Empowered AI or Computer Aided Diagnosis

- ▶ Company & Strategy
- ▶ Market Potential
- ▶ Corflow System Features
- ▶ Competitors
- ▶ Goals

Kamil Sterna - CEO Autosymed SRL



# Company & Strategy



# AutoSyMed SRL - quick facts

- ▶ **Founded in 2021**
- ▶ **Current EEA Norway Grants in CorFlow Projects:**
  - ▶ Corflow for Computer Aided Diagnosis
  - ▶ API to medical devices and systems
- ▶ **Core Team**
  - ▶ AI architect, Big Data Developer, AI Developers, Senior Developers
  - ▶ Cardiologists, Cardiosurgeons, Radiologist, Medical Students
- ▶ Successfully applying own IT Cardiology solutions in +50 hospitals

14  
Specialists

+163 Years  
Experience

1  
Team



# Strategy: Enable AI-based Medical Image Recognition in Healthcare

Offering assistance in various areas of the medical practice

Target: Leveraging costs and increasing profitability

## Timely Identification

- Detect the early symptoms with high certainty
- Improve KPIs (diagnose delivery, number of patients, offload doctors)
- Use advanced pattern recognition



## Precise Diagnosis

- Minimize false positives
- Reduce number of excessive procedures and expensive therapies
- Reach significant level of precision



## Automated Treatment

- Deliver precise treatment
- Use heuristics to propose therapy
- Automate repetitive work and documentations



# Market Potential



# Market Potential

- ▶ 17,9 M People die of cardiovascular diseases annually, 32% of all global deaths <sup>1</sup>
- ▶ ESC reported increase from 684 000 to 2 238 000 invasive coronary angiographies (from 1250 to 3930 per million inhabitants) in 12 years (320% increase)<sup>2</sup>
- ▶ More than 10 M invasive coronary angiographies are performed each year globally, 1 M of which in USA <sup>3</sup>
- ▶ Coronary surgeries are on the list of high growth procedures in Europe <sup>4</sup>

1. <https://www.who.int/health-topics/cardiovascular-diseases>

2. <https://pubmed.ncbi.nlm.nih.gov/17453137/>

3. <https://www.ncbi.nlm.nih.gov/books/NBK531461/>

4. [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Surgical\\_operations\\_and\\_procedures\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Surgical_operations_and_procedures_statistics)

	Transluminal coronary angioplasty	
	2010	2020
Belgium (*)	230.7	256.9
Bulgaria	:	280.0
Czechia	208.6	196.3
Denmark (*)	185.8	176.7
Germany	342.0	384.4
Estonia (*)	183.3	208.0
Ireland (*)	108.7	150.2
Greece	:	:
Spain (*)	113.5	114.0
France	198.7	271.7
Croatia (*)	183.3	462.2
Italy	199.2	195.9
Cyprus (*)	11.8	154.8
Latvia	:	329.2
Lithuania	124.2	264.1
Luxembourg	176.7	102.5
Hungary	168.3	210.8
Malta (*)	202.1	187.9
Netherlands (*)	241.1	229.1
Austria	240.6	306.1
Poland	87.8	212.7
Portugal (*)	109.1	114.0
Romania	56.5	97.4
Slovenia (*)	159.8	201.1
Slovakia (*)	:	:
Finland	150.0	220.6
Sweden	185.4	180.3
Iceland (*)	201.9	223.8
Liechtenstein (*)	0.0	0.0
Norway (*)	212.1	199.6
Switzerland	:	305.2
North Macedonia (*)	130.4	171.5
Serbia	:	212.0
Turkey	:	239.9

# Market Potential

## Global Angiography Devices Market

### Market Drivers

- Rise in prevalence of cardiovascular diseases
- Technological advancements

### By Product

- Angiography Systems Segment

Dominant market share in 2022



- Angiography Systems
- Catheters
- Guidewires
- Balloons
- Contrast Media
- Vascular Closure Devices
- Angiography Accessories

### By Types of Angiography

- Coronary Angiography Segment

Dominant market share in 2022

US\$ 12.4 Bn



In 2022 (A)

Market Revenue

CAGR (2023-2031)  
6.7%

### Opportunities

- Rise in demand for angiography devices in emerging market
- Increase in demand for minimally invasive surgeries techniques

### Key Players



### By End-user

- Hospitals & Surgical Centers
- Diagnostic Centers
- Ambulatory Surgical Centers



### By Region

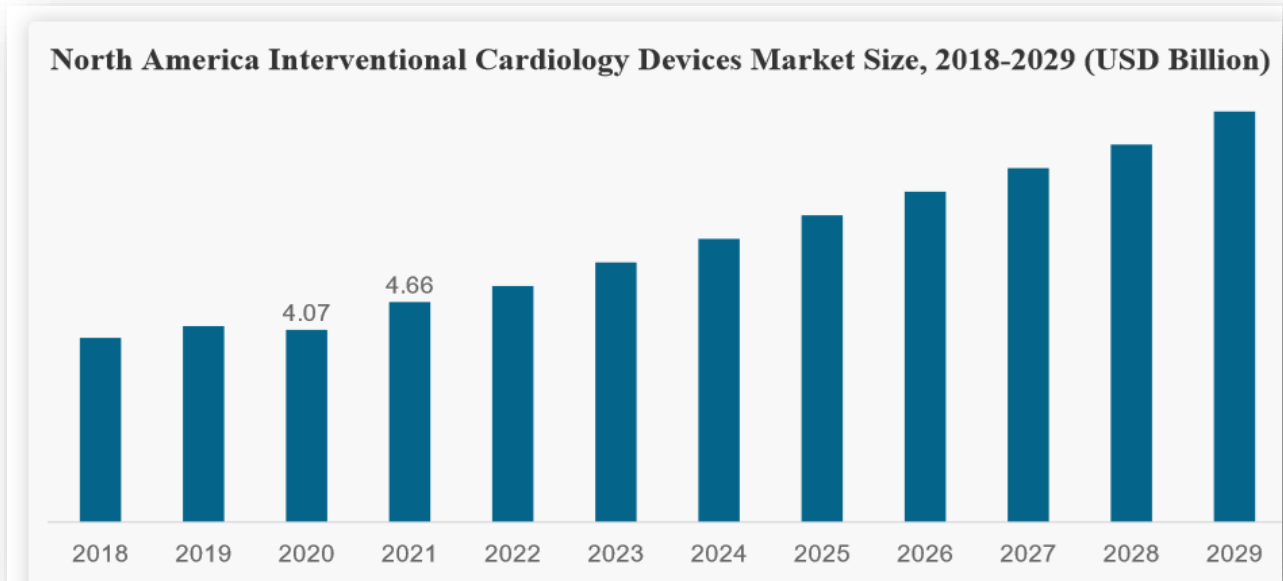
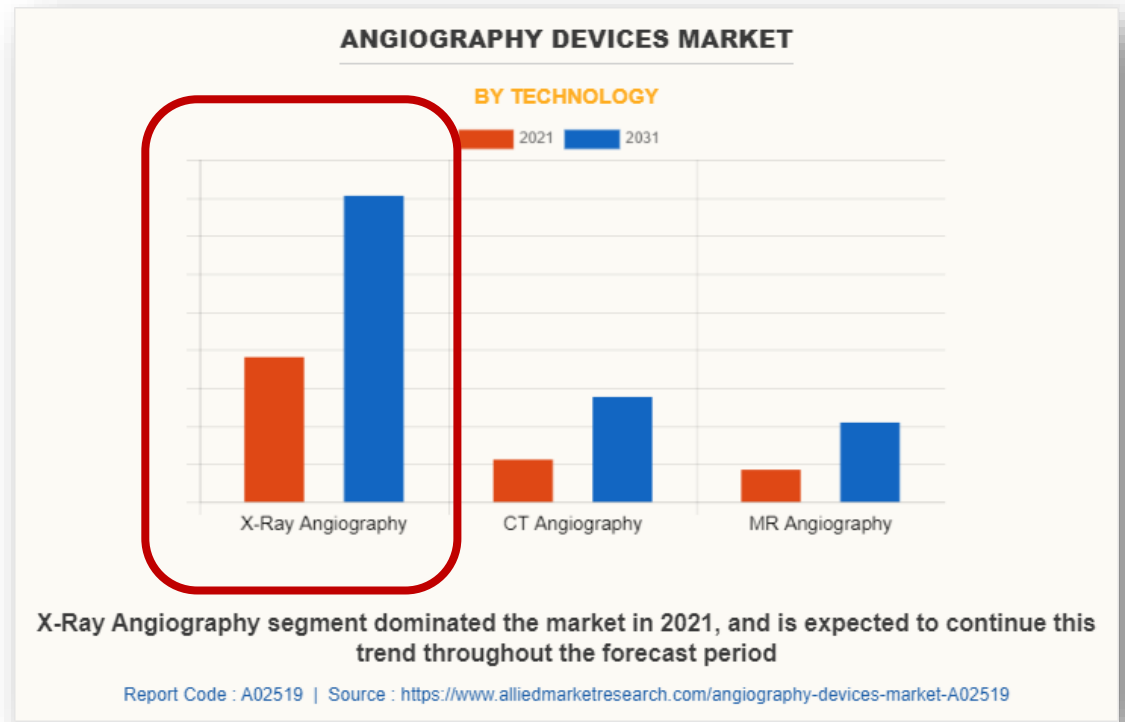
- North America
  - Largest market share in 2022
- Asia Pacific
  - Relatively high CAGR of XX% from 2023 to 2031



# Market Potential

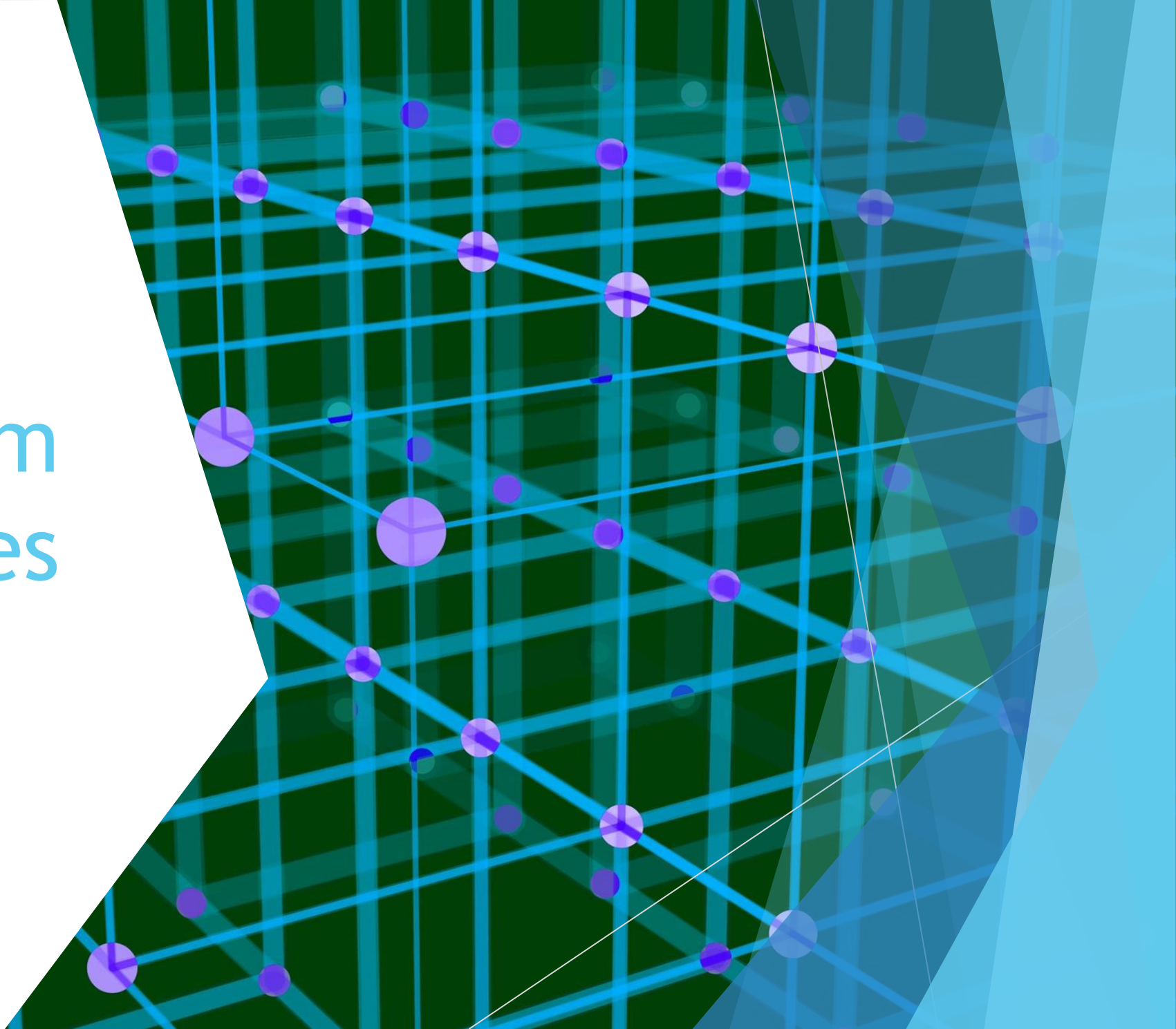
- ▶ Average CAGR until 2031 from 6 market researches is 6,292
- ▶ Average global growth in 2030 is 22,12 Billion USD
- ▶ 130 million patients are expected to have CVD by 2035 in US alone
- ▶ Europe dominated the market in 2022

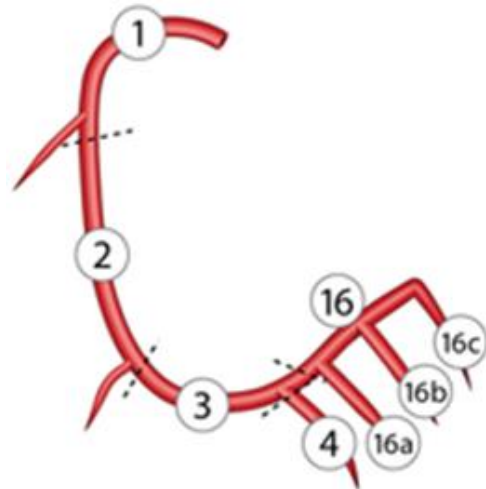
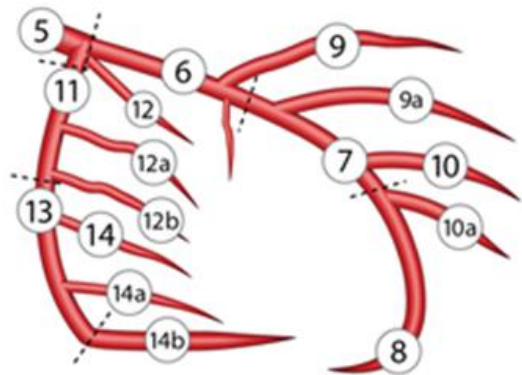
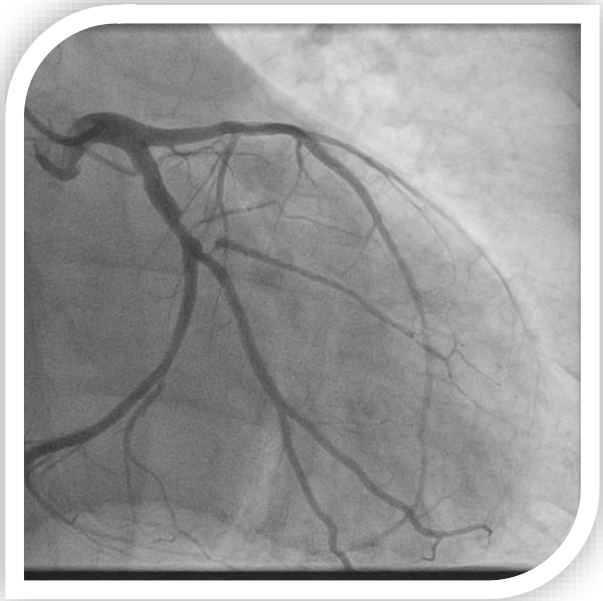
- ▶ <https://www.alliedmarketresearch.com/Angiography-devices-market>
- ▶ <https://www.transparencymarketresearch.com/angiography-devices-market.html>
- ▶ <https://www.fortunebusinessinsights.com/interventional-cardiology-devices-market-107414>
- ▶ <https://www.grandviewresearch.com/industry-analysis/angiography-device-market>
- ▶ <https://www.alliedmarketresearch.com/Angiography-devices-market>
- ▶ <https://www.marketdataforecast.com/market-reports/angiography-devices-market>





# System Features





# Syntax Score Calculation

*The SYNTAX score is an industry standard grading system that evaluates the complexity and prognosis of patients undergoing percutaneous coronary intervention (PCI).*



*Parameters per each lesion:*

- 1. Number of lesions*
- 2. Location of lesions*
- 3. Bifurcation lesions*
- 4. Trifurcation lesions*
- 5. Ostial lesions*
- 6. Severe tortuosity*
- 7. Heavy calcification*
- 8. Thrombus*
- 9. Total occlusion*

# SyntaxScore with Corflow

## Medical Condition

Multivesel coronary artery disease

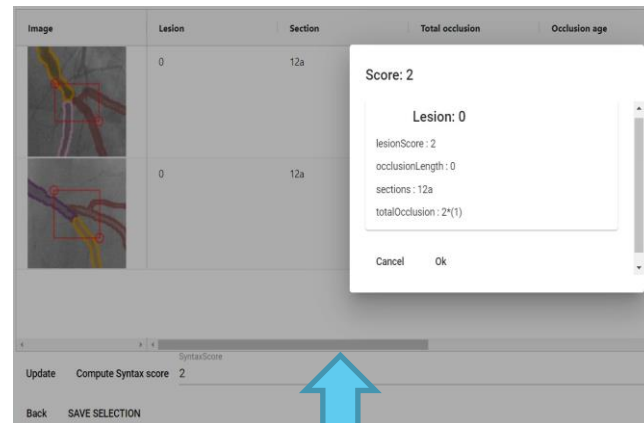
Left main coronary involvement



## Heart Team



## Corflow



AI based CAD  
image recognition



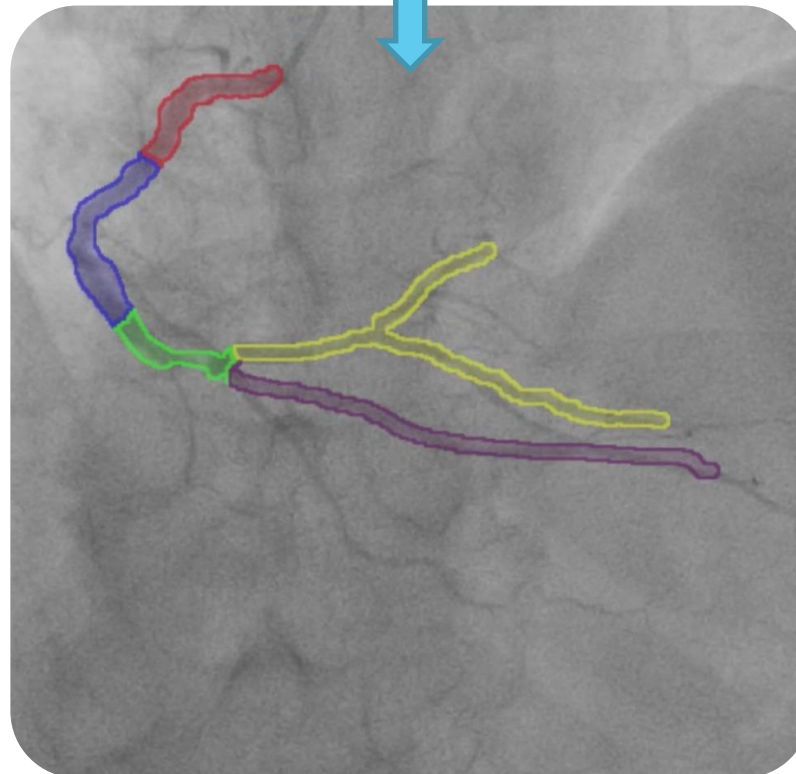
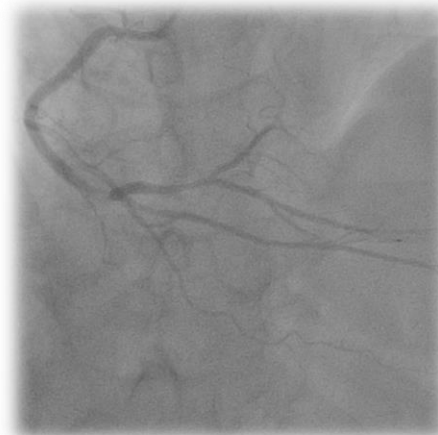
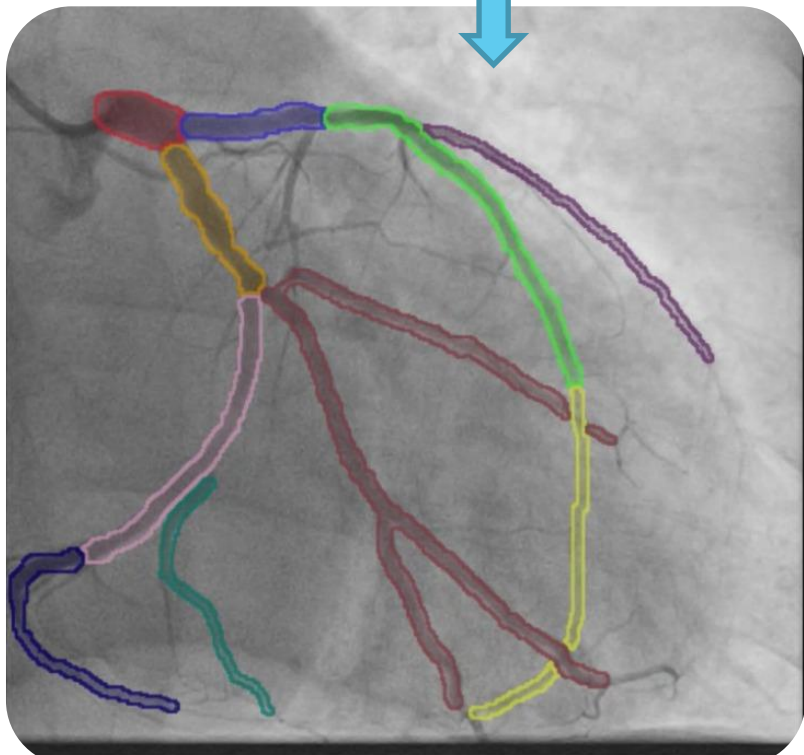
DICOM Image



## Advantages:

- SyntaxScore calculated automatically
- Vessel lumen narrowing detection
- Segment definition
- Adapts with FFR/iFR & IVUS/OCT
- Iterative process with review workflow

# Automatic Heart Vessel Segmentation



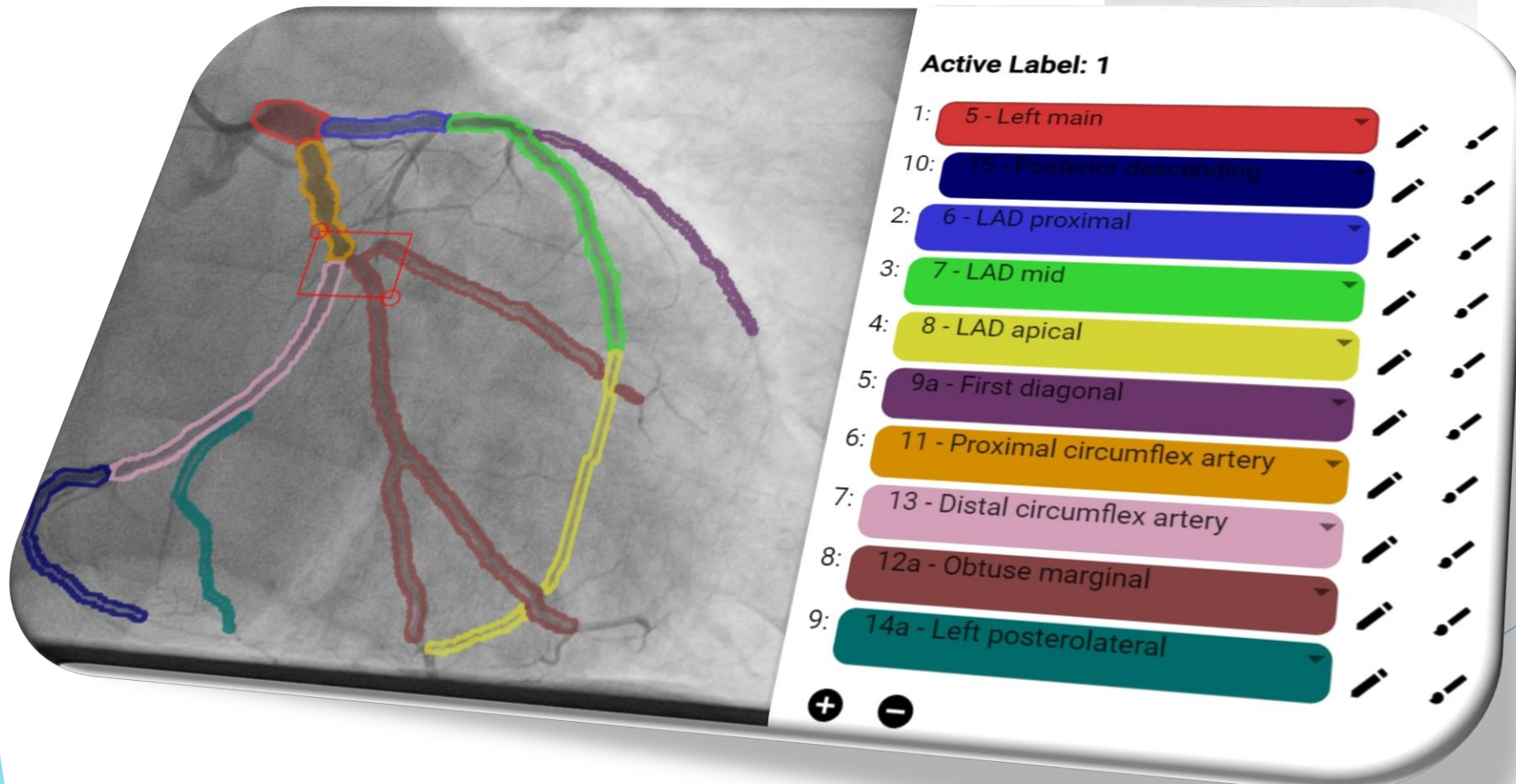
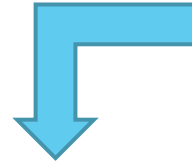
Automatic:

- Identification
- Segmentation
- Classification

# Automatic Heart Vessel Segmentation

## Automatic:

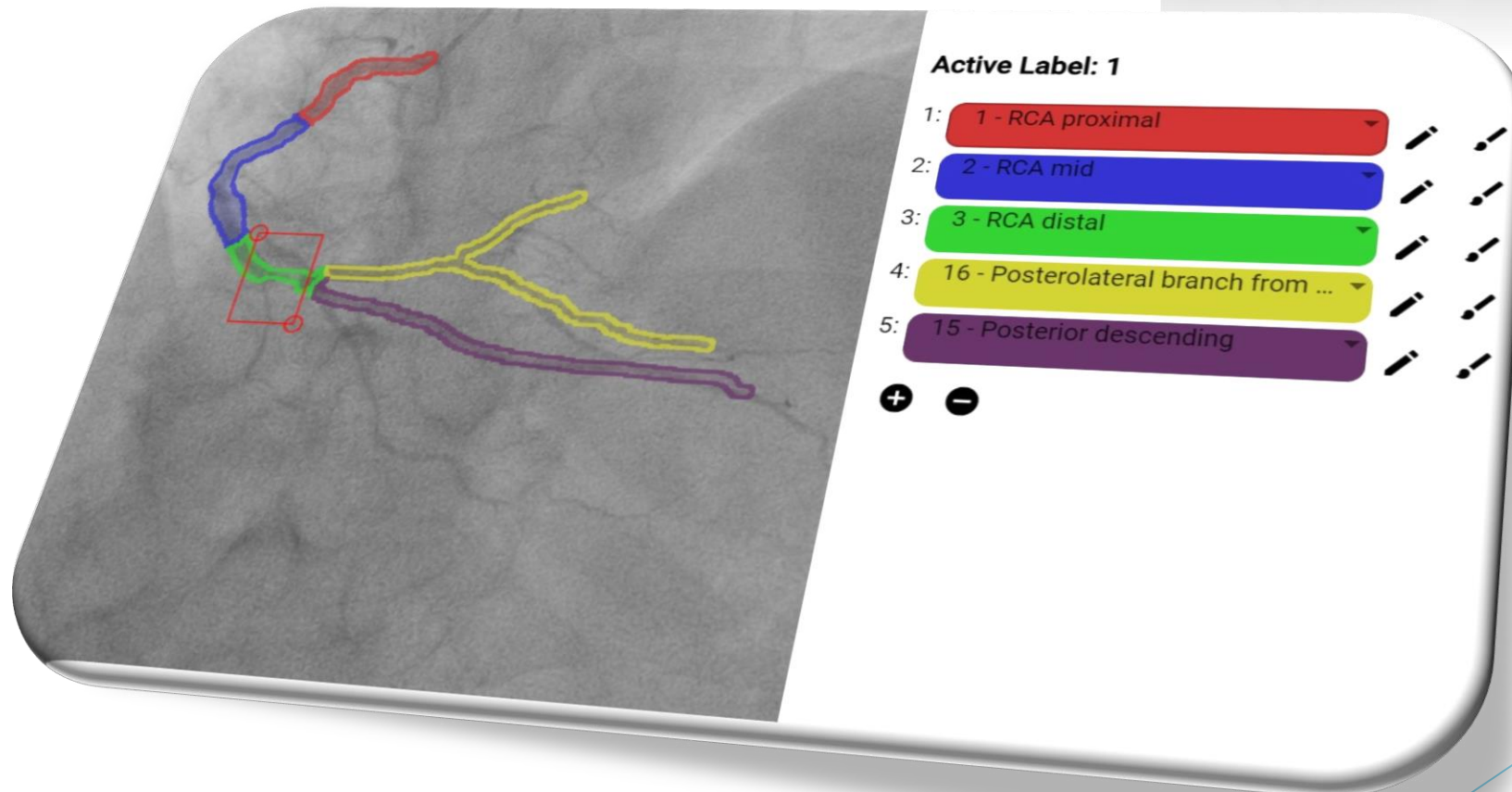
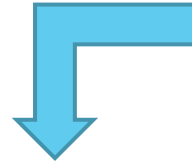
- Identification
- Segmentation
- Classification



# Automatic Heart Vessel Segmentation

## Automatic:

- Identification
- Segmentation
- Classification



# Syntax Score calculation

	2	7
	2	7
	3	11
	0	11
	3	11

**Score: 19**

**Lesion: 0 - score: 5.0**

Segments: 11  
Segment score:  $2 \times (1.5)$   
Bifurcation type: 2  
Bifurcation angle: 0

**Lesion: 1 - score: 2**

Segments: 3  
Segment score:  $2 \times (1)$

**Lesion: 2 - score: 7.0**

Segments: 7  
Segment score:  $2 \times (2.5)$   
Bifurcation type: 1  
Bifurcation angle: 1

**Lesion: 3 - score: 5.0**

Segments: 11  
Segment score:  $2 \times (1.5)$   
Severe tortuosity: 2

Diffuse disease:  $0 \times 1$

You can edit any cell by double clicking on it

Update    Compute SyntaxScore    19     Manual and computed SyntaxScore is different

# 3D Reconstruction

Undo

Active Label: 1

- 1: 5 - Left main
- 10: 15 - Posterior descending
- 2: 6 - LAD proximal
- 3: 7 - LAD mid
- 4: 8 - LAD apical
- 5: 9a - First diagonal
- 6: 11 - Proximal circumflex artery
- 7: 13 - Distal circumflex artery
- 8: 12a - Obtuse marginal
- 9: 14a - Left posterolateral

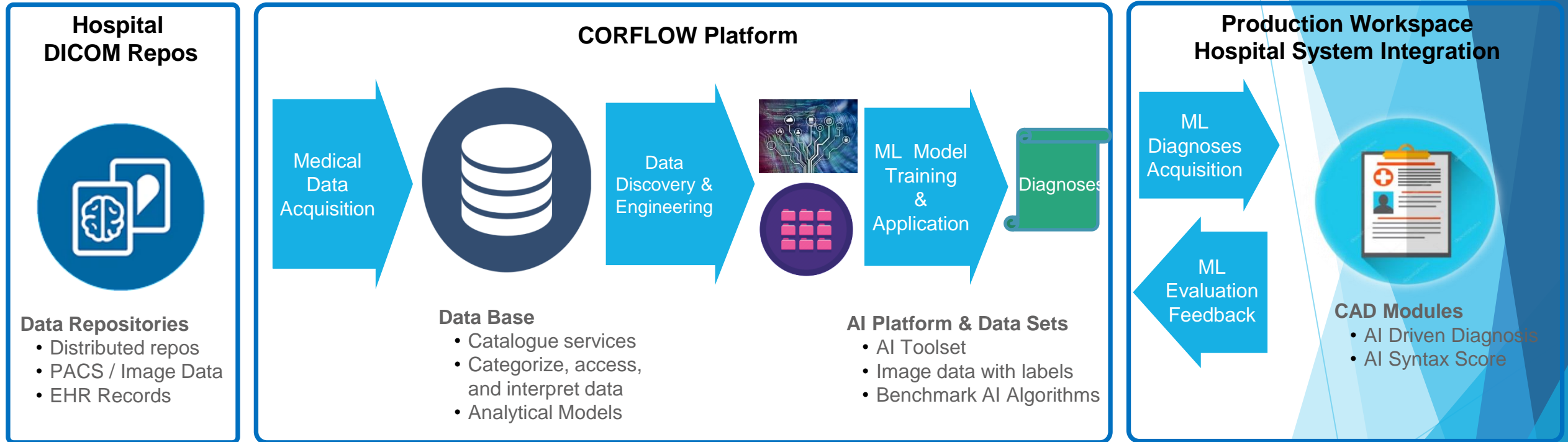
+ -

8: 15 - Posterior descending

8: 12a - Obtuse marginal



# Corflow Architectural Model

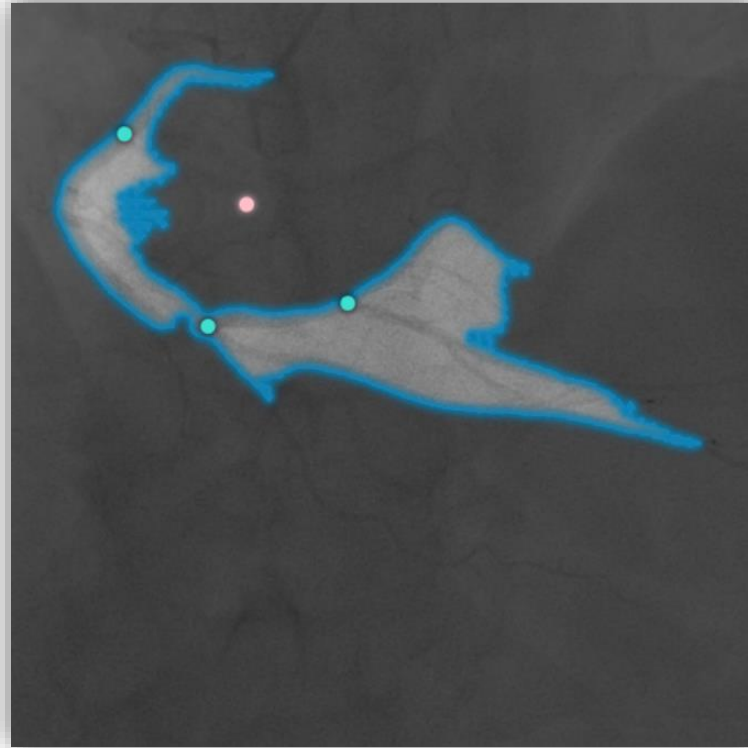
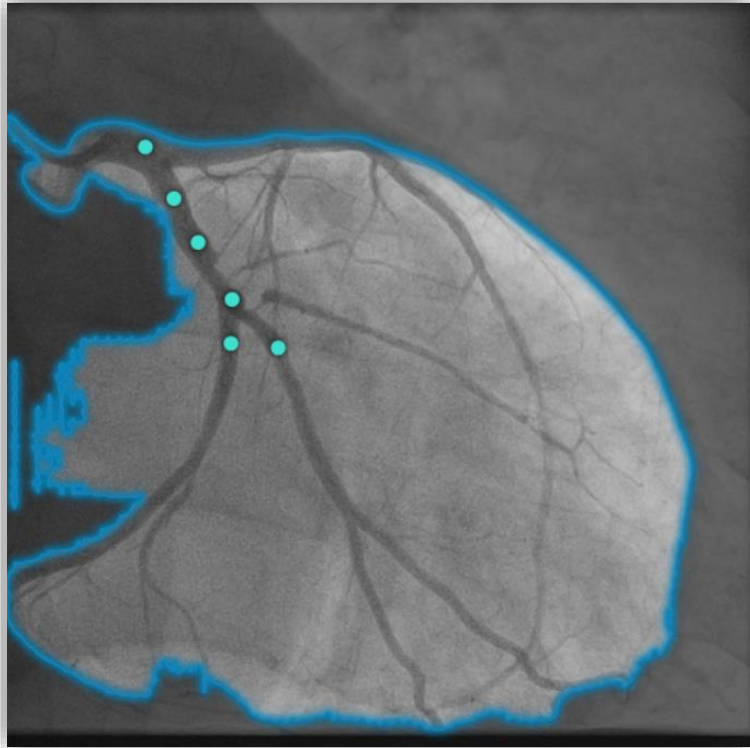


**Cloud-based with flexible architecture for hospital integration**  
**Sharing Data, ML Models efficiently between organizations**  
**Solid framework to enhance for other use-cases**

# Competitors

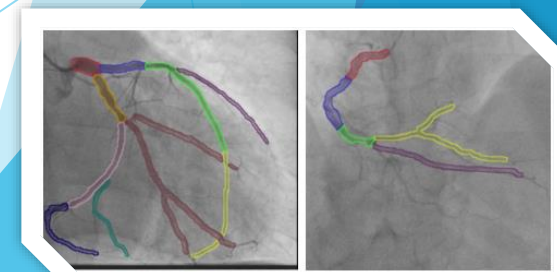


# Meta AI - Segment Anything - Facebook

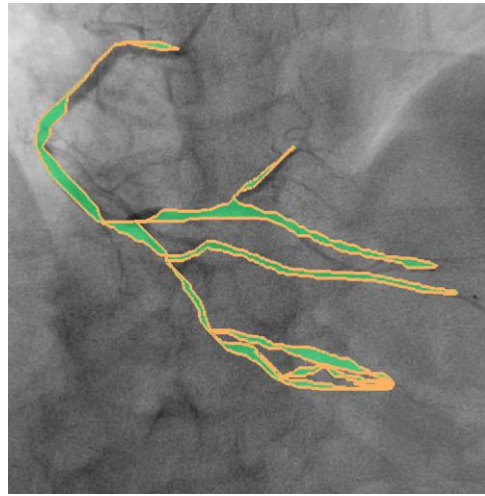
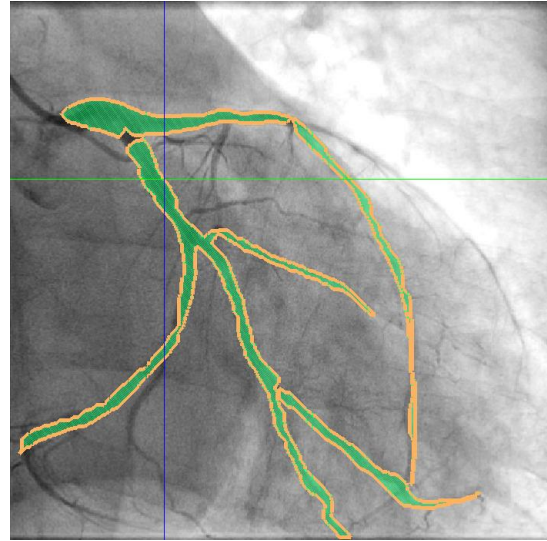
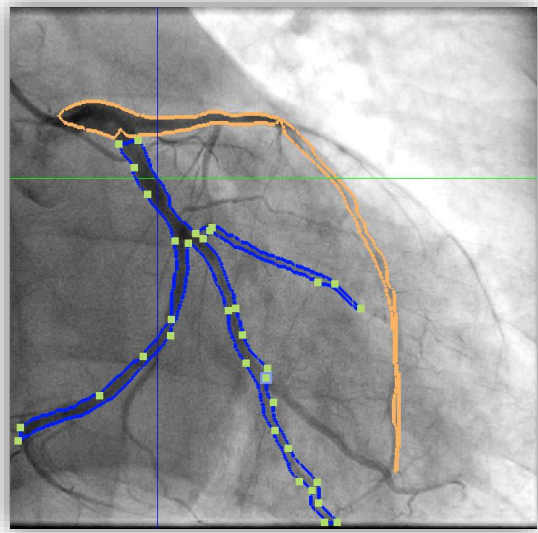


- ▶ **Meta AI - online tool**
- ▶ Manual marking necessary  
<https://segment-anything.com/demo>

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# TurtleSeg - Medical Image Analysis

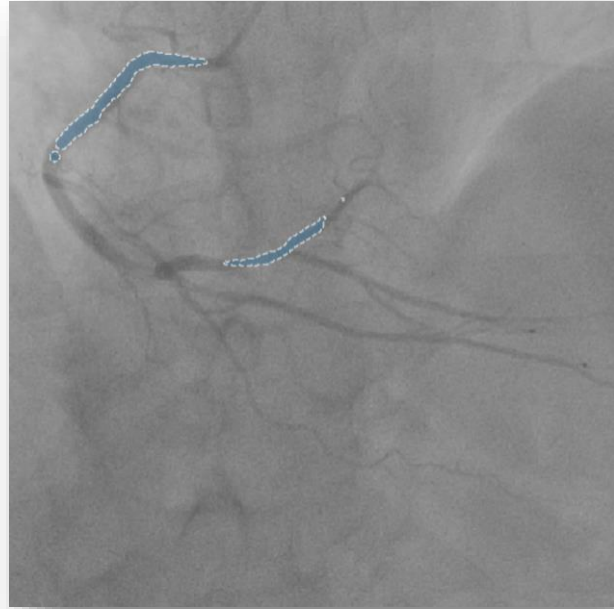
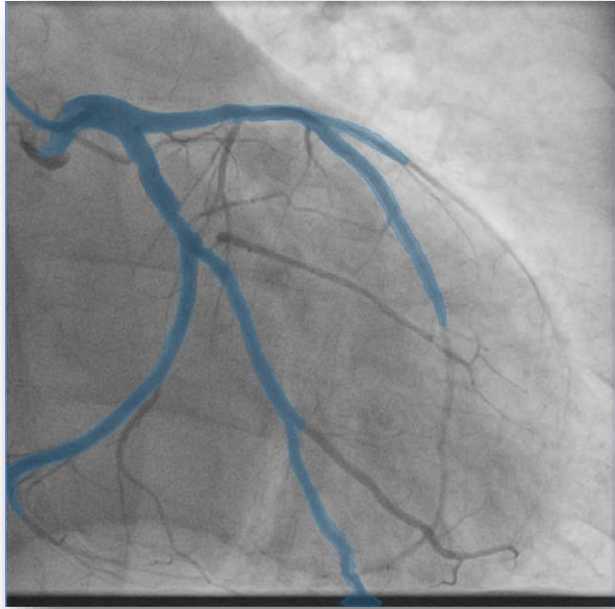


- ▶ TurtleSeg
- ▶ Manual marking necessary  
<https://www.medicalimageanalysis.com/software/turtleseg>

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# Hasty.ai - Medical Image Analysis

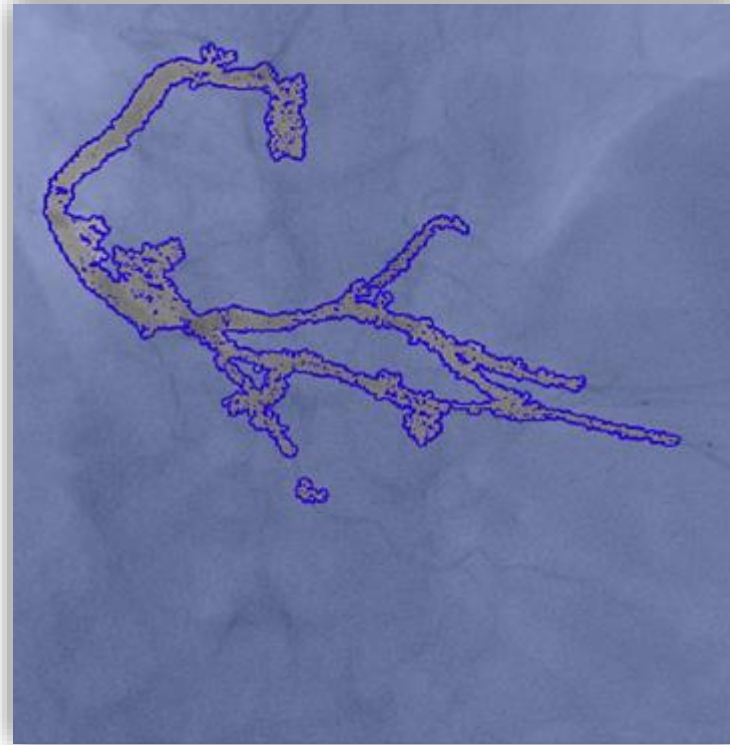
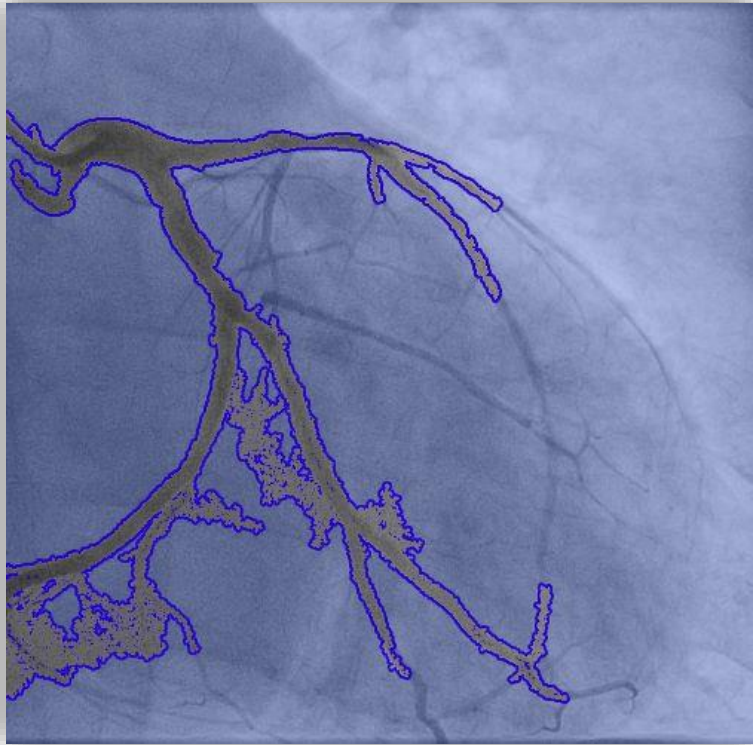


- ▶ **Hasty.ai**
- ▶ 100 segmentations uploaded (27 required)  
<https://www.hasty.ai>

CORFLOW

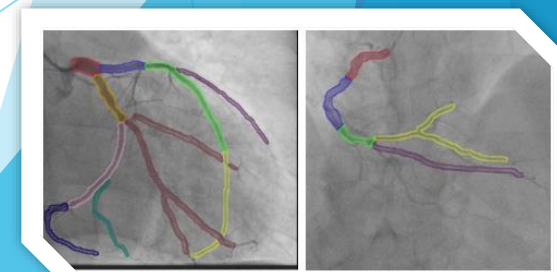


# Photopea - Online Photo Editor

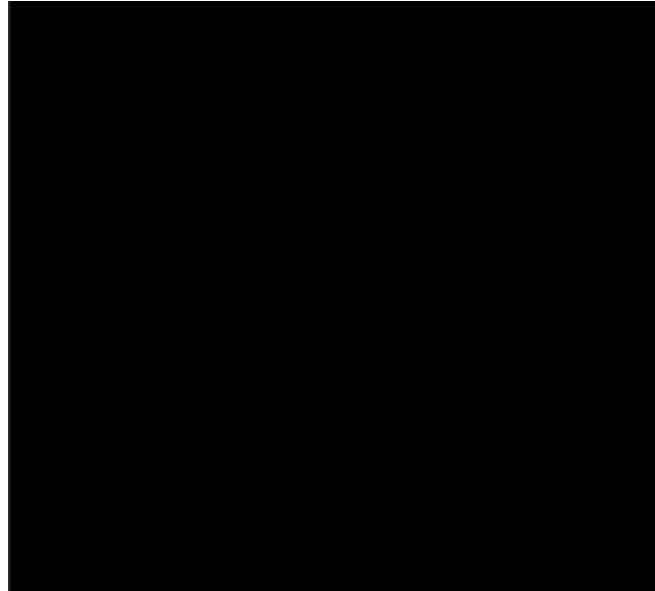
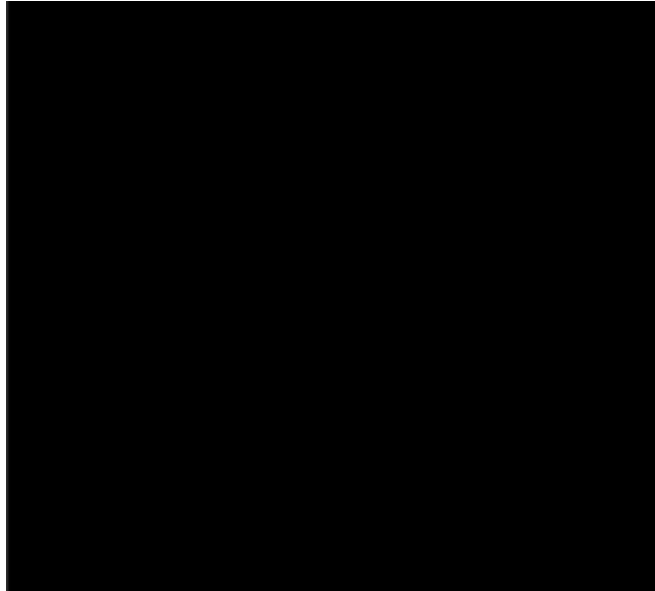


- ▶ **Photopea**
- ▶ Manual selection of starting points to expand to neighbouring pixels  
<https://www.photopea.com/>

CORFLOW



# Amazon Segmentation Algorithms

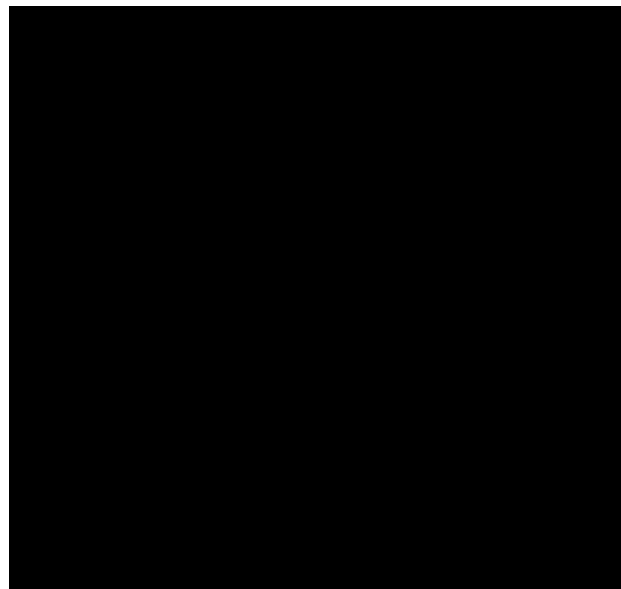
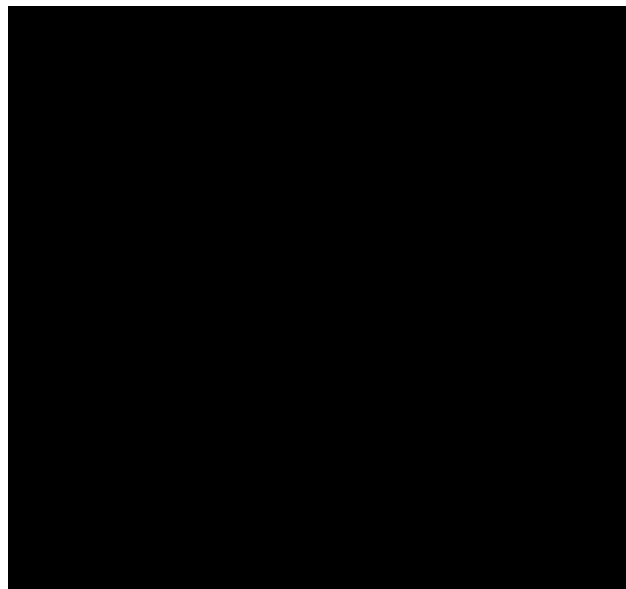


- ▶ **Amazon Sagemaker**
  - ▶ Pretrained models similar to PyTorch, TensorFlow, HuggingFace and Kaggle Models
  - ▶ Pre-training with 370 segmentations – no result
- <https://docs.aws.amazon.com/sagemaker/latest/dg/semantic-segmentation.html>

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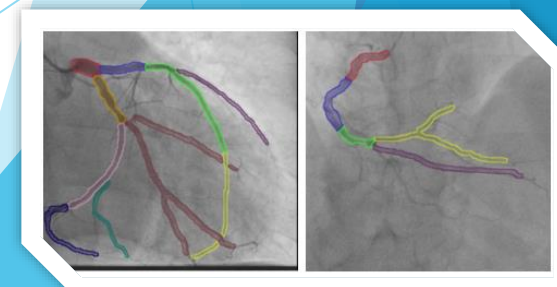
# NVIDIA NGC



- ▶ **NVIDIA Image Segmentation**
- ▶ No-pretrained model – packaged into Docker images.

<https://catalog.ngc.nvidia.com/orgs/nvidia/collections/imagesegmentation>

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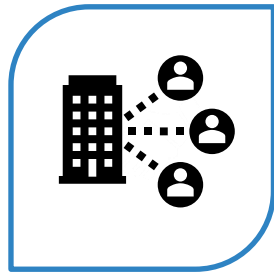




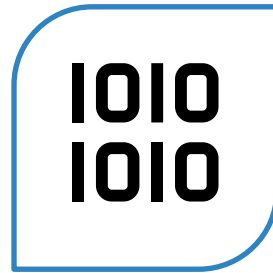
# Goals



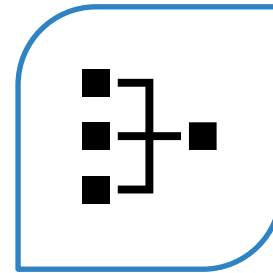
# Goals



R&D  
COOPERATION



INTEGRATION  
WITH HOSPITAL  
SYSTEMS



OTHER  
APPLICATIONS



HOSPITAL  
CUSTOMERS



AUTOSYMED

# Thank You!

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