

# Artificial Intelligence in Cardiac Diagnosis

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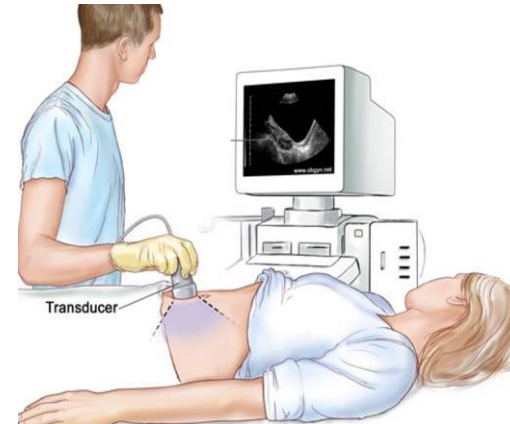
*Dr Robert B. Labs*

# Clinical Echocardiography

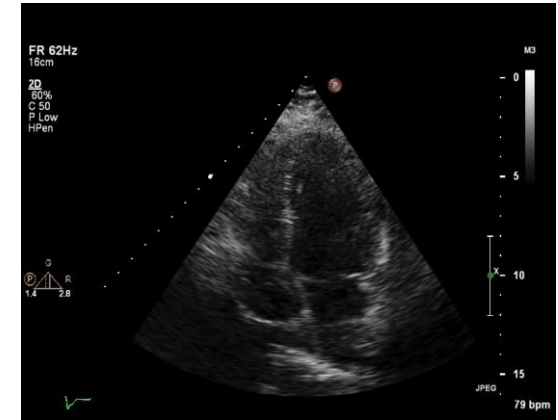
Echocardiography is ubiquitous in clinical lab due to its many advantages, but its image quality is paramount to reliable quantifications and diagnostic accuracy.

## Problems Solved:

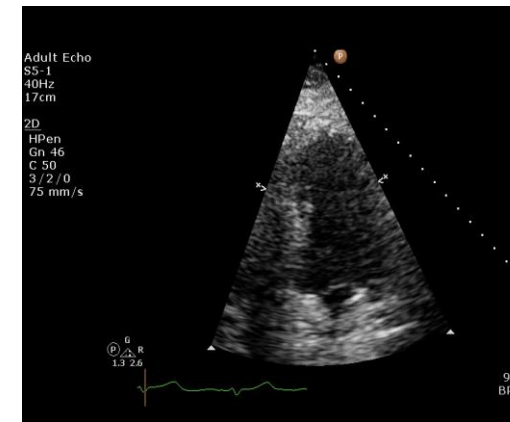
- Objective 2D/3D Quality Scores
- Heterogeneous Complexity
- Experience Dependent Acquisition
- Incoherent Quality Assessment
- Poor Response & Misdiagnosis



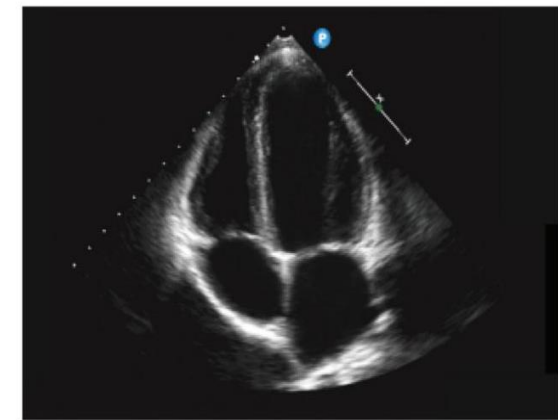
Average Resolution



Low Resolution Image



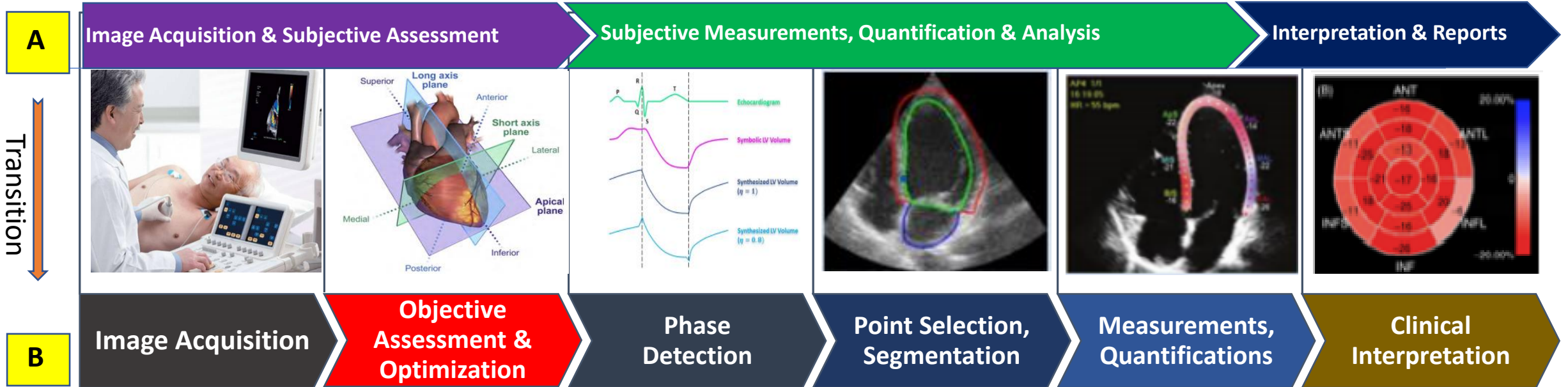
High Resolution Image



# The New Automated Unified Cardiac Assessment Workflow

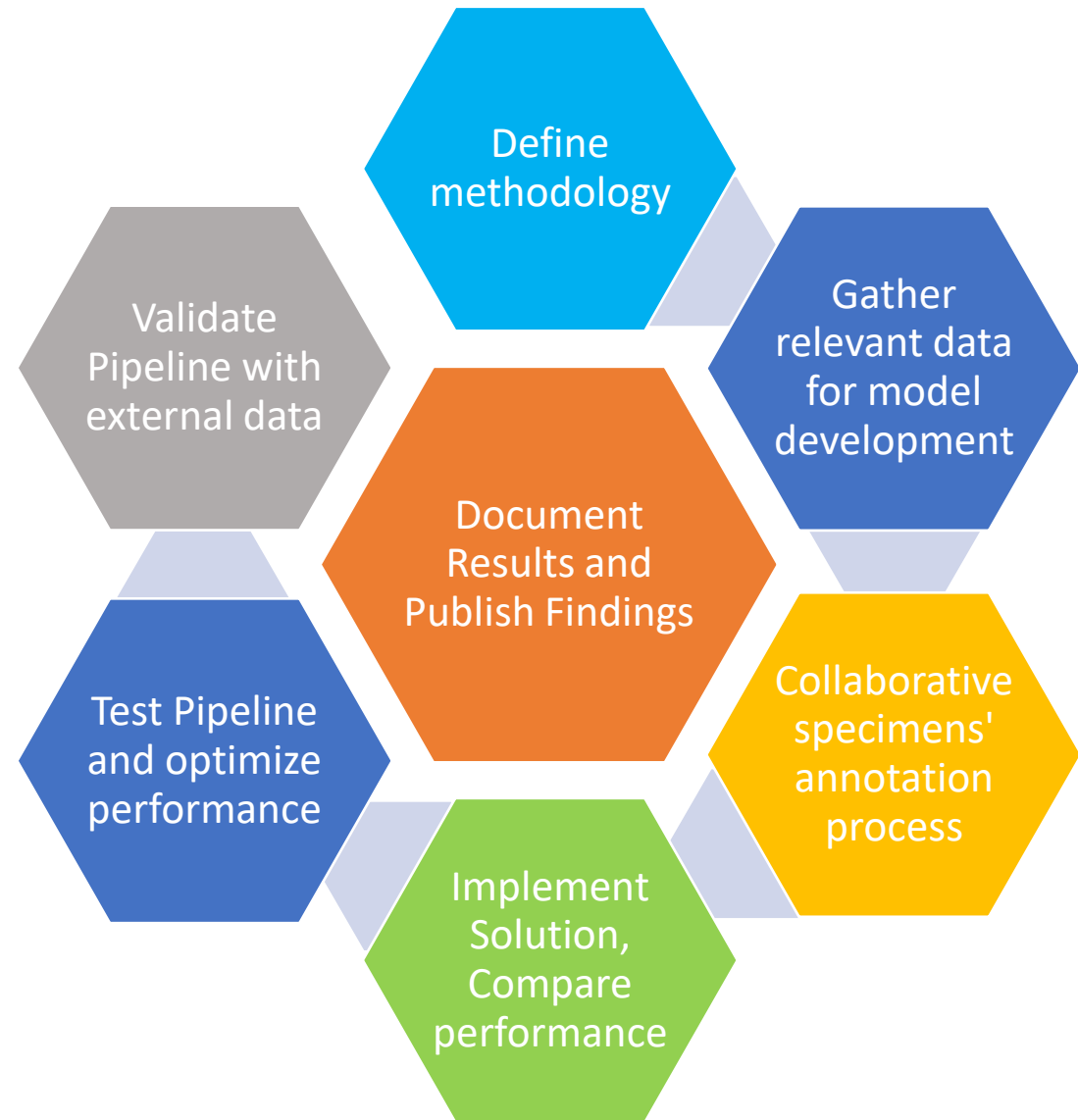
- Define quality indicators for 2D echo image
- Breakdown the quality elements in image
- Transition from Subjective to Objective Sys

- Provide objective assessment scores
- Provide real-time optimization pipeline
- Validate pipeline using Clinical Cohort



## Achieved Objectives

- Quantify the anatomical structure of echocardiograms in real-time and automatically identify the view types, within the selection of 14 apical views
- Characterize and identify the pathological element within a given 2D/3D echocardiographic image
- Quantify the pathological element using objective indicators and compared with experts scores



## Research Outcomes

- Model were validated against known models: MobileNetV2, ResNet50 and VGG16 achieved 92.52%, 92.62% and 89.25% respectively.
- The derived lightweight model (**CardioNetV1**) slightly outperformed VGG16 while lagging behind MobileNetV2 and ResNet50 in terms of accuracy but leads the chosen state-of-the-art models on 2D echo cine loop video in terms of inference speed of 6.44ms with an overall accuracy of 91.25% on 14 anatomical views.

## Research Impacts

- Clinical Antenatal Investigations
- Medical emergencies
- Point of care scenarios
- Diagnosis of Infarction
- Cardiac prognosis & risk factor treatment
- Obstetrician treatment
- Accelerate learning curve for novice users

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