



# CardioAI

Automated Medical Diagnosis from MRI and Patient Data using Deep Learning

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GO   
DATA  
DRIVEN

Ivo Everts  
AI specialist

# OUR STORY

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Making clients win  
by using data



42 data specialists:

- 50% data engineer
- 50% data scientist



Part of Xebia Group  
Headquartered in Amsterdam

Xebia

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Xpirit

binx.io

XCCelerated

StackState

instruqt

# CLIENTS

E-commerce	Travel & Leisure	Financial Services	Utilities	Products	Media
					 nederlandse publieke omroep
					
					
					

# Technical Partnering



Google Cloud



University Medical Center Groningen

SIEMENS  
Healthineers

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# Technical Partnering



Google Cloud



University Medical Center Groningen

SIEMENS  
Healthineers

*Let's add Healthcare to our list of clients-by-industry!*

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# Overview

>> The CardioAI tool

>> The future of AI in healthcare

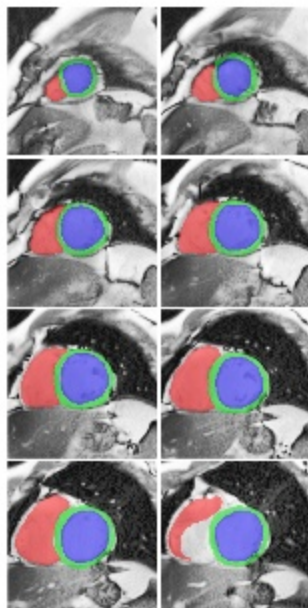


# CardioAI

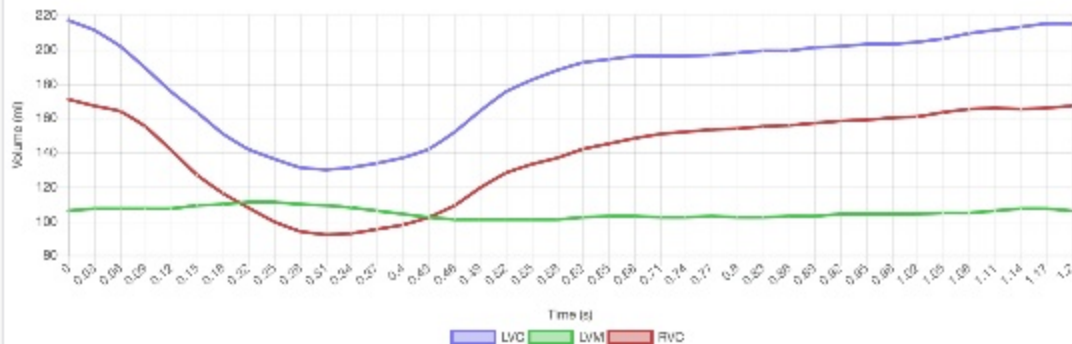
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# CardioAI

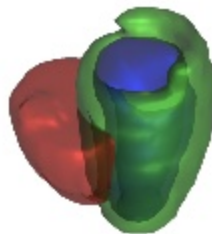
Slices



Volumes over Time



Volumes



Features

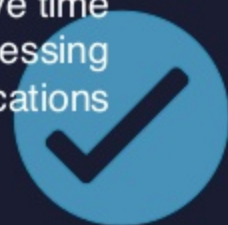
	Left	Right
End Diastolic Volume	225 mL (100)	199 mL (76)
End Systolic Volume	140 mL (53)	81 mL (31)
Ejection Fraction	57.8 %	45.8 %
Stroke Volume	85 mL (35)	77 mL (33)
Cardiac Output	4.27 L (1.94)	3.87 L (1.76)
Myocardial Mass	102 g (46)	

(\* Indexed with Body Surface Area)

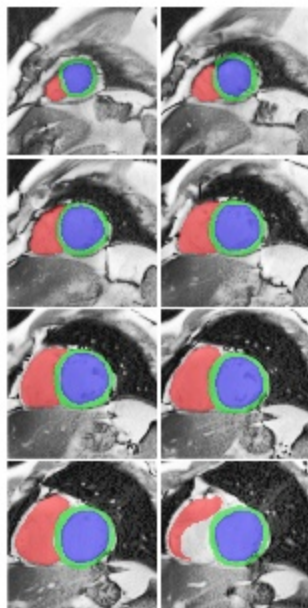


# CardioAI

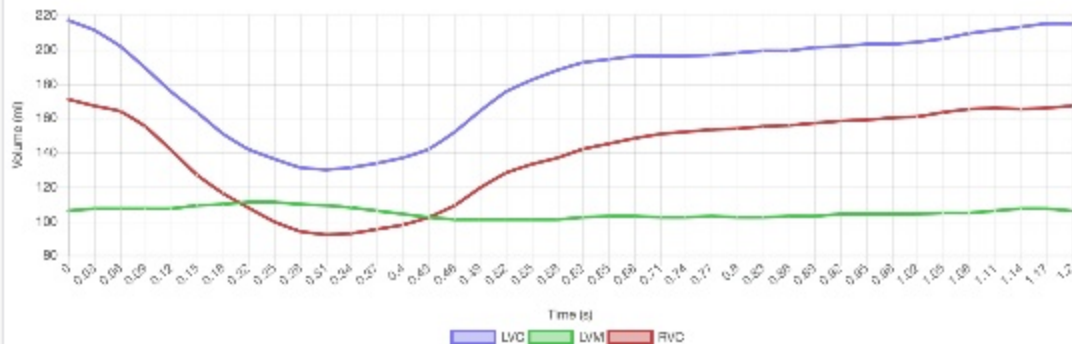
Offering this as a service could:  
Save time  
Enable large scale processing  
Unleash new research and applications



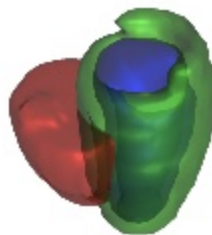
Slices



Volumes over Time



Volumes



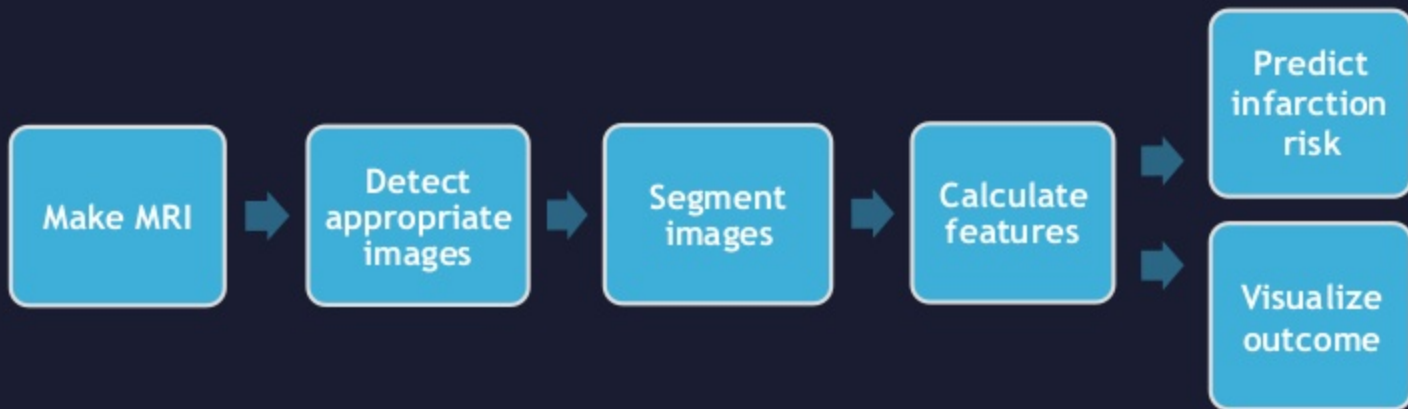
Features

	Left	Right
End Diastolic Volume	225 mL (100%)	189 mL (76%)
End Systolic Volume	140 mL (35%)	81 mL (41%)
Ejection Fraction	57.8%	45.8%
Stroke Volume	85 mL (35%)	77 mL (35%)
Cardiac Output	4.27 L (1.94)	3.67 L (1.76)
Myocardial Mass	102 g (46%)	

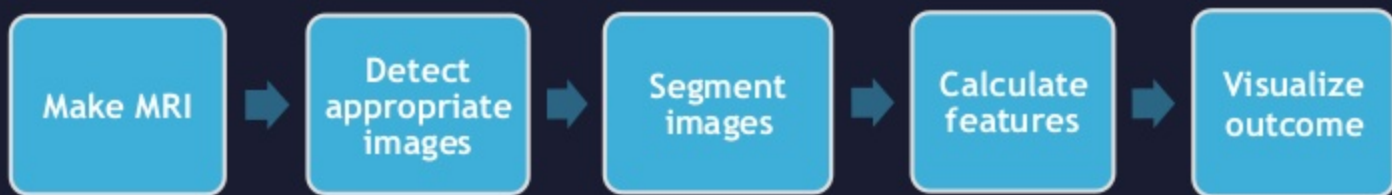
(\* Indexed with Body Surface Area)

Partners:

# CardioAI service

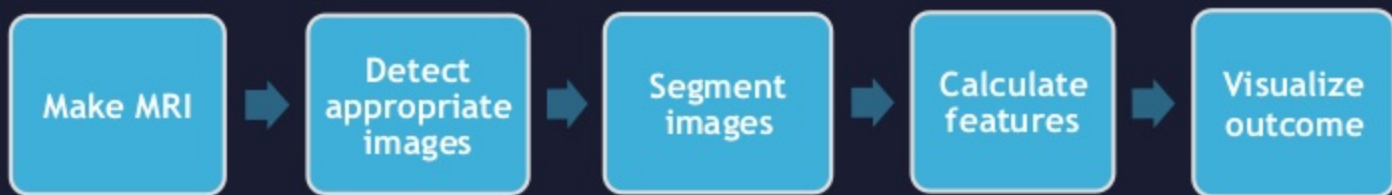


# CardioAI service



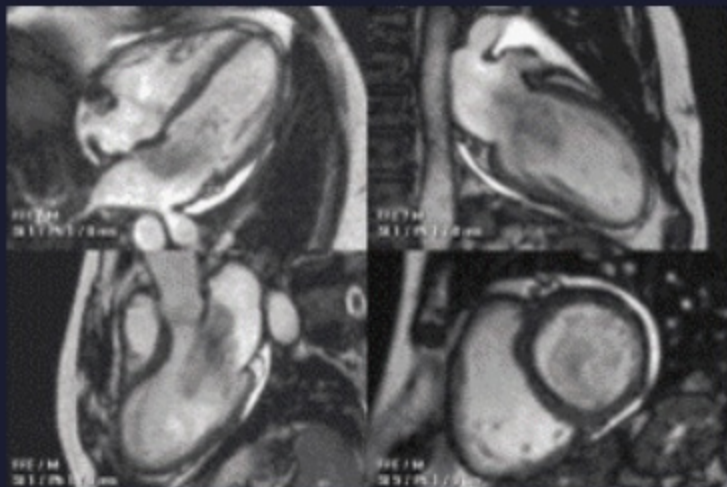
# CardioAI service

GCP / Python / Keras



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# CardioAI service



Make MRI

Detect  
appropriate  
images

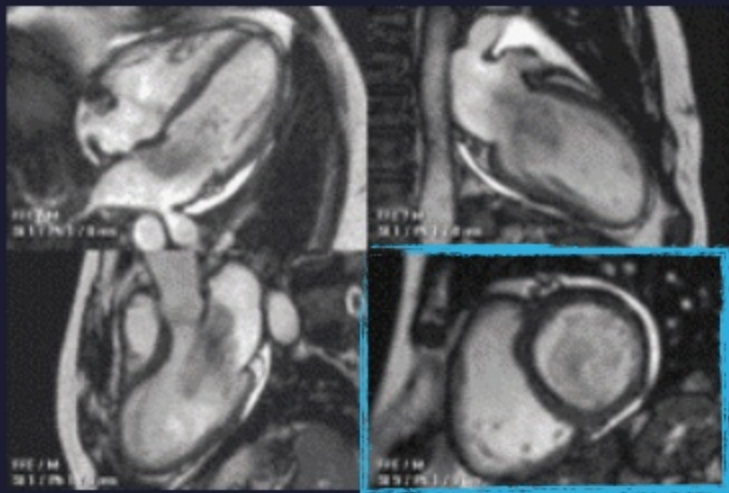
Segment  
images

Calculate  
features

Visualize  
outcome

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# CardioAI service



Metadata or convnet

Make MRI

Detect  
appropriate  
images

Segment  
images

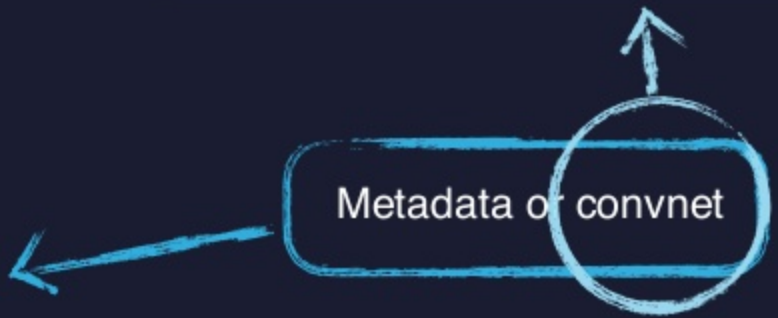
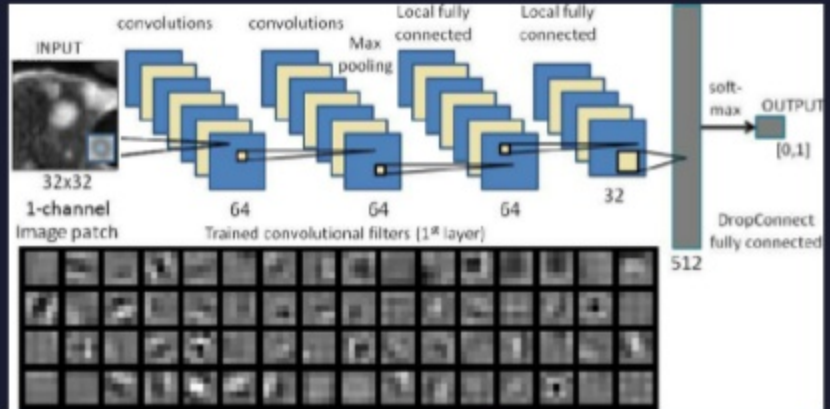
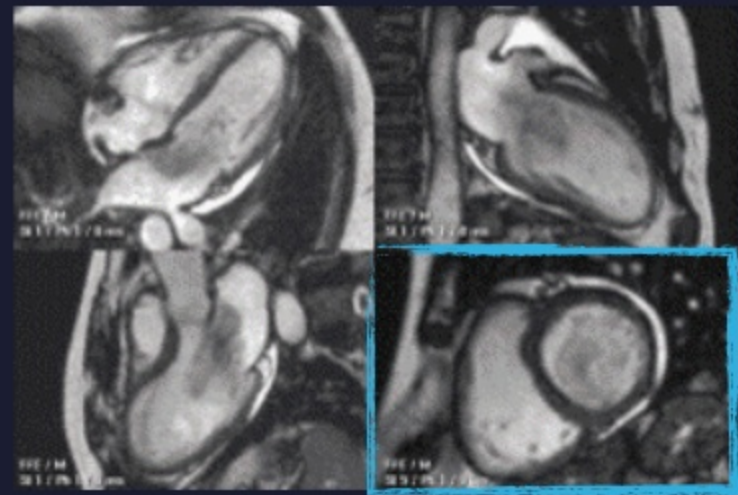
Calculate  
features

Visualize  
outcome

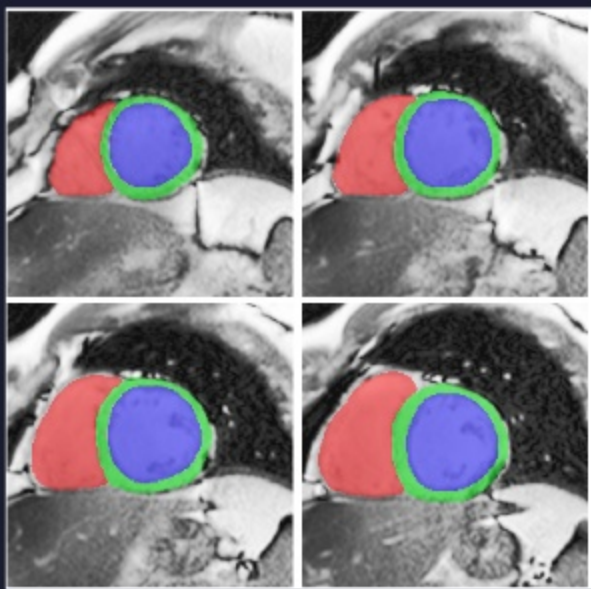
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# CardioAI service



# CardioAI service



Make MRI

Detect  
appropriate  
images

Segment  
images

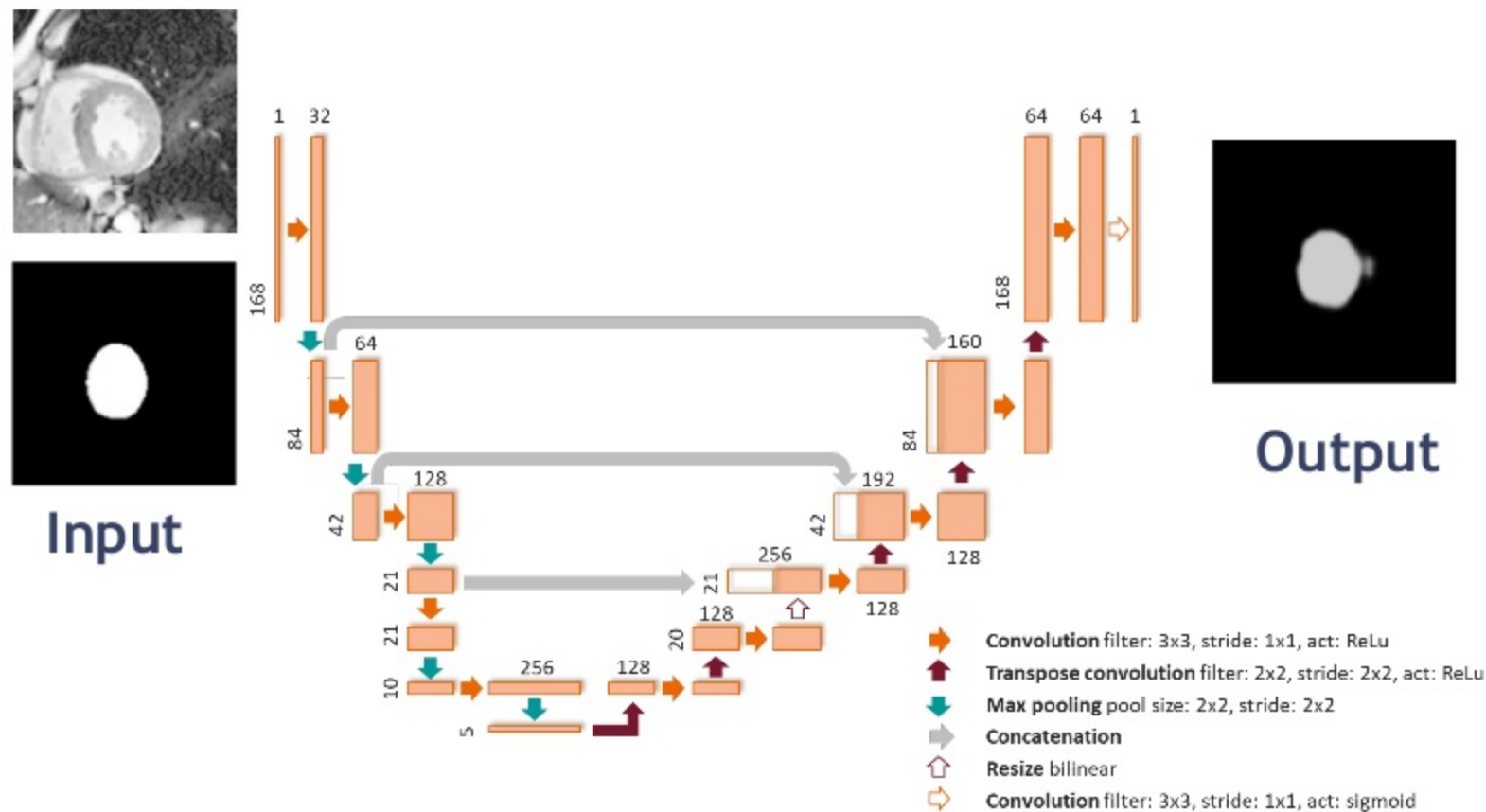
Calculate  
features

Visualize  
outcome

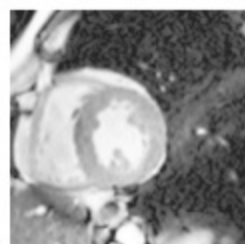
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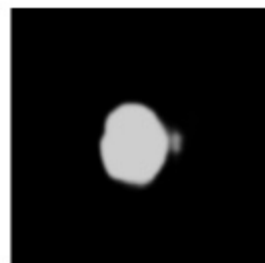
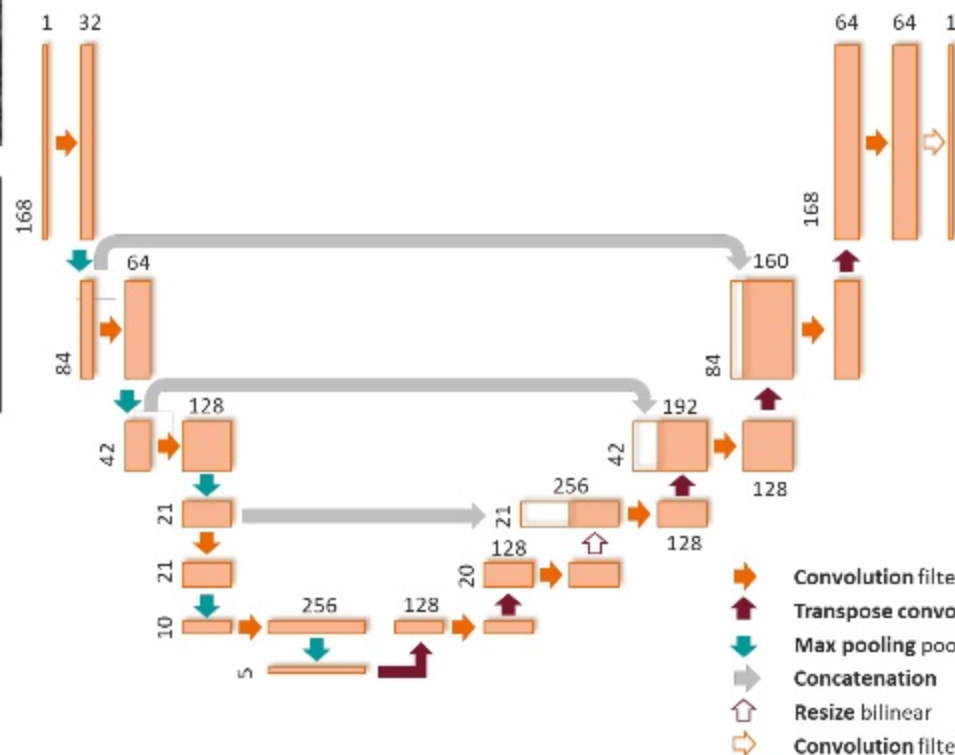
# CardioAI service



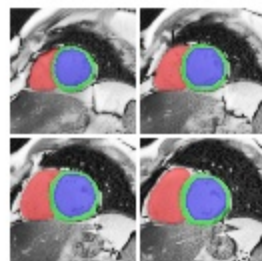
# CardioAI service



Input



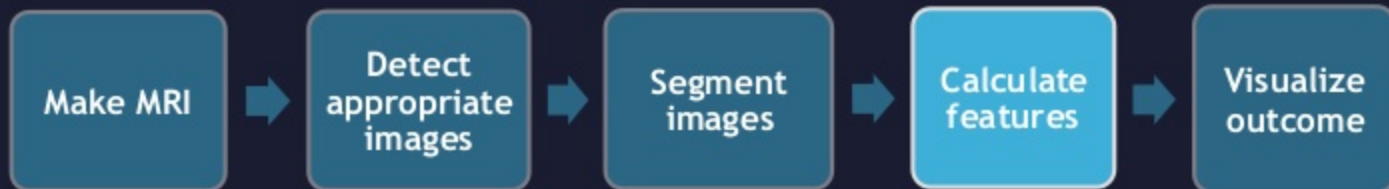
Output



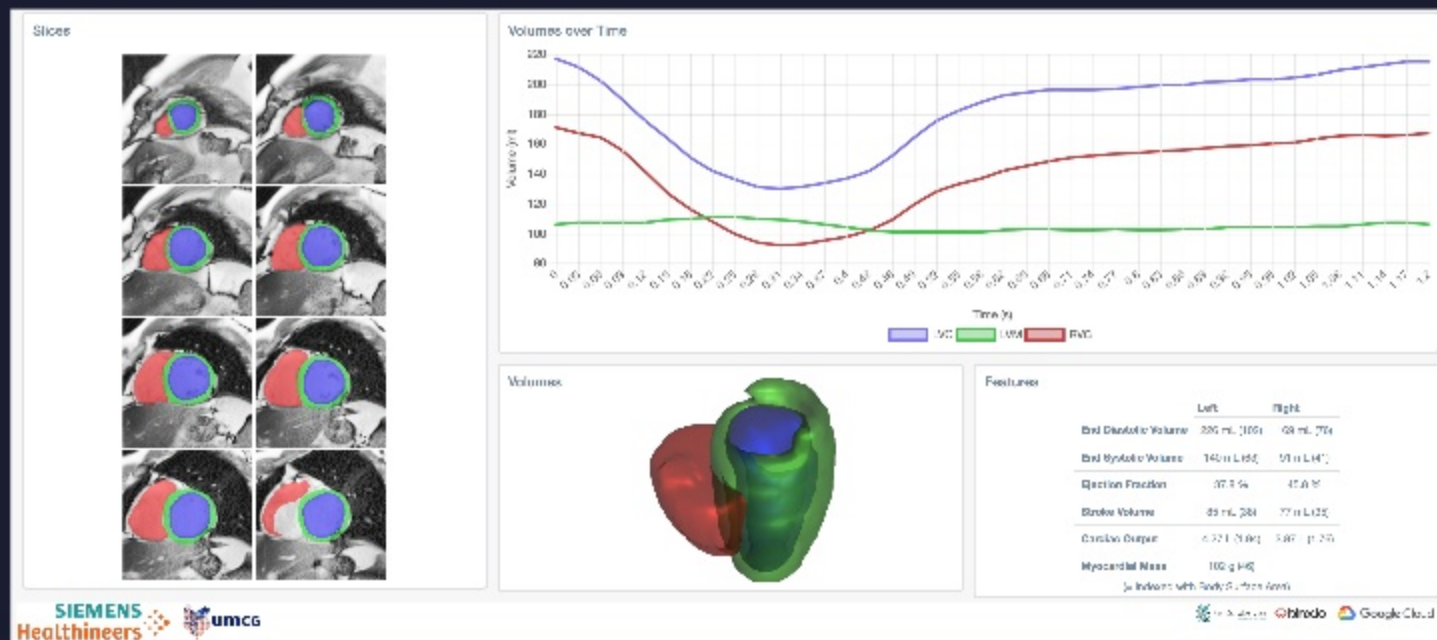
One Unet per class

# CardioAI service

	Left	Right
End Diastolic Volume	226 mL (102)	169 mL (76)
End Systolic Volume	140 mL (63)	91 mL (41)
Ejection Fraction	37.8 %	45.8 %
Stroke Volume	85 mL (38)	77 mL (35)
Cardiac Output	4.27 L (1.94)	3.87 L (1.76)
Myocardial Mass	102 g (46) (= Indexed with Body Surface Area)	



# CardioAI service



Make MRI

Detect  
appropriate  
images

Segment  
images

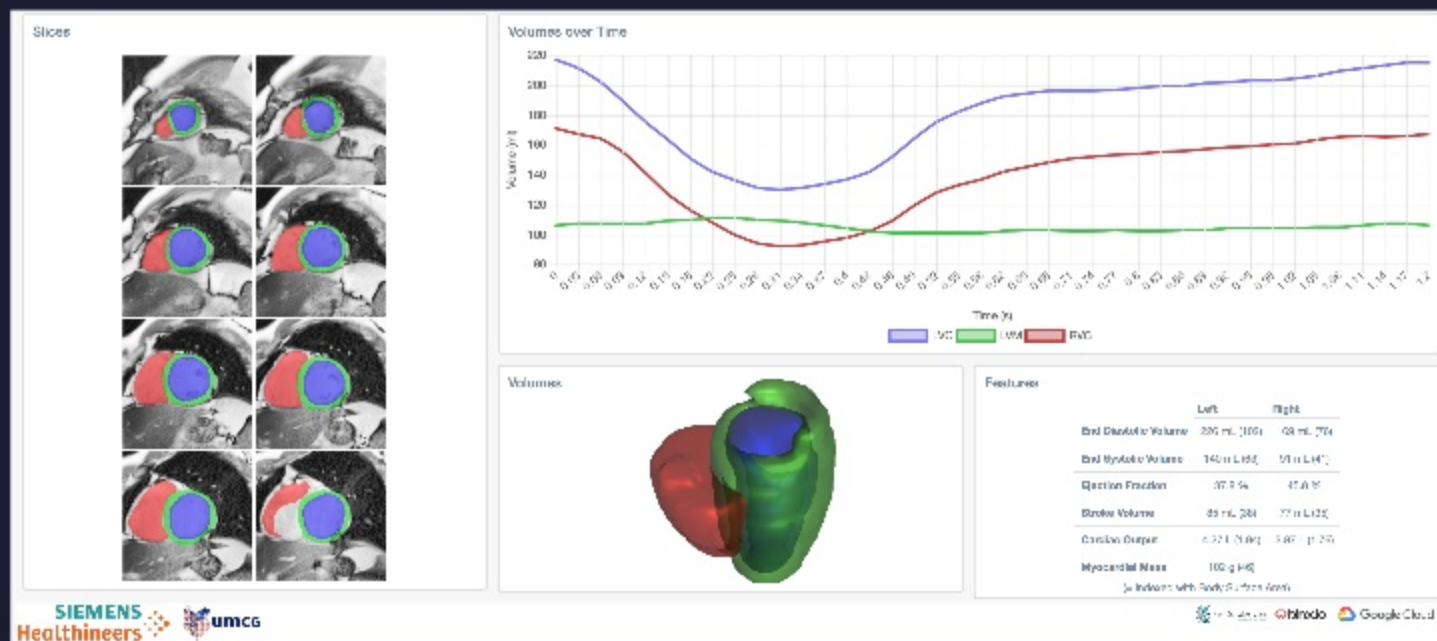
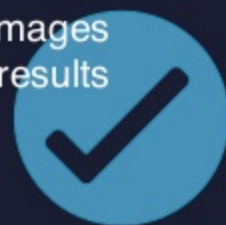
Calculate  
features

Visualize  
outcome

GO  
DATA  
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# CardioAI service

Upload MRI images  
Download results



Make MRI

Detect  
appropriate  
images

Segment  
images

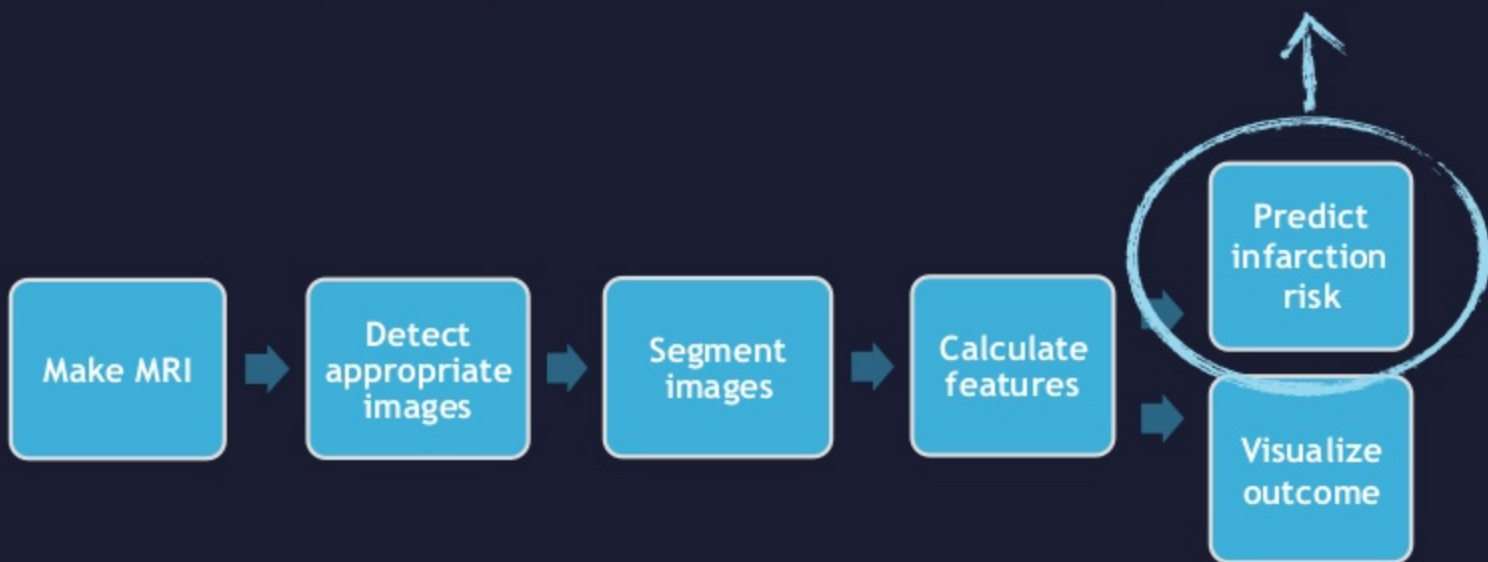
Calculate  
features

Visualize  
outcome

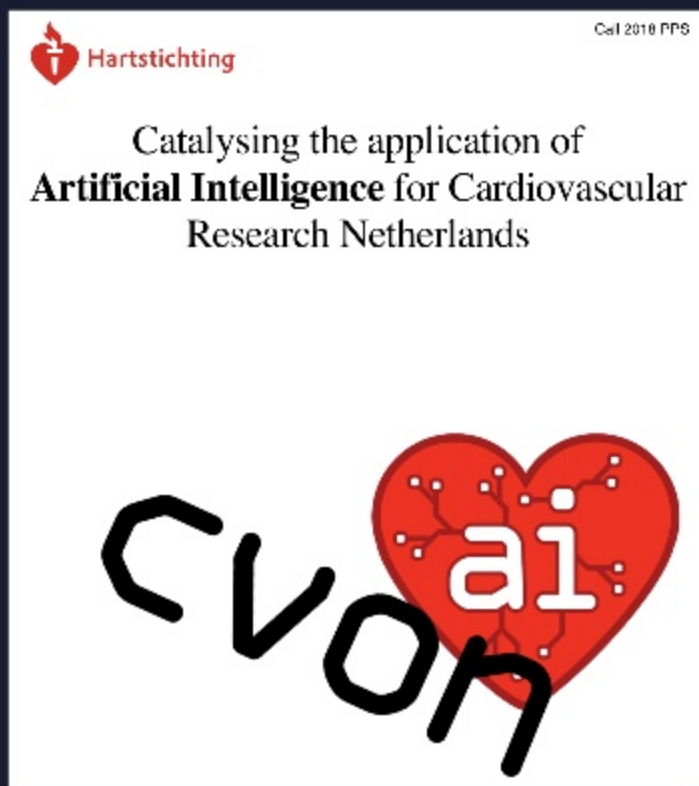
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# CardioAI future

This - and many other things - are to be implemented based on datasets obtained by the CardioAI service



# CardioAI future



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# CardioAI

*Deep Learning MRI Google Cloud 3D Medical Awesomeness*



# CardioAI

*Deep Learning MRI Google Cloud 3D Medical Awesomeness*

When & how exactly!?

>> Still far fetched connection with daily ops in the clinic



# The future of AI in healthcare

**"The future is already here — it's just not very evenly distributed."**

**William Gibson**

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# MedicX.AI

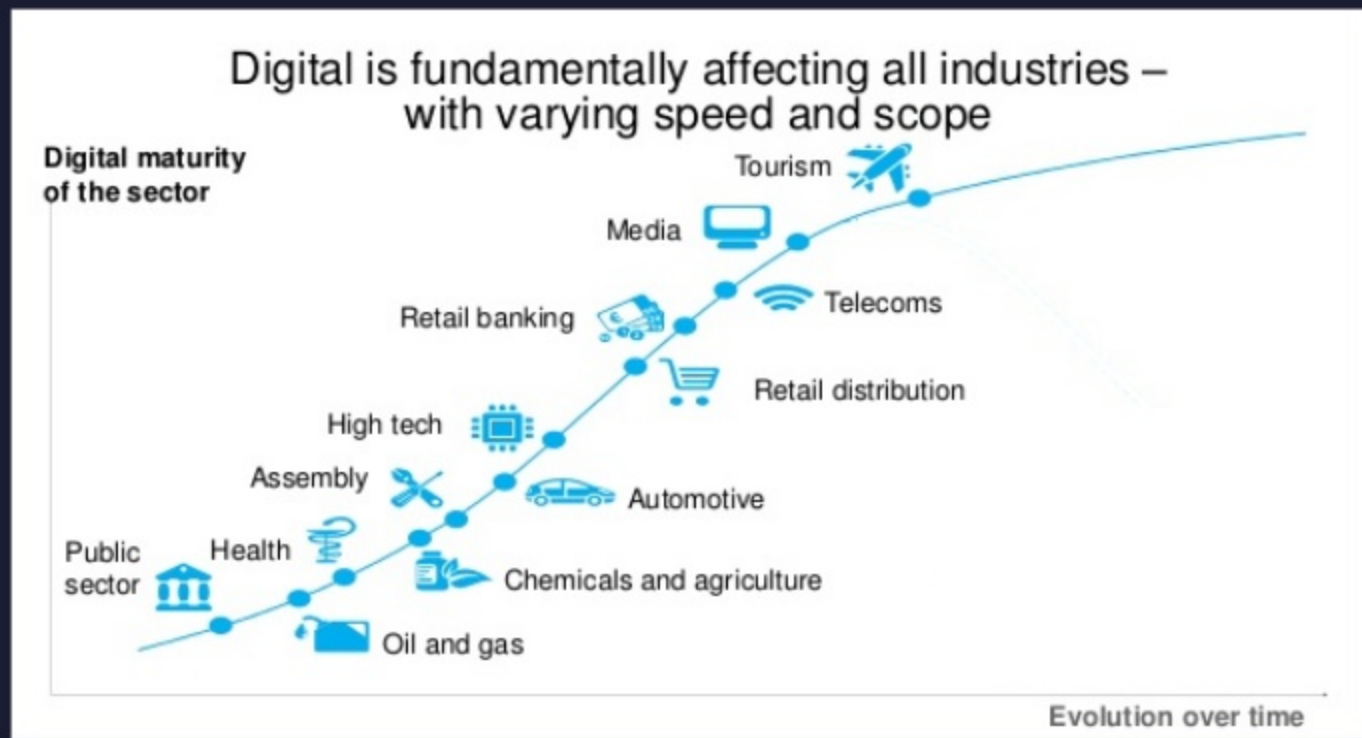
## The future of AI in healthcare

**"The future is already here — it's just not very evenly distributed."**

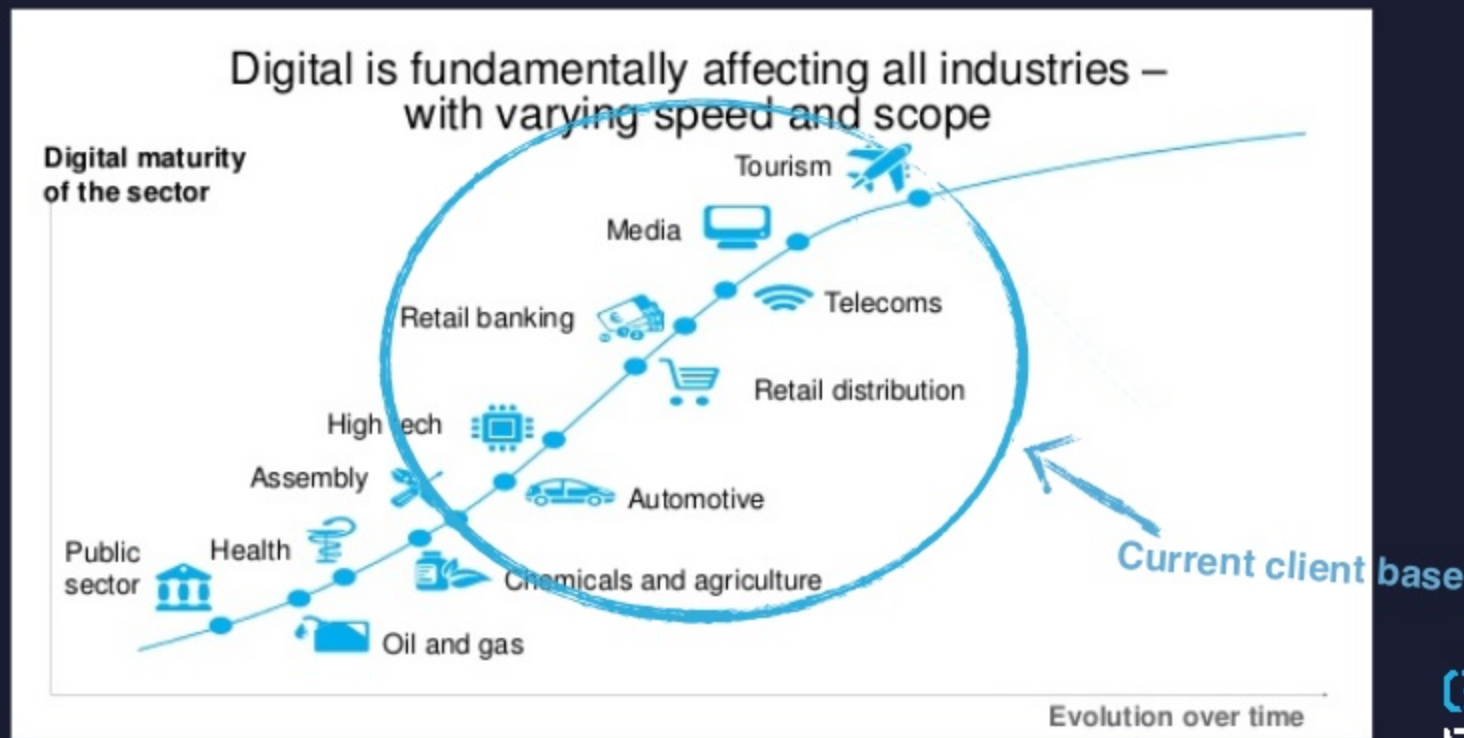
**William Gibson**

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# Let's consult McKinsey

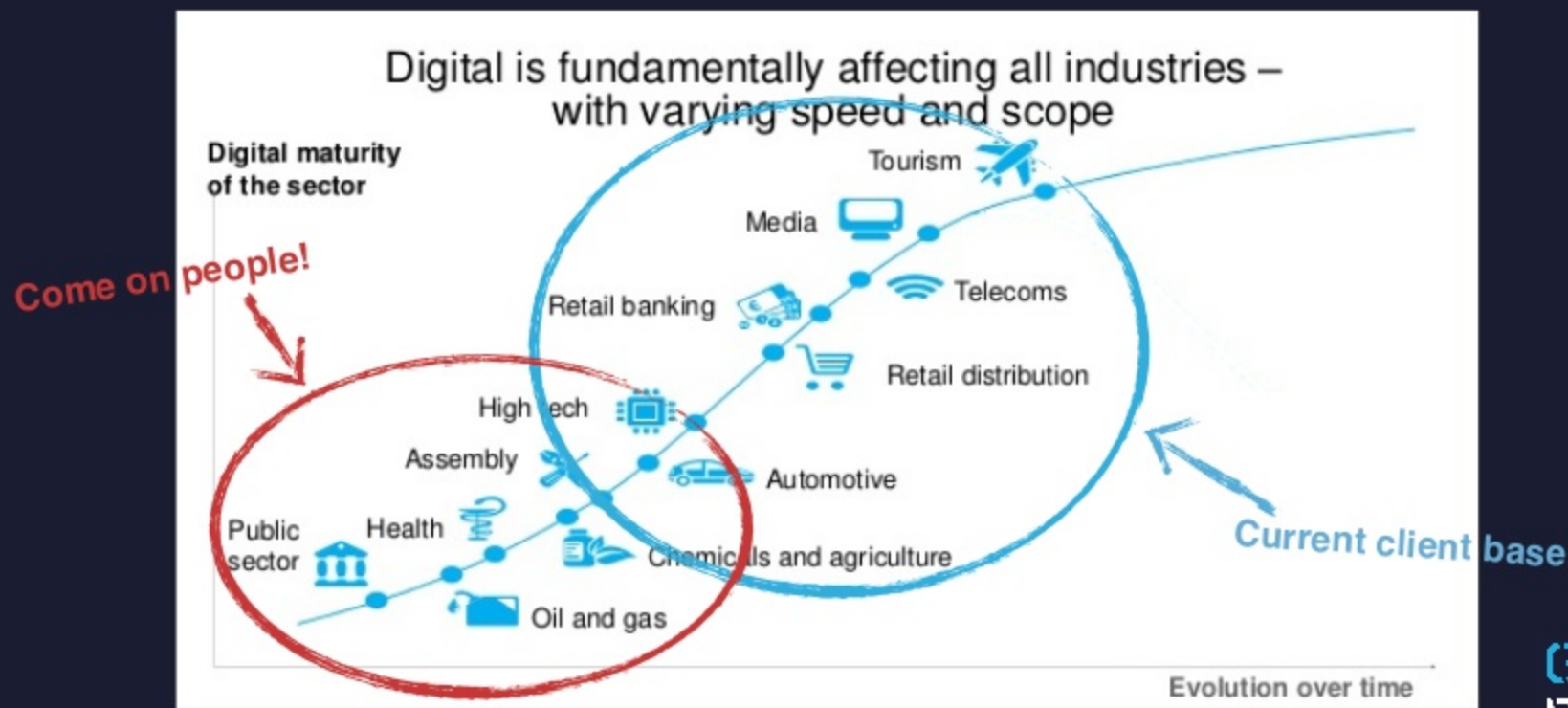


# Let's consult McKinsey



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# Let's consult McKinsey



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Things  
are  
getting  
serious

COMMENT  
JUNE 15 2018, 5:00PM, THE TIMES

**If NHS patient data is worth  
£10 billion, put it on the  
balance sheet and save lives  
too**

PHILIP ALDRICK



Maxine Mackintosh @ NRClive zorgtech

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# Flip the ethical discussion



- >> Projects freeze because of privacy and security concerns
- >> Where would we be if we could add some defrost





# Flip the ethical discussion



- >> Projects freeze because of privacy and security concerns
- >> Where would we be if we could add some defrost

Cardiac function analysis on thousands of patients



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# Flip the ethical discussion



- >> Projects freeze because of privacy and security concerns
- >> Where would we be if we could add some defrost

Cardiac function analysis on thousands of patients

AI as a medicine:  
predicting stent urgency from blood pressure measurements



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# Flip the ethical discussion



- >> Projects freeze because of privacy and security concerns
- >> Where would we be if we could add some defrost

Cardiac function analysis on thousands of patients

ADHD profiling for early detection

AI as a medicine:  
predicting stent urgency from blood pressure measurements



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# Flip the ethical discussion



- >> Projects freeze because of privacy and security concerns
- >> Where would we be if we could add some defrost

Cardiac function analysis on thousands of patients

ADHD profiling for early detection

AI as a medicine:  
predicting stent urgency from blood pressure measurements

Hypoglycemia prediction based on heart rate variability



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# Explore new opportunities

Healthcare is

- >> relevant
- >> interesting
- >> difficult



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# Explore new opportunities

Healthcare is

- >> relevant
- >> interesting
- >> difficult

We must

- >> mutually benefit
- >> push forward
- >> team up



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# MedicX.AI

Make impact on patient care with AI  
based on years of experience





**Ivo Everts**  
AI SPECIALIST



**Kicky van Leeuwen**  
DATA SCIENCE & BUSINESS  
DEVELOPMENT



**Wietse Vonema**  
CLOUD ENGINEER



**Albert Brand**  
SOFTWARE ENGINEER



**Fokko Driesprong**  
DATA ENGINEER



**Walter van der Scheer**  
MARKETING



**Guido Hobcijn**  
SALES



**Rob Dickelemaans**  
PROMOTER



**Bart Verlaet**  
PROMOTER



**Dennis Groenhuizen**  
PROMOTER



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# MedicX.AI

Check us out at [medicx.ai](https://medicx.ai) / LinkedIn

[ivoeverts@godatadriven.com](mailto:ivoeverts@godatadriven.com)

(I need to fix that;)

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