

A photograph of three young children of African descent standing in a rural field. They are all smiling and holding several bright red tomatoes in their hands. The child on the left is wearing a light blue button-down shirt. The child in the middle is wearing a light-colored, patterned t-shirt. The child on the right is wearing a white sleeveless top with small red polka dots and a colorful patterned skirt. In the background, there are green trees, a blue sky with light clouds, and some traditional thatched-roof huts. In the foreground, there are several crates filled with harvested tomatoes.

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AI For Good

# Our Mission

We are inventing for humanitarian impact.





# INVENTING FOR THE BOTTOM BILLION

Bill Gates & Nathan Myr vold at IV Laboratory

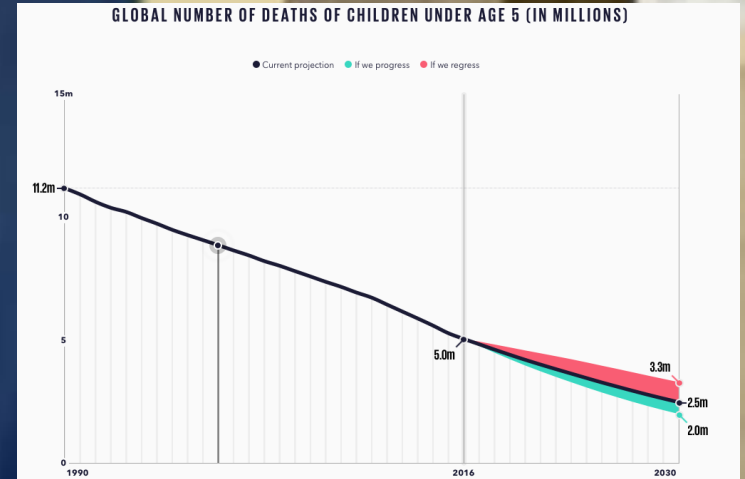
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# ENABLING CATALYTIC INVENTIONS



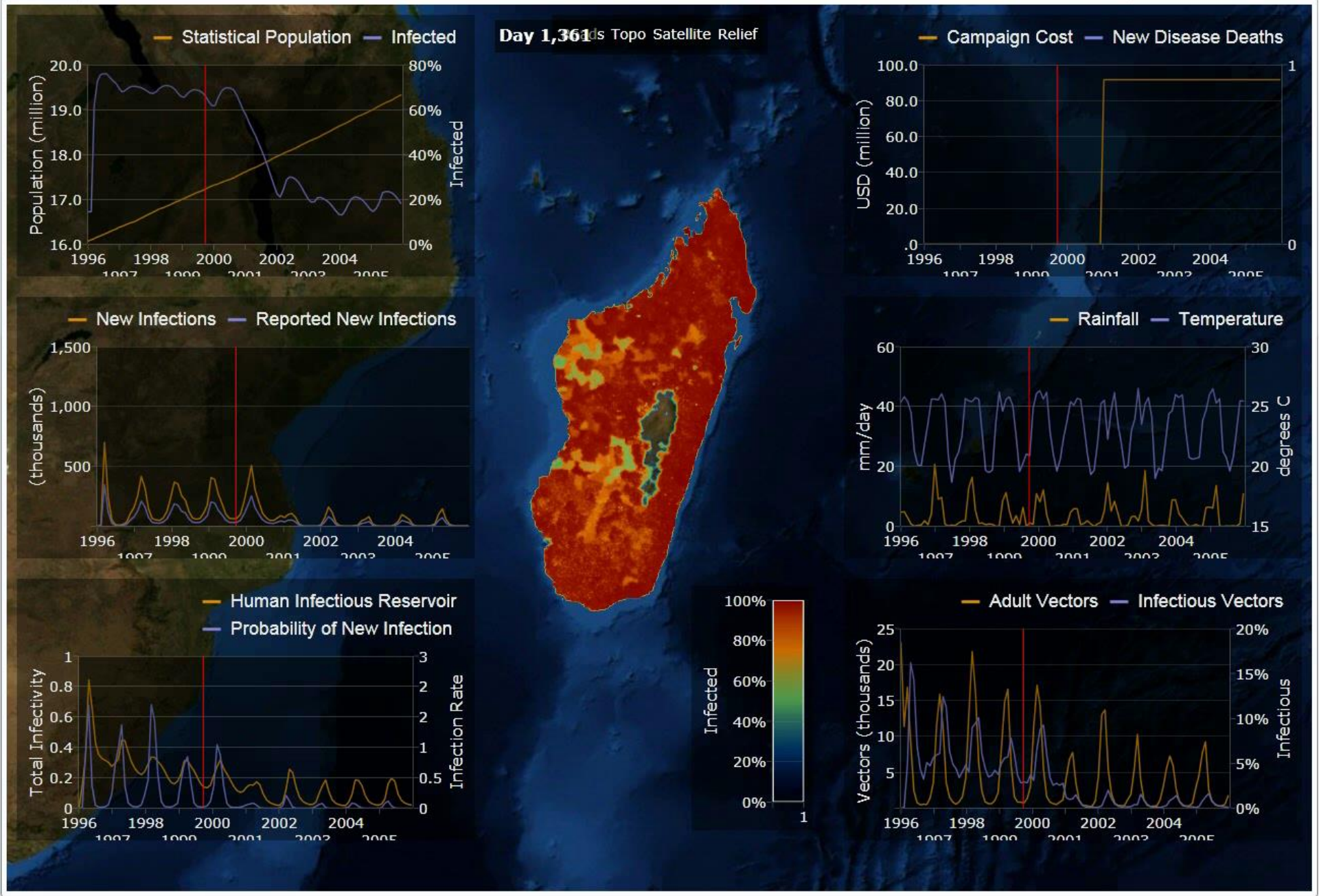
# REINVENTING HEALTH CARE

(Source: Goalkeepers, 2016)



**1/2** of the 5 million children that will die next year will do so in the first 28 days of life

**40%** of world's disease burden is preventable



# AUTOMATED MALARIA DST QUANTIFICATION



# OUTPERFORMING THE BEST TRAINED HUMAN

Help every clinician perform at the level of the best trained specialist

The screenshot displays the 'Malaria Detector' software interface. On the left, a table provides analysis results for 'PIDML04\_Thick':

PIDML04_Thick	
Blood sample:	PIDML04_Thick
Malaria confirmed:	YES
Species:	vivax
Estimated parasitemia per 8000 WBCs:	5400(range 4450 to 8100)
Number of white blood cells found(all FOV):	81
Estimated ring-stage count(per 8000 WBCs):	4830
Estimated late-stage count(per 8000 WBCs):	560

Below the table, a warning message reads: 'Warning: not enough WBCs found.Result may be unreliable.' A large microscopic image of a blood smear is shown below, with a green circle highlighting a specific area. To the right, a grid of 16 smaller microscopic images is displayed, each with a red numerical value below it, ranging from 99.6 to 96.2. At the bottom of the interface, there are radio buttons for 'Ring-like objects' (selected), 'Ring-like Z-stacks', 'Latestage-like objects', and 'Latestage-like Z-Stacks'. Below these are fields for 'Select Slide or Report Location' containing 'G:/gg/PIDML04\_Thick' and buttons for 'Analyze' and 'Export Report'.



# AUTOMATED DIAGNOSIS OF LUNG PATHOLOGY

>4 million  
deaths per year

## Loss of life

WHO, 2017. Global Impact  
of Respiratory Diseases;  
2<sup>nd</sup> edition

## Impact of lower respiratory tract infections

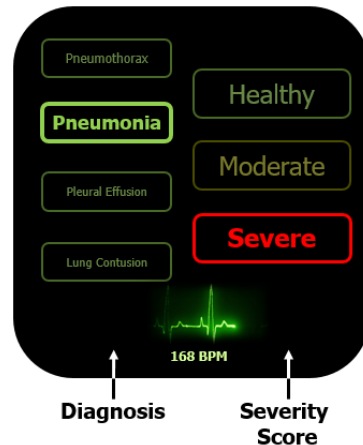
Est. 290M infections/year  
Avg. 1.9-7 days lost per infection



## Loss of economy

LRI Global Burden of Disease  
collaborators; The Lancet, 2017

## Enabling technology: Automated ultrasound diagnostic

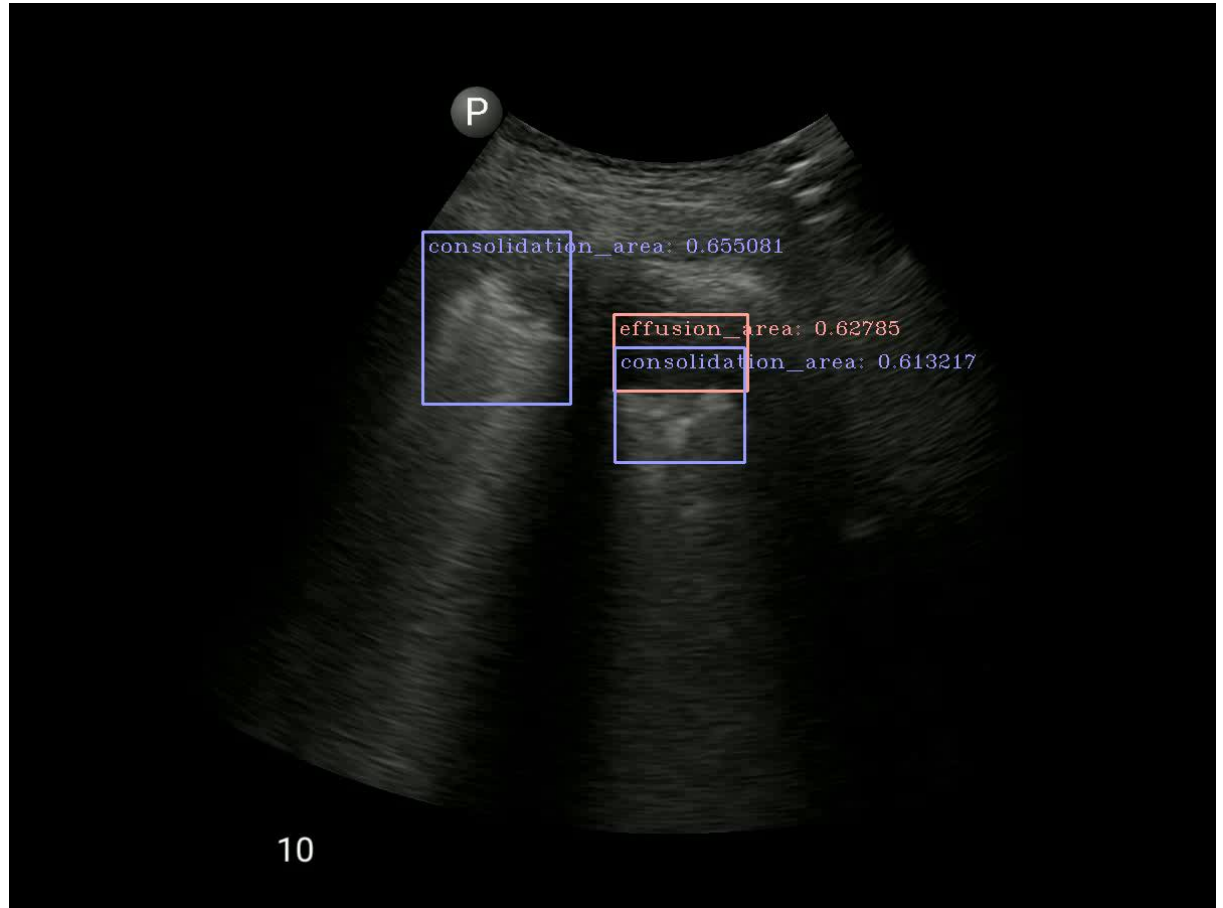
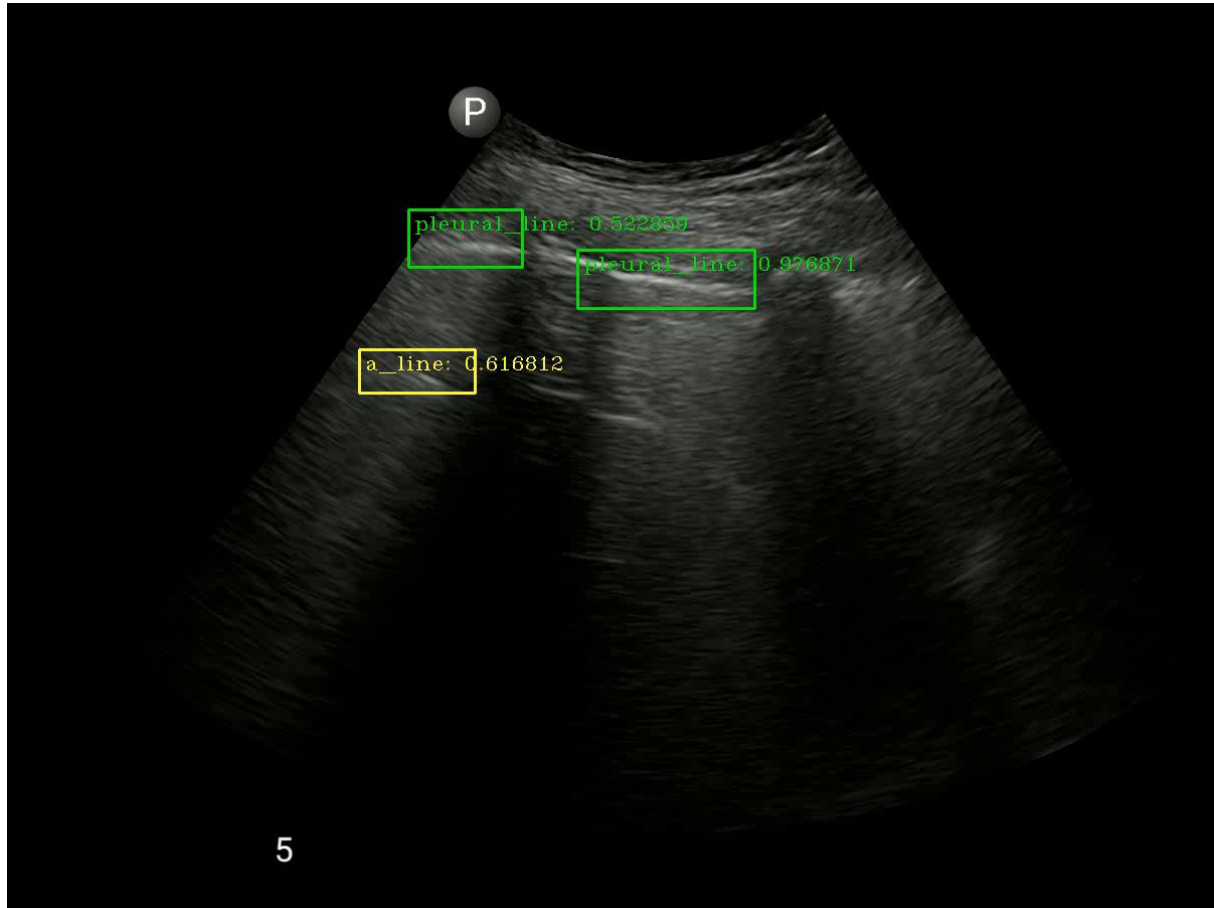


- Enables **rapid**, non-invasive screening for lung pathology
- **Immediate** diagnosis at the point of care
- Define severity of disease (**new capability**)
- **Portable, hand-held** device on mobile platform (Android)
- Fully digital solution



## Pathogen-agnostic detection of disease

# AUTOMATED PULMONARY ULTRASOUND



Exceeding Sensitivity and Specificity of X-Ray with expert interpretation

(Source: WHO)

# ELIMINATE CERVICAL CANCER

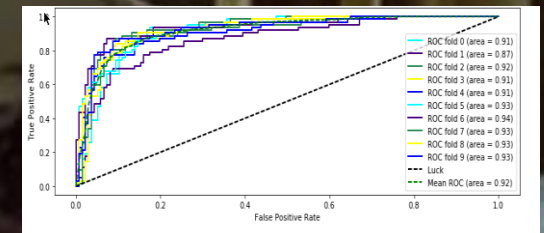


20

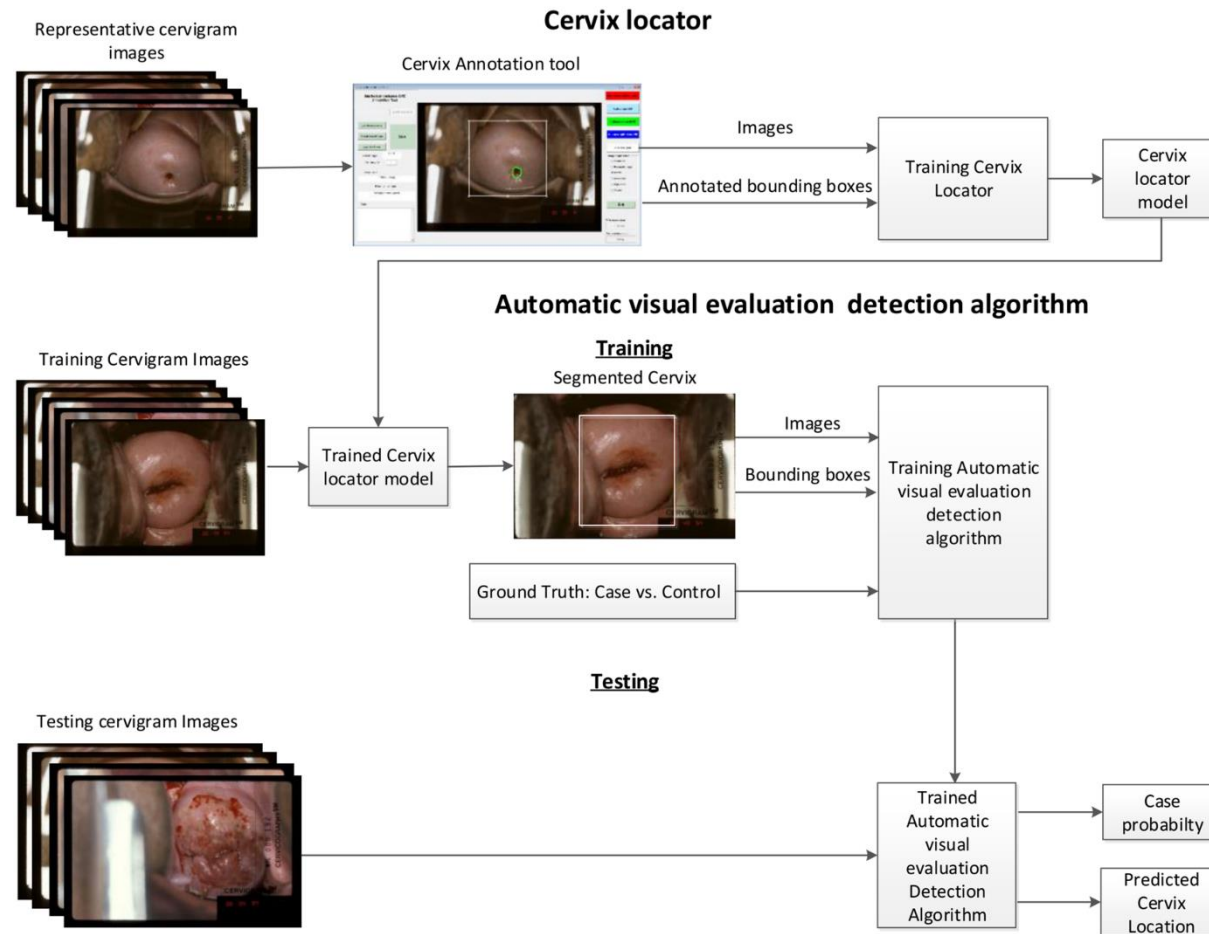
Million women will die in the next 25 years despite the availability of HPV Vaccine unless credible screen & treat is implemented

85%

of Cervical Cancer Deaths Occur in Low Resources Settings



# AUTOMATED VISUAL INSPECTION



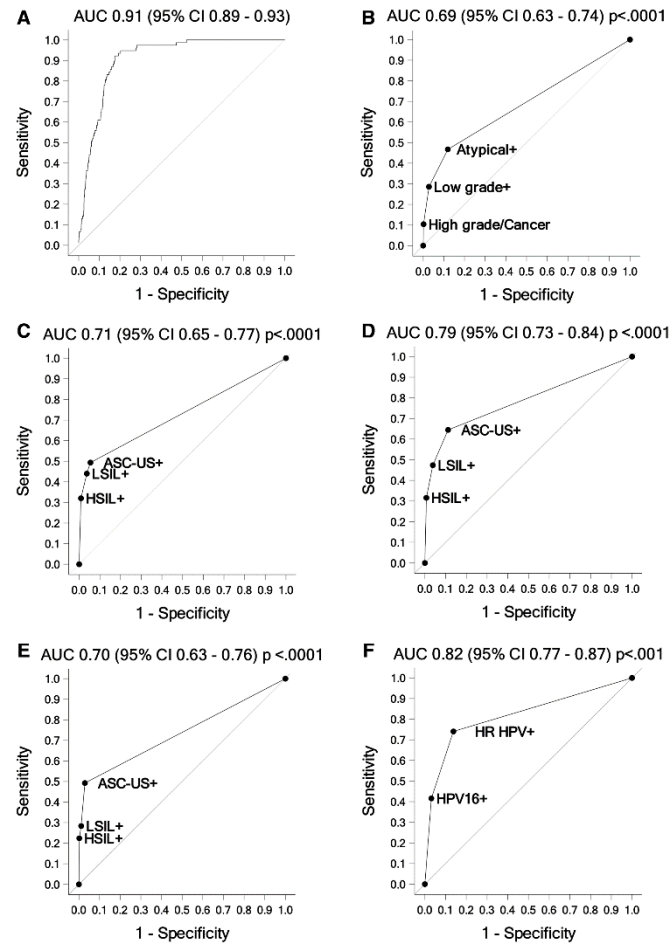
From: An Observational Study of Deep Learning and Automated Evaluation of Cervical Images for Cancer Screening

J Natl Cancer Inst. Published online January 10, 2019. doi:10.1093/jnci/djy225

J Natl Cancer Inst | Published by Oxford University Press 2019. This work is written by US Government employees and is in the public domain in the US.

# OUTPERFORMING EVERYTHING ELSE

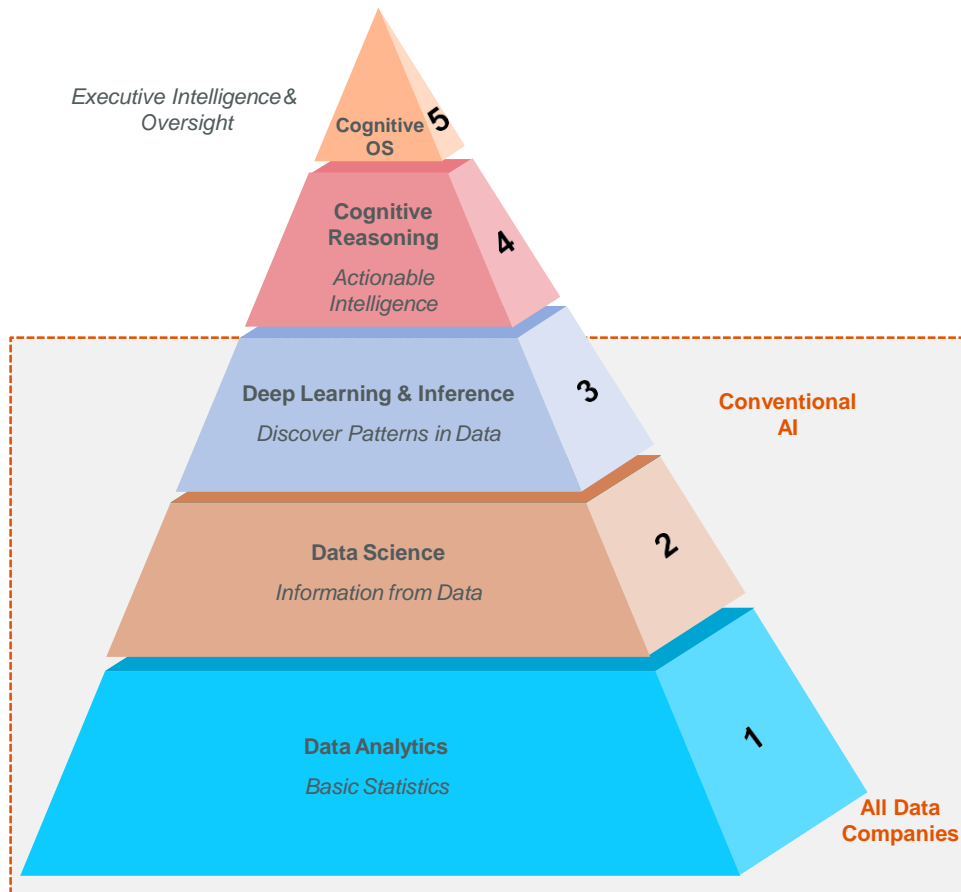
Automated visual evaluation was as accurate or more than all of the screening tests used in the cohort study, including: **A)** automated visual evaluation; **B)** cervicography: area under the curve (AUC); **C)** conventional Pap smear; **D)** liquid-based cytology; **E)** first-generation neural network-based cytology; and **F)** MY09-MY11 PCR-based human papillomavirus (HPV) testing. ASC-US = atypical squamous cells of undetermined significance; HSIL = high-grade squamous intraepithelial lesion; LSIL = low-grade squamous intraepithelial lesion.



Automated visual evaluation performance was also statistically significantly **more accurate than conventional Pap smears** (AUC = 0.71, 95% CI = 0.65 to 0.77;  $P < .001$ ), **liquid-based cytology** (AUC = 0.79, 95% CI = 0.73 to 0.84;  $P < .001$ ), first-generation **neural network-based cytology** (AUC = 0.70; 95% CI = 0.63 to 0.76;  $P < .001$ ), and **HPV testing** (AUC = 0.82, 95% CI = 0.77 to 0.87;  $P < .001$ ).

# MOVING BEYOND ML: COGNITIVE REASONING

## Human-Like Reasoning at its Core



5 The addition of fully autonomous solutions by creating cooperative societies of interacting intelligence

4 Addressing layer of interpretations to traditional deep learning solutions

3 Uses enormous amounts of data to find patterns in data; no ability to answer why a solution is selected

2 Uses machine learning techniques to make inferences based on historical data

1 Commoditized software that combines and analyses data

THANK YOU



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