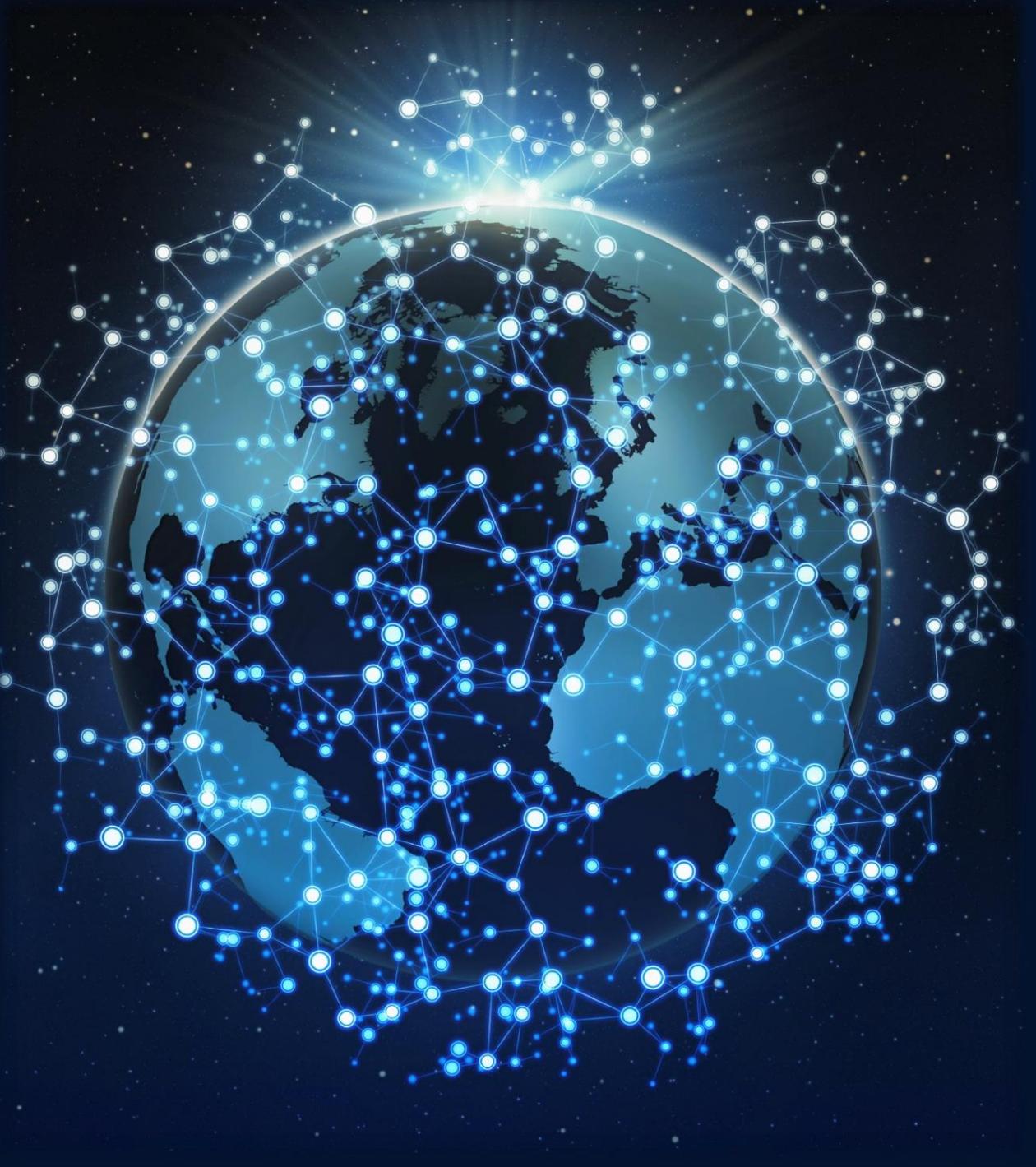


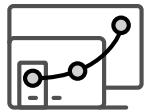


# Some basis elements for AI

Bruno Schröder  
National Technology  
Officer  
Microsoft BeLux



# Microsoft's worldview



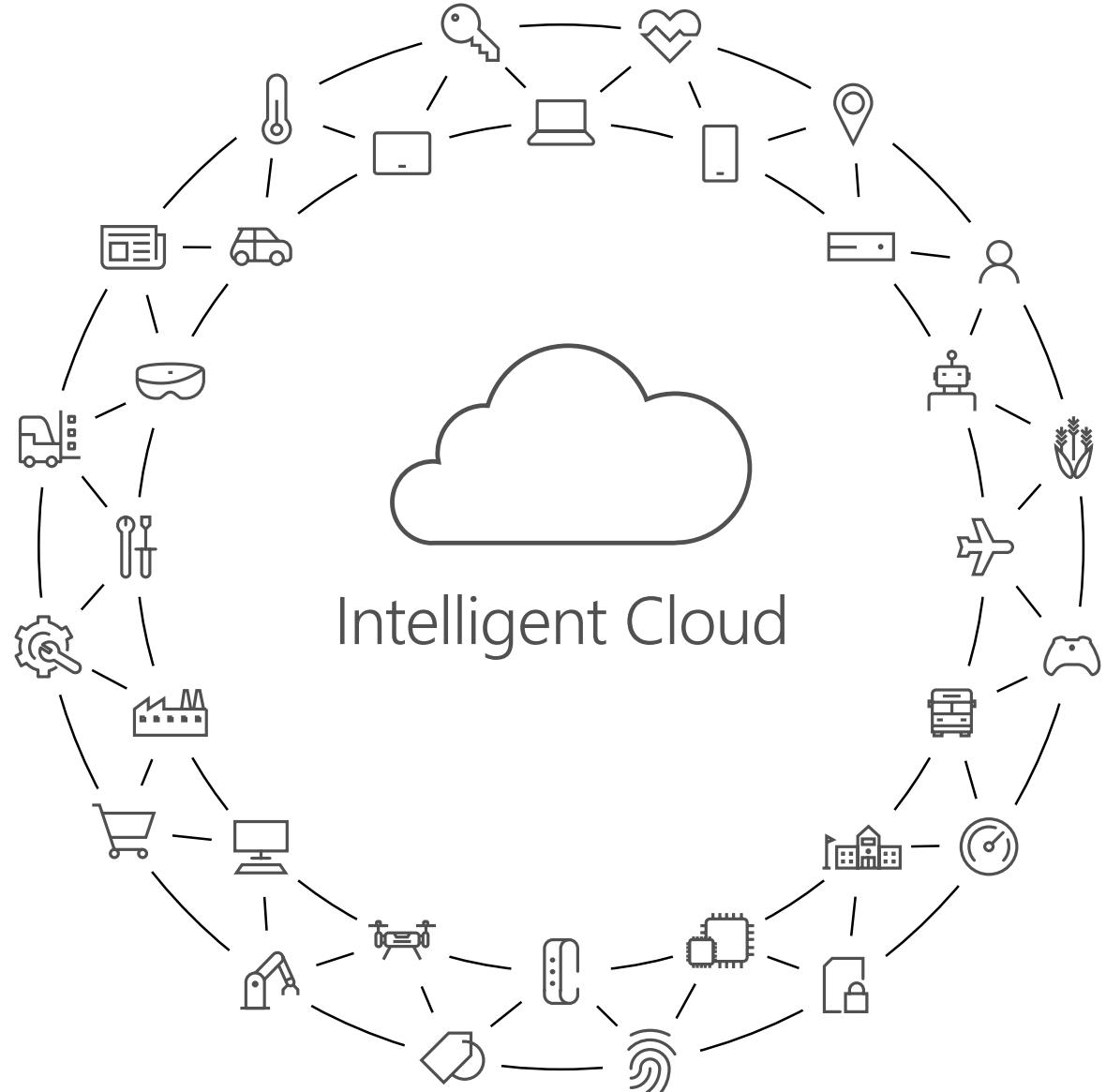
Multi-sense, Multi-device



Artificial Intelligence



Ubiquitous Computing



Intelligent Edge

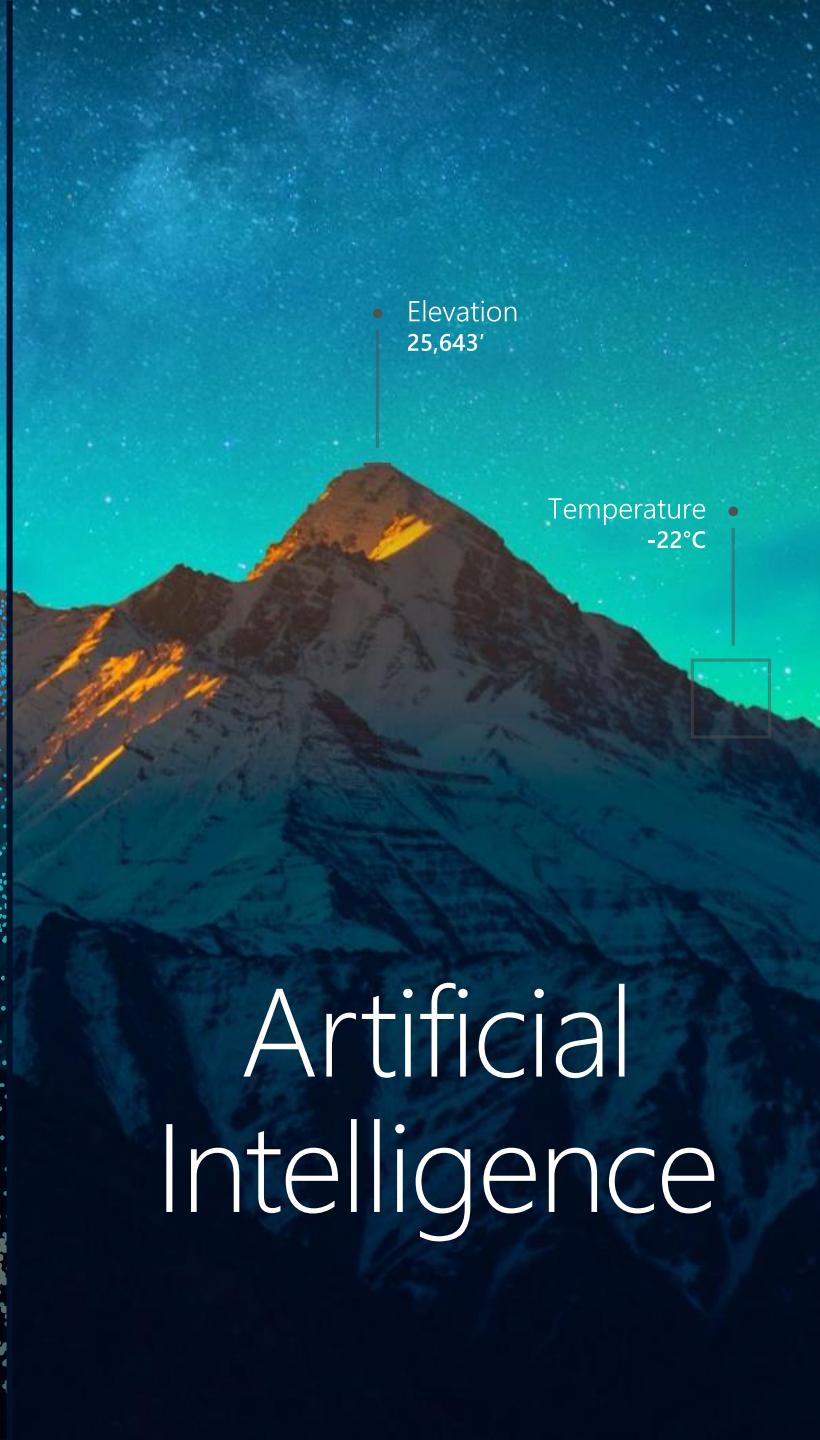
# Global Infrastructure

54 regions announced, 42 currently available to customers. 52 zones available to customers





Mixed  
Reality

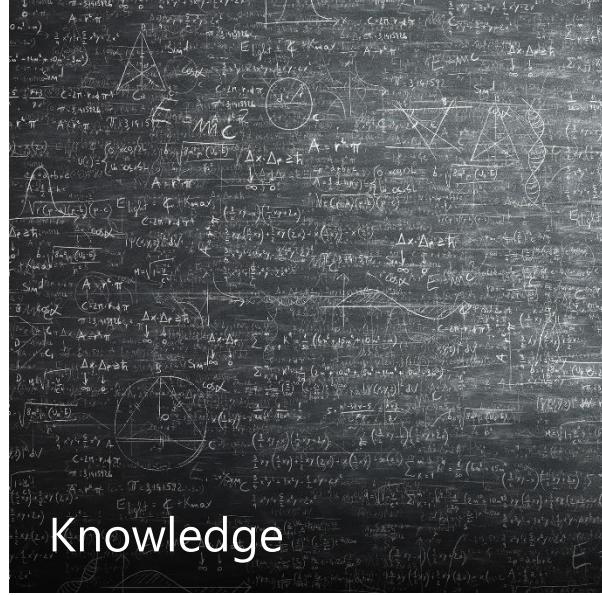
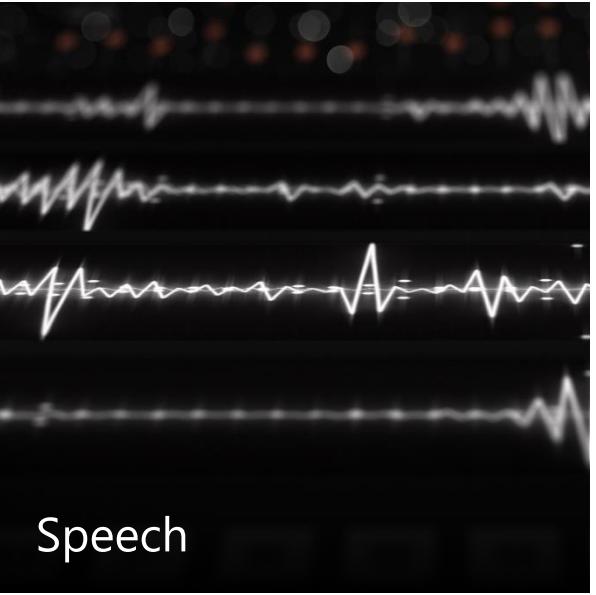
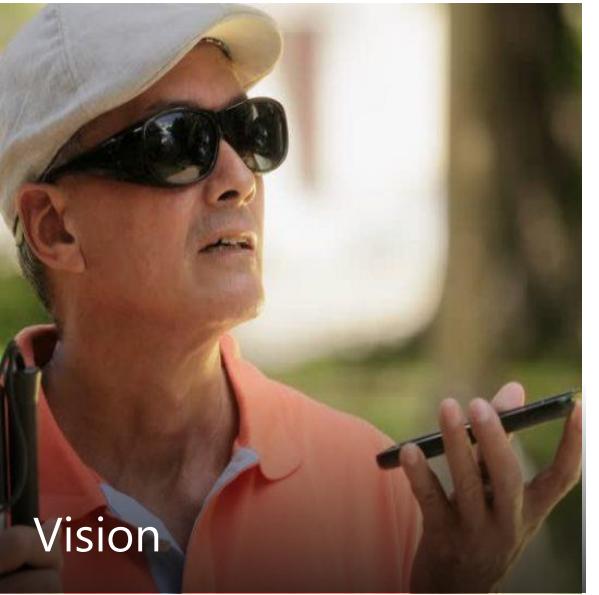


Artificial  
Intelligence



Quantum  
Computing

# Computers **understanding** the world



Perception



Comprehension

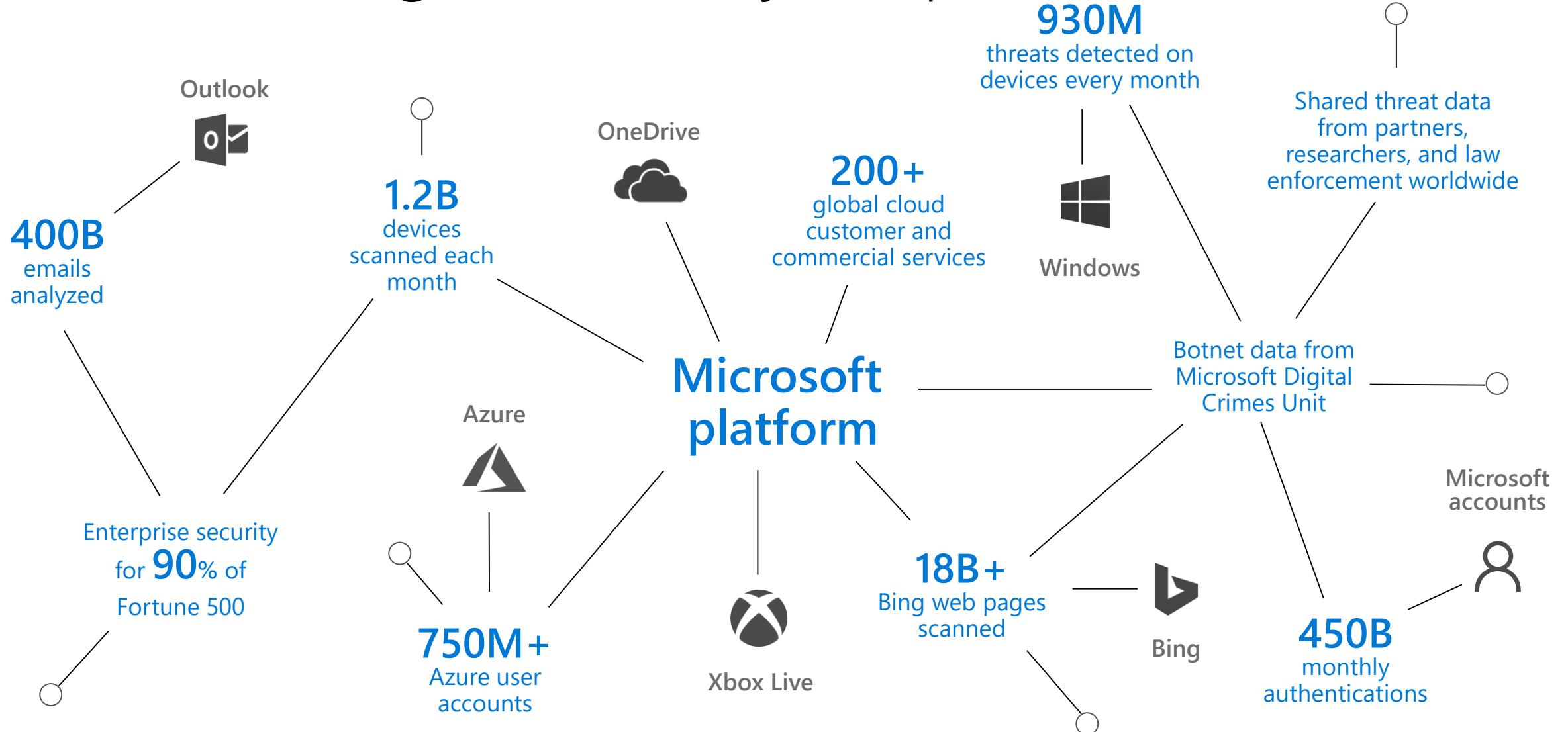


Solving new classes of problems  
out of Large Scale Data

A probabilistic, sampling model to understand the world ...

... and make decision about it

# Microsoft Intelligent Security Graph



**6.5 TRILLION** signals per day



data  
science  
is  
different

# FOURTH PARADIGM

DATA-INTENSIVE SCIENTIFIC DISCOVERY

EDITED BY TONY HEY, STEWART TANSLEY, AND KRISTIN TOLLE

Probability, sampling based,  
learned from data

[https://en.wikipedia.org/wiki/Nyquist–Shannon\\_sampling\\_theorem](https://en.wikipedia.org/wiki/Nyquist–Shannon_sampling_theorem)



<http://blog.viacom.com/2014/05/mtv-surveys-young-people-in-the-eu-ahead-of-european-parliamentary-elections/>

# The FOURTH PARADIGM

DATA-INTENSIVE SCIENTIFIC DISCOVERY

Probability based, learned from data



*The*  
**FOURTH**  
**PARADIGM**  
DATA-INTENSIVE SCIENTIFIC DISCOVERY

EDITED BY TONY HEY, STEWART TANSLEY, AND KRISTIN TOLLE

# In real life, some examples

Next to elections and automatic translation



# DeepMood: Modeling Mobile Phone Typing Dynamics for Mood Detection

Bokai Cao, Lei Zheng, Chenwei Zhang, Philip S. Yu, Andrea Piscitello, John Zulueta, Olu Ajilore, Kelly Ryan, Alex D. Leow

(Submitted on 23 Mar 2018)

The increasing use of electronic forms of communication presents new opportunities in the study of mental health, including the ability to investigate the manifestations of psychiatric diseases unobtrusively and in the setting of patients' daily lives. A pilot study to explore the possible connections between bipolar affective disorder and mobile phone usage was conducted. In this study, participants were provided a mobile phone to use as their primary phone. This phone was loaded with a custom keyboard that collected metadata consisting of keypress entry time and accelerometer movement. Individual character data with the exceptions of the backspace key and space bar were not collected due to privacy concerns. We propose an end-to-end deep architecture based on late fusion, named DeepMood, to model the multi-view metadata for the prediction of mood scores. Experimental results show that 90.31% prediction accuracy on the depression score can be achieved based on session-level mobile phone typing dynamics which is typically less than one minute. It demonstrates the feasibility of using mobile phone metadata to infer mood disturbance and severity.

Comments: KDD 2017

Subjects: **Human-Computer Interaction (cs.HC); Artificial Intelligence (cs.AI)**

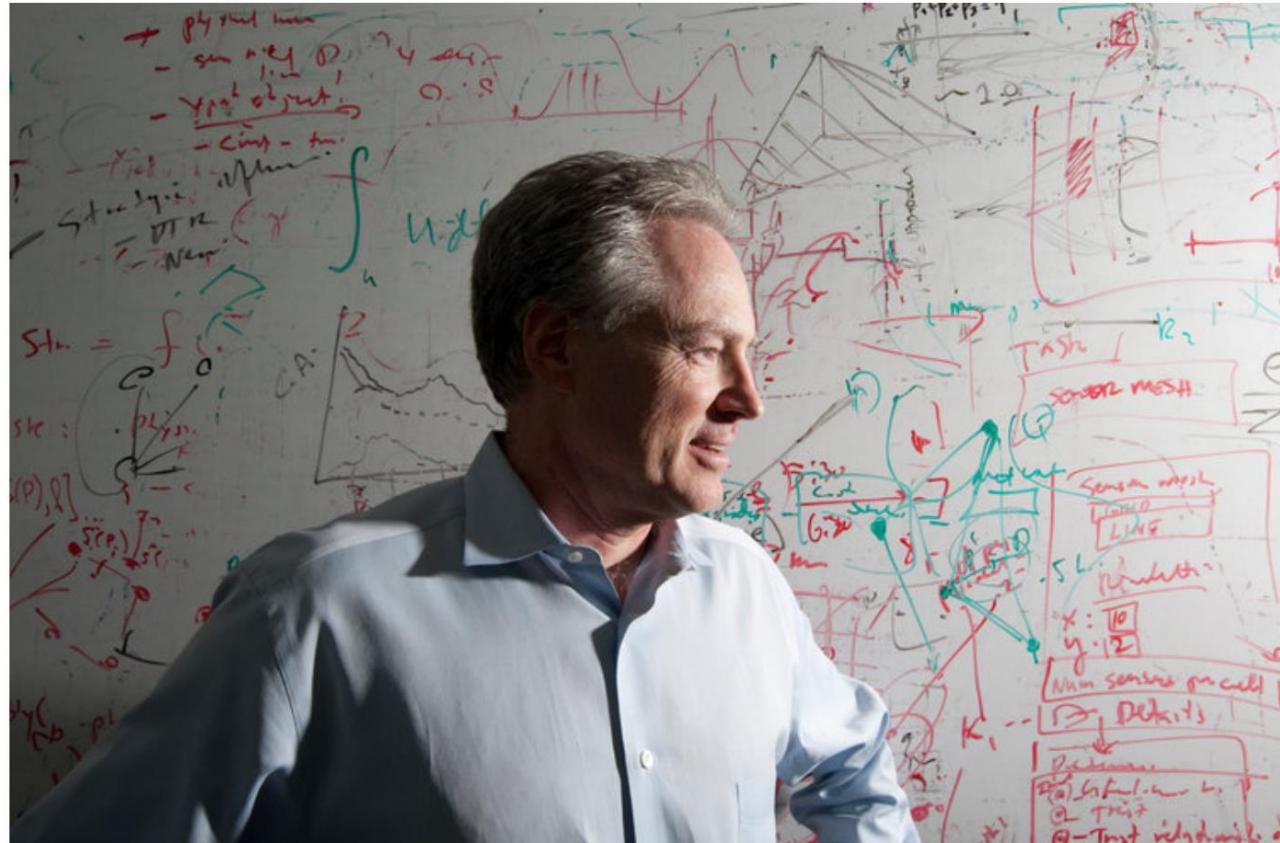
DOI: [10.1145/3097983.3098086](https://doi.org/10.1145/3097983.3098086)

Cite as: **arXiv:1803.08986 [cs.HC]**

(or [arXiv:1803.08986v1 \[cs.HC\]](https://arxiv.org/abs/1803.08986v1) for this version)

# Microsoft Finds Cancer Clues in Search Queries

By JOHN MARKOFF JUNE 7, 2016



Dr. Eric Horvitz is one of the Microsoft researchers who conducted the study.

[http://www.nytimes.com/2016/06/08/technology/online-searches-can-identify-cancer-victims-study-finds.html?smid=tw-share&\\_r=1](http://www.nytimes.com/2016/06/08/technology/online-searches-can-identify-cancer-victims-study-finds.html?smid=tw-share&_r=1)

<http://asconpubs.org/doi/full/10.1200/JOP.2015.010504>

## Journal of oncology practice

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## Screening for Pancreatic Adenocarcinoma Using Signals From Web Search Logs: Feasibility Study and Results

John Paparrizos, MSc, Ryon W. White, PhD , Eric Horvitz, MDPhD  
Columbia University, New York, NY; and Microsoft Research, Redmond, WA

[Abstract](#) [Full Text](#) [Supplemental Material](#) [PDF](#)

### Abstract

Choose

### Introduction:

People's online activities can yield clues about their emerging health conditions. We performed an intensive study to explore the feasibility of using anonymized Web query logs to screen for the emergence of pancreatic adenocarcinoma. The methods used statistical analyses of large-scale anonymized search logs considering the symptom queries from millions of people, with the potential application of warning individual searchers about the value of seeking attention from health care professionals.

# Project Premonition

uses Microsoft AI to  
turn mosquitoes  
into allies instead  
of enemies

“ Right now our ability to analyze these sequences depends on computer power.”

— James Pipas  
Professor, Boyer Chair of Molecular Biology  
University of Pittsburgh



## Project

# Premonition

### Problem

When trying to predict the spread of a disease, every second counts. About 60%–75% of all emerging infectious diseases originate in animals, but it's difficult to pinpoint how, when, and where.

### Solution

Microsoft Researchers are using mosquitos to collect blood samples from animals in the wild and identify the diseases they're carrying.

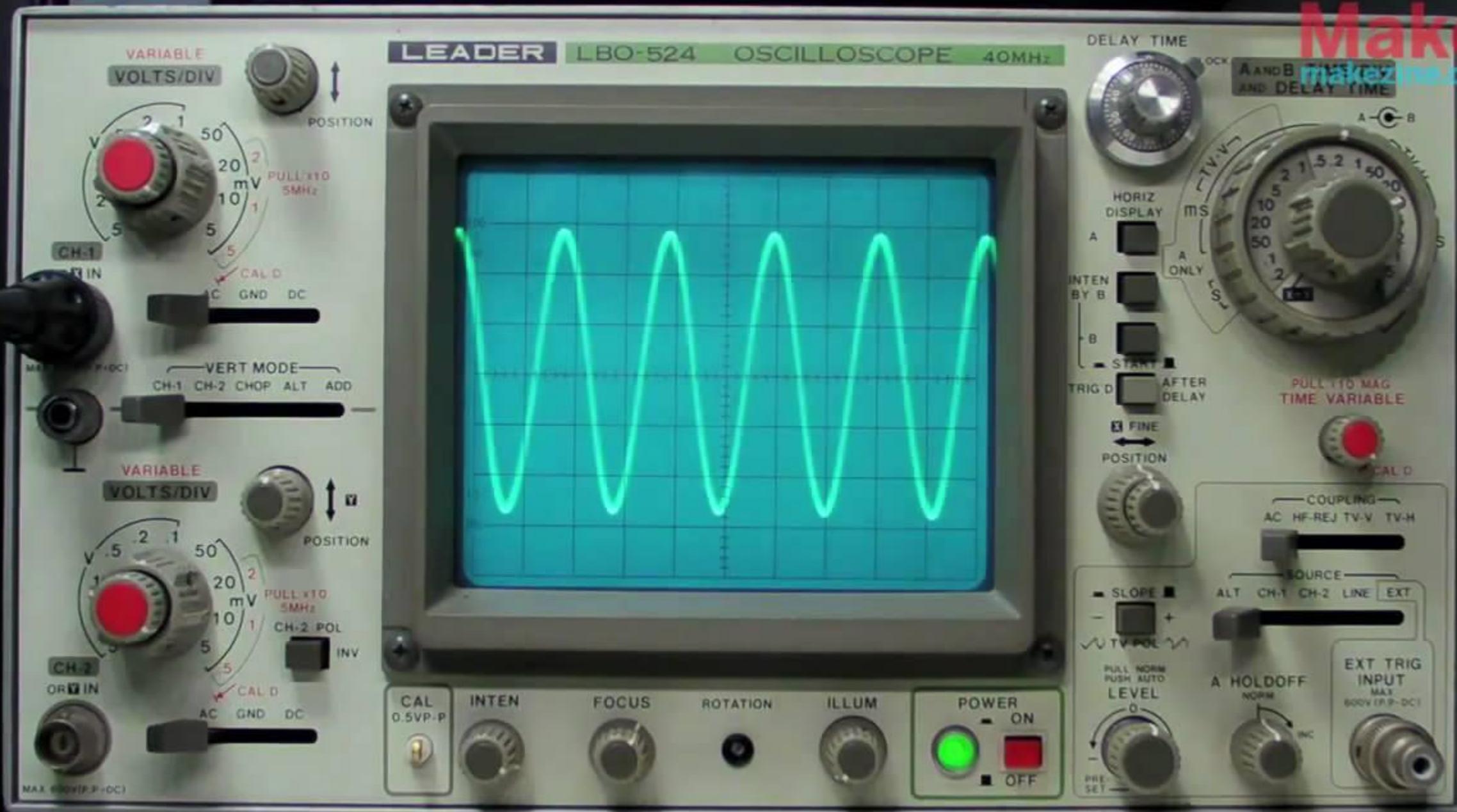
Project Premonition uses drones to find mosquito breeding grounds, robotic traps to gather specimens, and cloud-scale genomics powered by machine learning to search the specimens' DNA for pathogens.

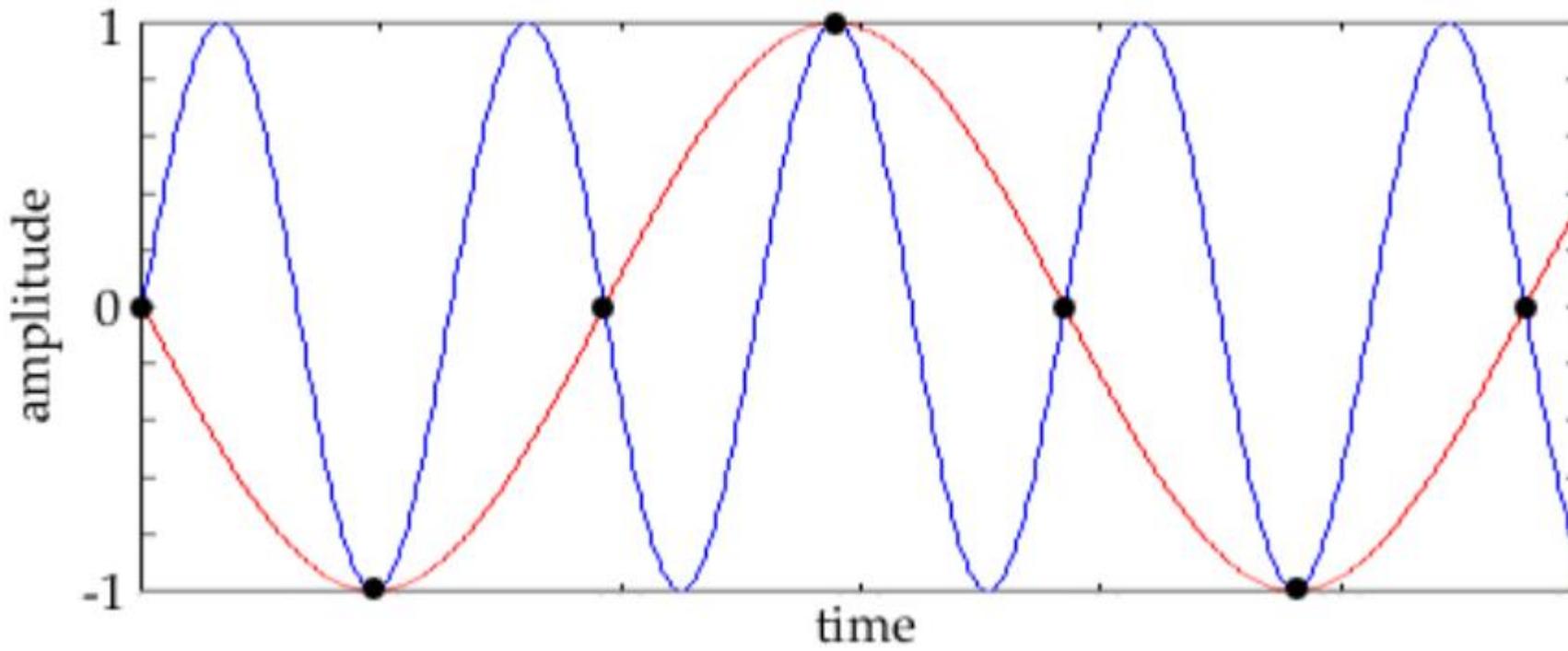
"Using the Microsoft Cloud, we can analyze more than 100 million pieces of DNA in every sample," says Microsoft Researcher Ethan Jackson.



The Microsoft Cloud is fighting disease by turning mosquitos into data-gathering devices, and analyzing pathogen data ... **so we may one day stop outbreaks before they begin.**

For more information, please see the [Premonition video case study](#).





$$F_N = \frac{f_e}{2}$$



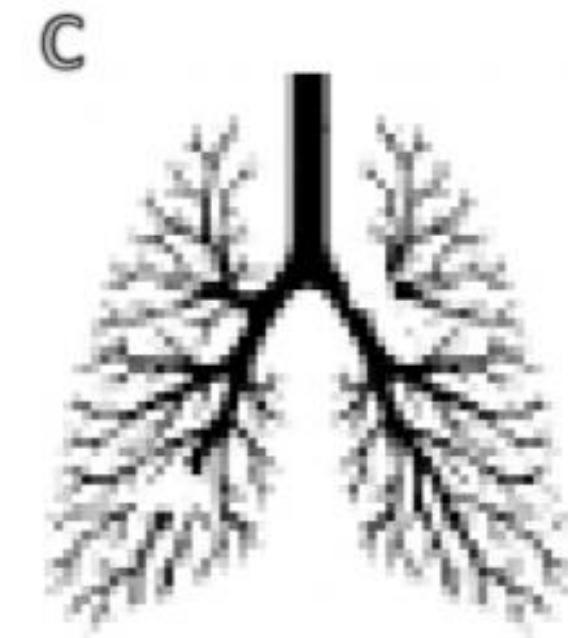
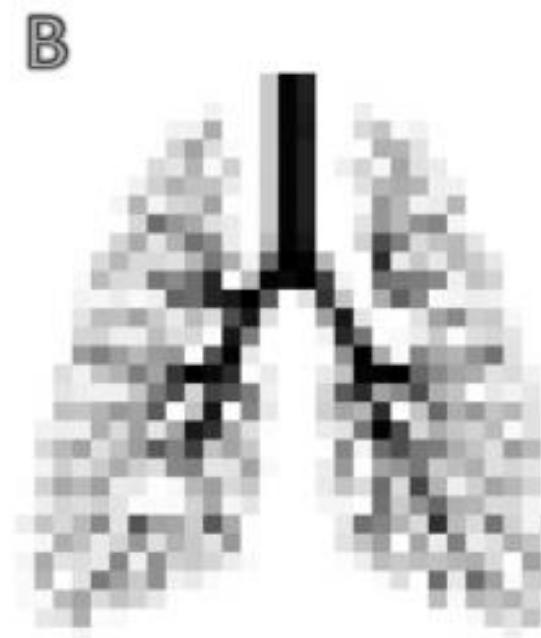
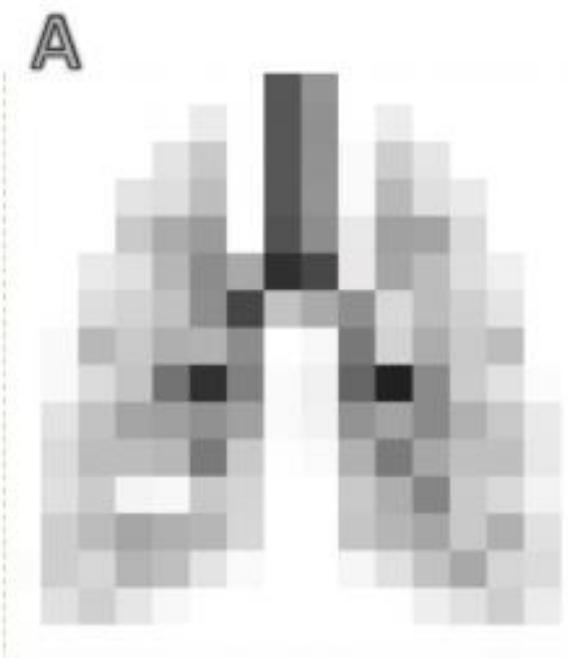
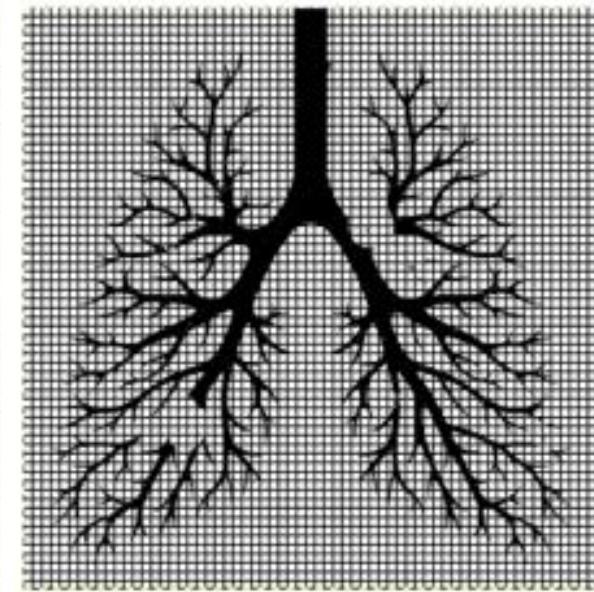
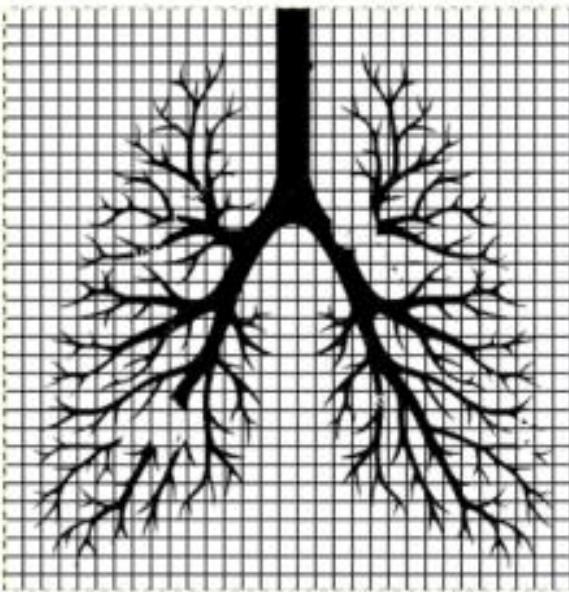
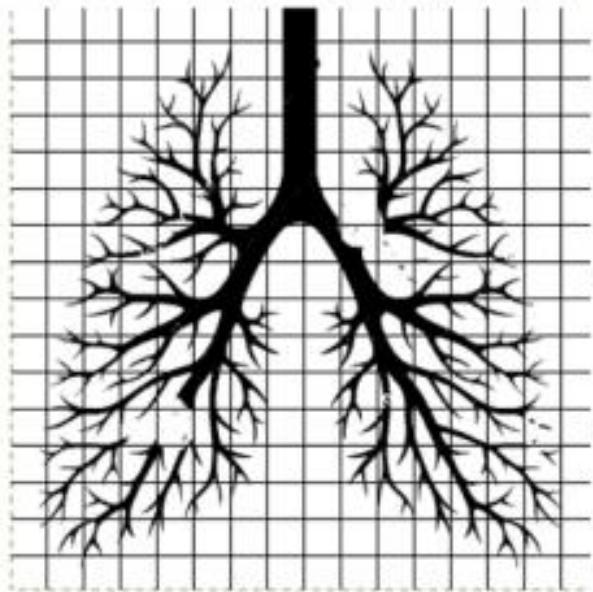


There is a theory about that!

# Nyquist–Shannon sampling theorem

In the field of digital signal processing, the sampling theorem is a fundamental bridge between continuous-time signals (often called "analog signals") and discrete-time signals (often called "digital signals"). It establishes a sufficient condition for a sample rate that permits a discrete sequence of samples to capture all the information from a continuous-time signal of finite bandwidth.

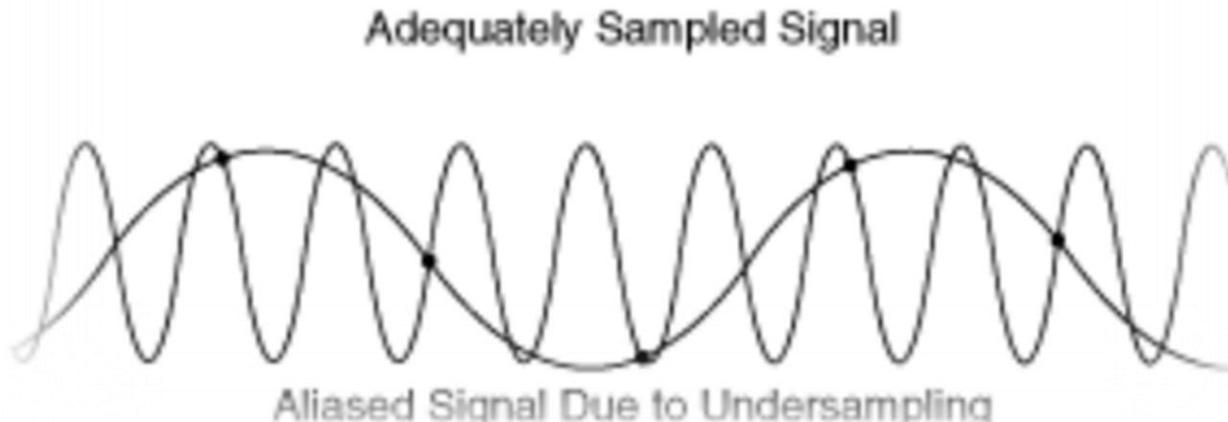
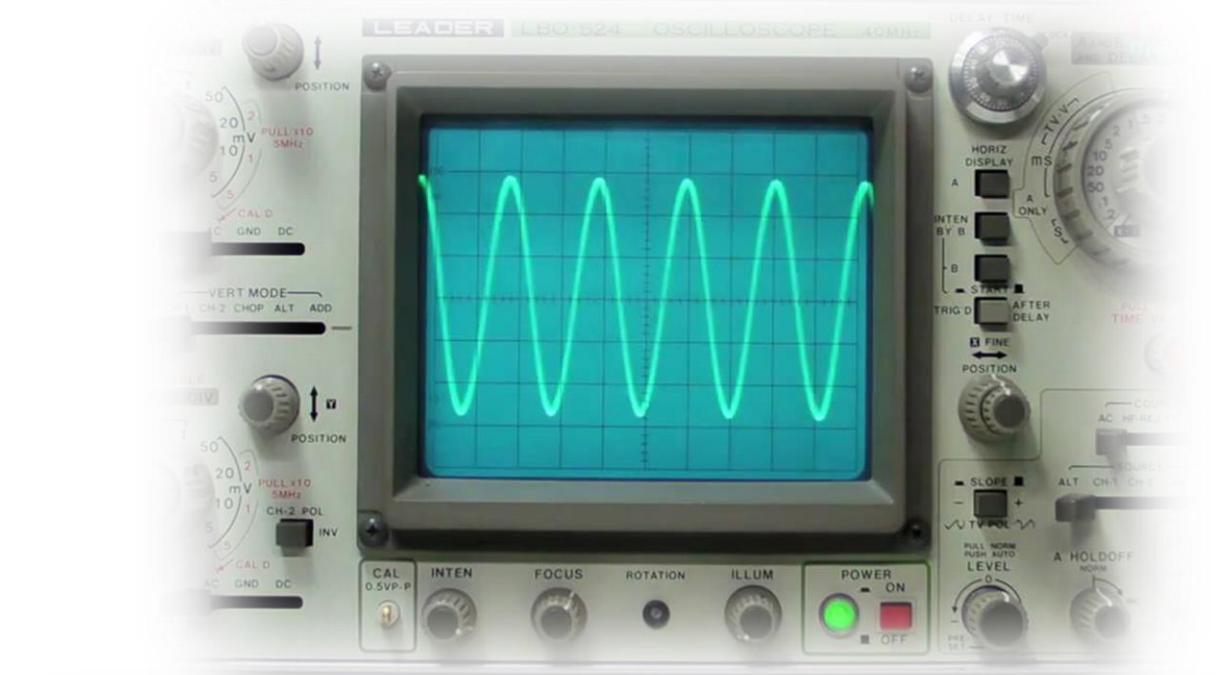
[https://en.wikipedia.org/wiki/Nyquist–Shannon sampling theorem](https://en.wikipedia.org/wiki/Nyquist–Shannon_sampling_theorem)



A

B

C



Questions:

What is the problem ?

Is there a Signal?

What is the Sample?

[https://en.wikipedia.org/wiki/Nyquist–Shannon sampling theorem](https://en.wikipedia.org/wiki/Nyquist–Shannon_sampling_theorem)

Data Bias is a sampling error

Ethics:  
the probable and the possible

# Future is the only way forward!



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brunosch@Microsoft.com

