



# THE IMPORTANCE OF RESEARCH

**Samuel Wanji, PhD**

**(Professor of Infection Biology and  
Global Health)**

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# Definitions

Research is an art of scientific investigation.  
It is regarded as a systematic efforts to gain  
new knowledge.

# Definitions

- Research is a careful investigation or enquiry especially through search for new facts in any branch of knowledge.

# Definitions

- Research comprises defining and redefining problems,
- Formulating hypothesis or suggested solutions;
- Collecting, organizing and evaluating data;
- Making deductions and reaching conclusions;
- Carefully testing the conclusions to determine whether they fit the formulating hypothesis

# Definitions

- Research is an organized and systematic way of finding answers to questions”
- Systematic because there is a definite set of procedures and steps which one will follow.
- There are certain things in the research process which are always done in order to get the most accurate results

# TYPES OF RESEARCH

## **Pure, Basic or Fundamental research**

- It is undertaken to improve our understanding of certain problems that commonly occur in social setting and how to solve them.
- It is undertaken for sole purpose of adding to our knowledge that is fundamental and generalizable.
- This type of research may have no immediate or planned application. But it may later be used in further research of an applied nature

## **Basic Research(ctd)**

Its objective is therefore, not to apply the findings to solve immediate problems at hand, rather to understand more about certain phenomena or problem that occur in social life or settings, and how they can be solved. It contributes to theory formation



## **Basic Research(Ctd)**

- .. It explains the phenomena as they are and as not they should be. It may verify or establish new one.

# Applied research

- Also called action or decisional research.
- It is undertaken in response to a societal problem, which requires a solution.
- Its major purpose is to answer practical and useful question.
- The results are practically applied to solve immediate problems.
- It involves normative prescription.
- Applied research is concerned with policy change

# Applied research

- Applied Scientific research relies on the application of the scientific method, a harnessing of curiosity.
- This research provides scientific information and theories for the explanation of the nature and the properties of the world around us.
- It makes practical applications possible

# **Applied research**

**Karl Pearson in his book *The Grammar of Science* says-**”There is no shortcut to truth ... no way to gain the knowledge of the universe except through the gateway of scientific research”

# Quantitative Research

Quantitative methodology is the dominant research framework in Biology, Physics, Mathematics Chemistry, Economics and humanities. It refers to a set of strategies, techniques and assumptions used to study processes through the **exploration of numeric patterns**.

# Quantitative Research

Quantitative research gathers a range of numeric data. Some of the numeric data is intrinsically quantitative (**e.g. personal income**), while in other cases the numeric structure is imposed (**e.g. ‘On a scale from 1 to 10, how depressed did you feel last week?’**).

# Quantitative Research

The collection of quantitative information allows researchers to conduct simple to extremely sophisticated statistical analyses that aggregate the data, show relationships among the data or compare across aggregated data

# Qualitative research

Qualitative research is defined as a market research method that focuses on obtaining data through open-ended and conversational communication.



# Qualitative research

This method is not only about “**what**” people think but also “**why**” they think **so.**

# Qualitative research

- Qualitative research is a process of naturalistic inquiry that seeks an in-depth understanding of phenomena within their natural setting. It focuses on the "**why**" rather than the "**what**" of phenomena and relies on the direct experiences of human beings as meaning-making agents in their every day lives.

# Qualitative research

- Rather than by logical and statistical procedures, qualitative researchers use multiple systems of inquiry for the study of natural phenomena.



**100 scientists, whom research activities shaped the humanity from the 17<sup>th</sup> century to the 21<sup>st</sup> century**

Lemaitre, Heike Kamerlingh, Isaac Newton, Jacques Charles, James Clerk Maxwell, James Prescott Joule, Jean Buridan, Johannes Kepler, John Ambrose Fleming, John Dalton, John O'Keefe, Joseph Black, Josiah Gibbs, Lord Kelvin, Lord Rayleigh, Louis Pasteur, Marie Curie, Martinus Beijerinck, Michael Faraday, Murray Gell-Mann & George Zweig, Neils Bohr

Albert Einstein, Alessandro Volta, Alexander Fleming, Amedeo Avogadro, Andre Geim, Antoine Lavoisier, Antony van Leeuwenhoek, Archimedes, Benoit Mandelbrot, Carl Friedrich Gauss, Charles Darwin, Christian Doppler, Copernicus, Crick and Watson, Dmitri Mendeleev, Edwin Hubble, Enrico Fermi, Ernest Rutherford, Erwin Schrodinger, Euclid, Fermat, Frederick Sanger, Galileo Galilei, Georg Ohm, Georges

Nicholas Steno, Peter Higgs, Pierre Curie,  
Ptolemy, Robert Boyle, Robert Brown,  
Robert Hooke, Roger Bacon, Rudolf  
Clausius, Seleucus, Shen Kuo, Stanley  
Miller, Tyco Brahe, Werner Heisenberg,  
William Gilbert, William Harvey, William  
Herschel, William Rontgen, Wolfgang Pauli.



# Scale Up and Study Effectiveness

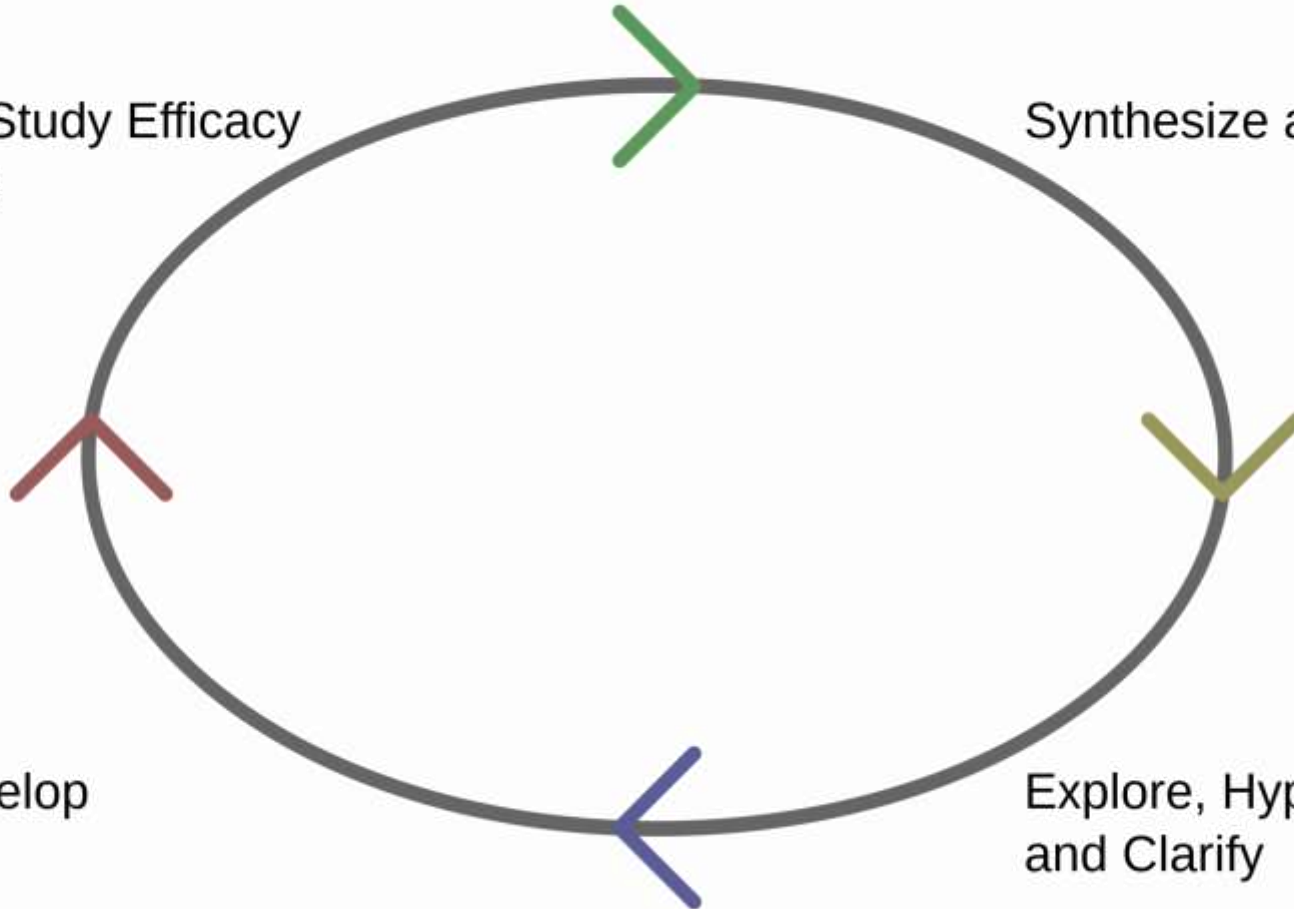
Implement, Study Efficacy and Improve

Synthesize and Theorize

Design, Develop and Test

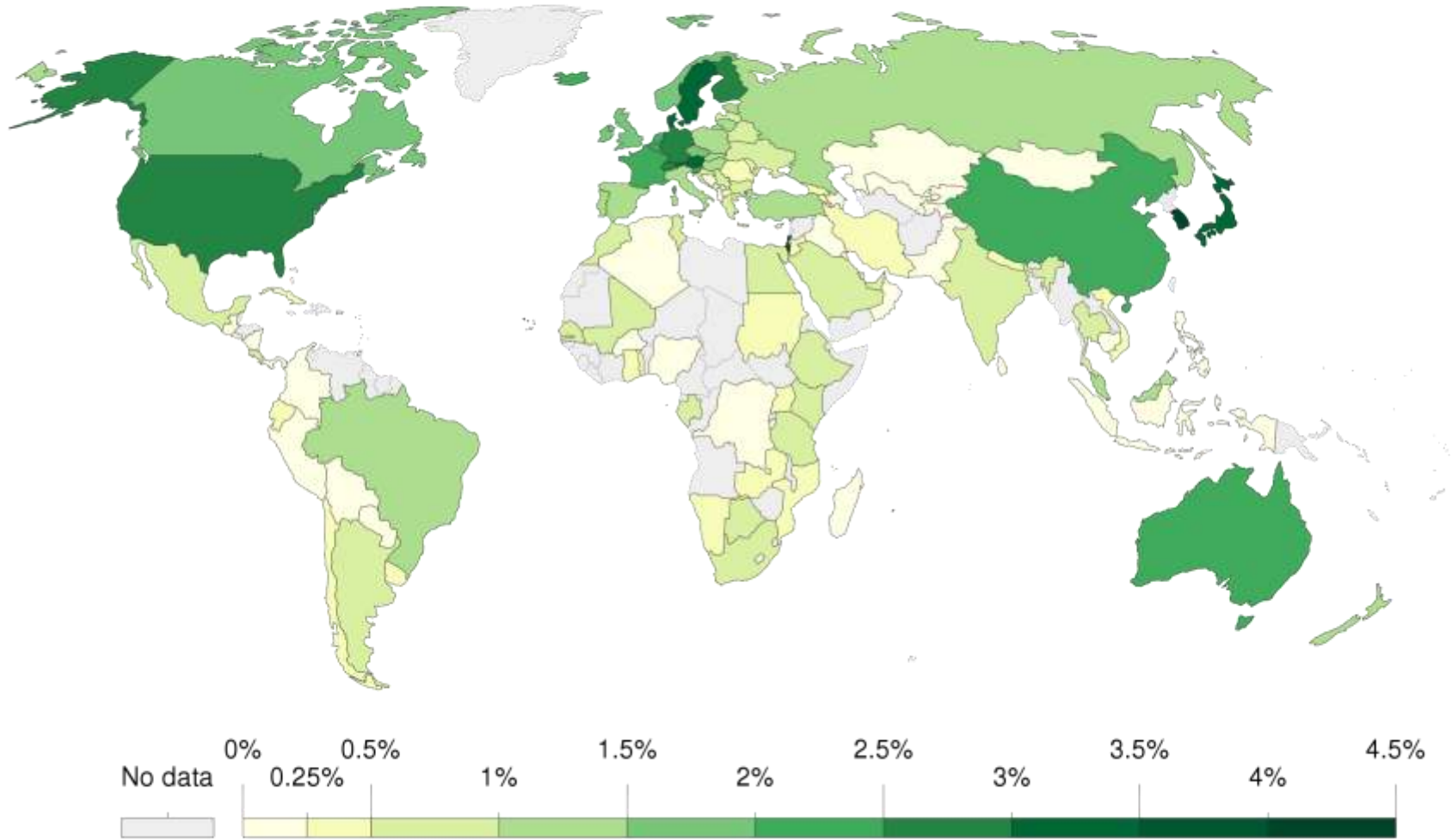
Explore, Hypothesize and Clarify

# Cycle of Research and Development



# Spending on research and development as share of GDP, 2015

Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.



# Importance of Research

- The history of science is measured in milestones of discovery. Each new milestone allows other scientists to further advance the sum of human knowledge.
- As Sir Isaac Newton said, **“If I have seen further, it is by standing on the shoulders of giants.”**

# Importance of Research

- Frank Herbert noted that **“the beginning of knowledge is the discovery of something we do not understand.”**
- Homo sapiens is an inquisitive species and it is a scientist’s profound curiosity that brings discoveries, pushing at the boundaries of the known world and bringing order to chaos.

# Importance of Research

## **Technology is Conceived Through Research**

Without the principles of Newtonian physics, our world would still be very simple. All of the technology used today would be impossible without those principles.

The law of gravity and the theories of special and general relativity have made almost all of our technology possible.

# Importance of Research

- Research into the world of physics, biology, economics, and culture all translate into insights that change the way we live.

# Importance of Research

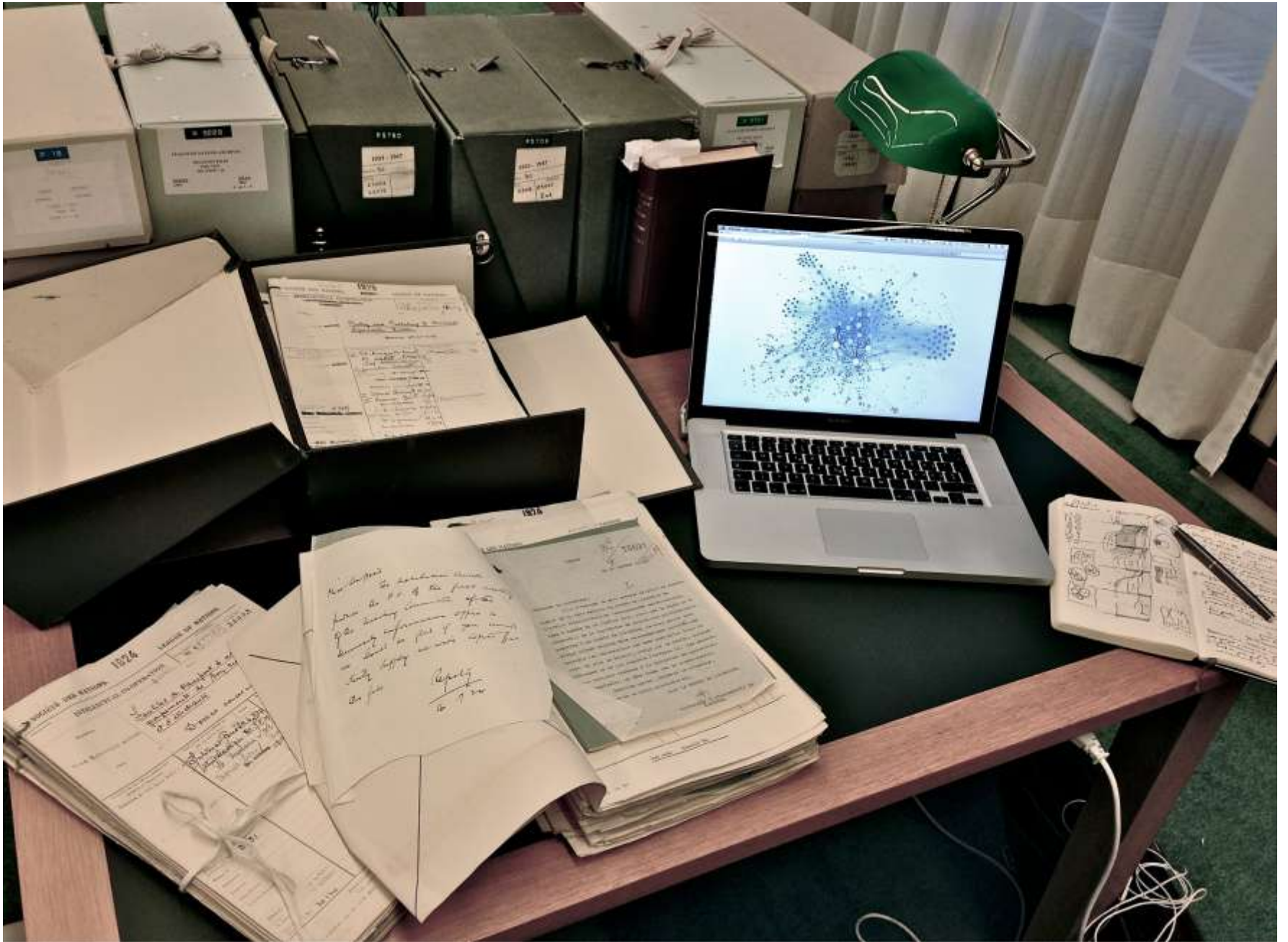
## A Catalyst for Changes in Society

- The impact of academic research is spread through all tiers of human civilization.
- As we inch forward, changes are made that benefit all people.
- Research into microbiology finds a way to decompose plastic.
- Inquiry into the cosmos demystifies longstanding cultural myths that people have accepted for centuries.



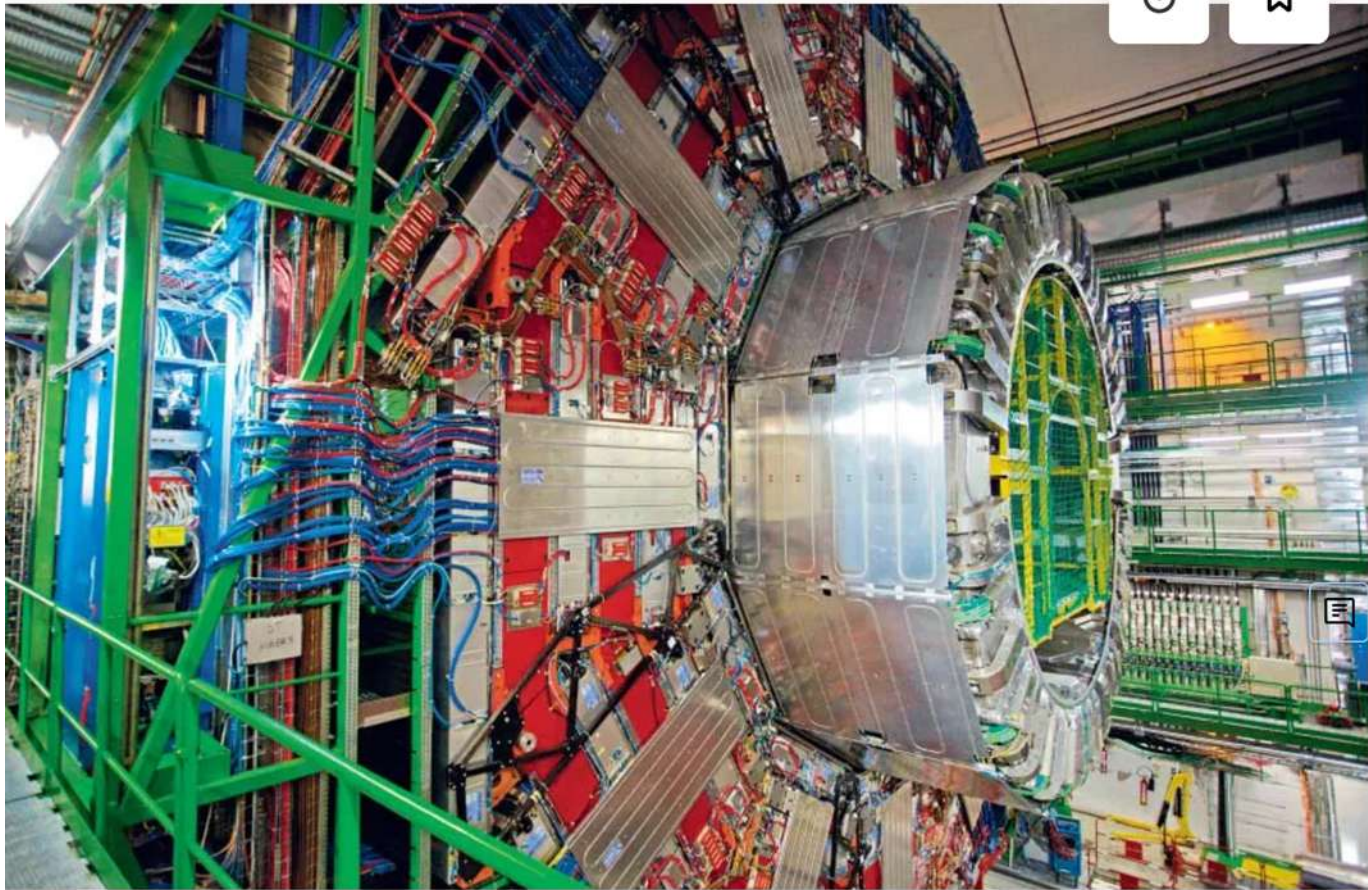
*Marie Curie working with daughter Irène Joliot-Curie, who, along with her husband Frédéric, won the 1935 Nobel chemistry prize for the discovery of artificial radioactivity. The Curies' success highlights the folly of restricting education and roles for women in science for hundreds of years.*



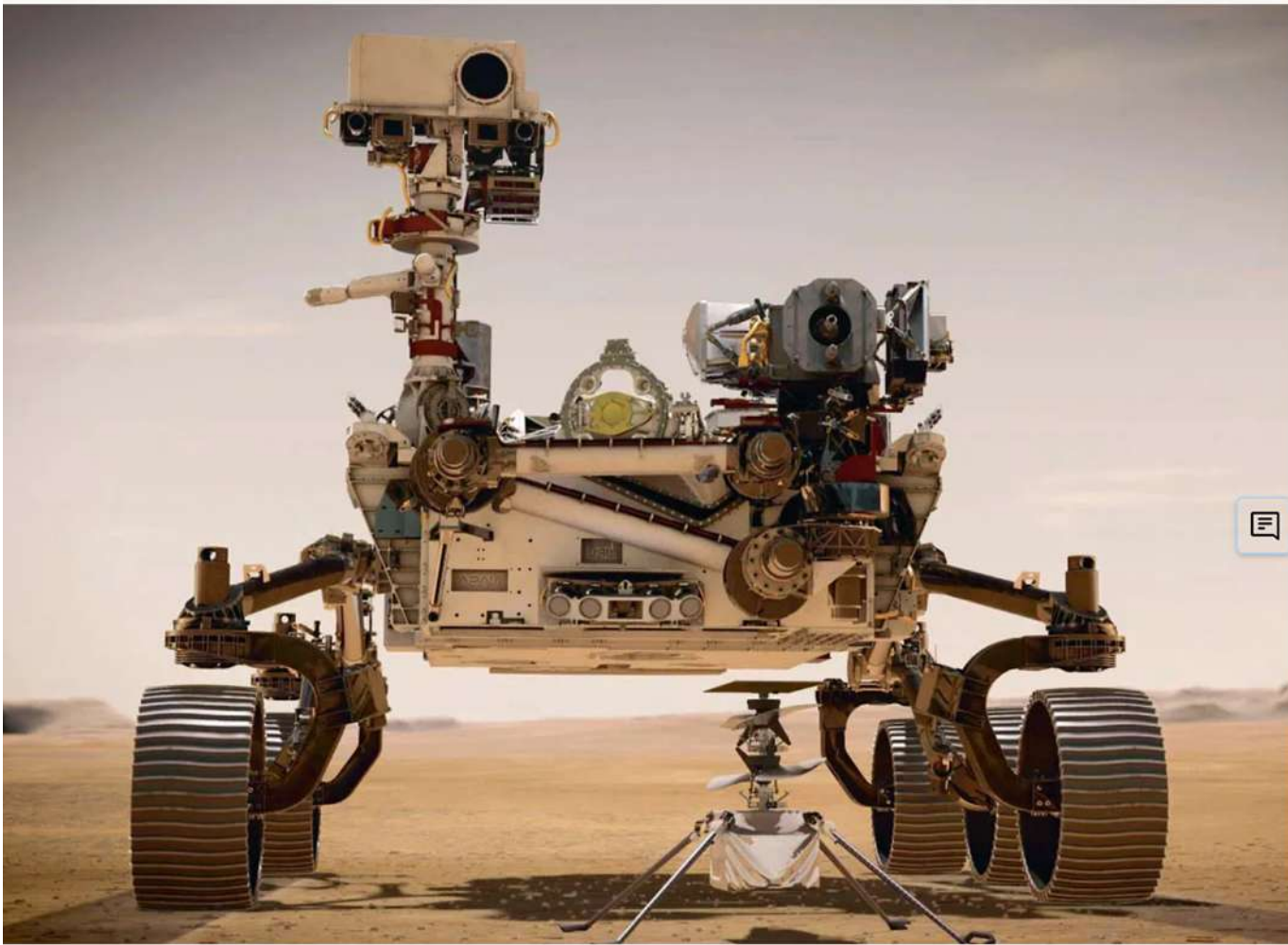








*The Compact Muon Solenoid detector attached to the Large Hadron Collider at CERN in Switzerland. It was built to study the outcomes of proton-proton collisions.*



*NASA's Perseverance Mars Rover and the Ingenuity Helicopter on the Martian surface. The Perseverance successfully landed on February 18, 2021 to begin the search for signs of ancient microbial life.*

# CONCLUSION

IF WE WANT THE DEVELOPMENT IN AFRICA,  
THE ONLY OPTION WE HAVE IS TO INVEST IN  
RESEARCH

**THANK YOU**