

# A Tale of Two Pandemics:

## Applying Lessons from Ebola to Drive Innovation for Zika

### Innovation & Technology Policy Lab | Global Health



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## Project Summary

With the significant international consequences of recent outbreaks, the ITP Lab conducted extensive stakeholder interviews and macro-level health policy analysis to expose gaps in pandemic preparedness and develop legal frameworks for future threats.

## The Pandemic Problem

- Emerging infectious disease outbreaks pose a significant health and socioeconomic threat

**Severe Acute Respiratory Syndrome (SARS) – 2002**

- 8000+ cases reported in 37 countries
- 700+ deaths prior to containment
- \$40+ billion in losses worldwide
- No vaccine is currently available for future outbreaks

**Middle East Respiratory Syndrome (MERS) – 2012**

- 1000+ cases reported in 24 countries
- \$2+ billion in losses during 2015 South Korea outbreak
- No vaccine is currently available for future outbreaks

Figure 1: Major Global Outbreaks 2000-2015

**Influenza A (H1N1) Virus – 2009**

- Cases reported in 200+ countries, territories, and communities
- 250,000+ deaths prior to containment
- \$40+ billion in losses worldwide
- Undersupply of vaccines inhibited outbreak management

**Ebola Virus – 2014**

- 28,000+ cases reported in 10 countries
- 10,000+ deaths prior to containment
- \$30+ billion in losses worldwide
- No vaccine is currently available for future outbreaks

**Zika Virus – 2015**

- Cases reported in 30+ countries
- Possible link to microcephaly
- \$3.5+ billion in estimated losses
- No vaccine is currently available for future outbreaks

## Research Strategy

- Challenges:**
- What motivates players to invest in infectious diseases?
- Methodology**
- Interviewed stakeholders from the public, private, and non-profit sectors
  - Analyzed partnership formation following the Ebola and Zika outbreaks

## Mapping R&D Alliances

Figure 2: Ebola Vaccine Development

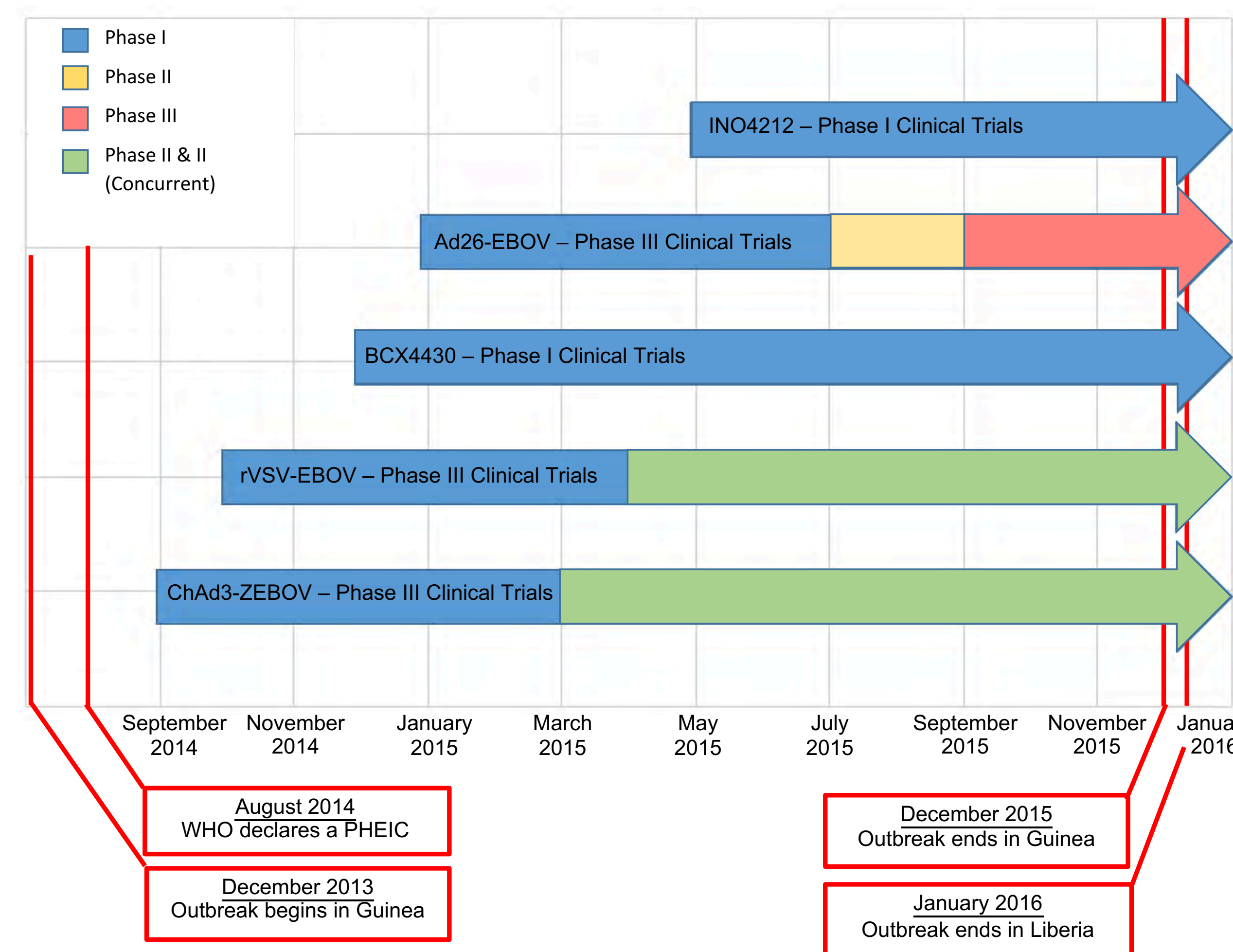


Figure 3: Zika Vaccine Development

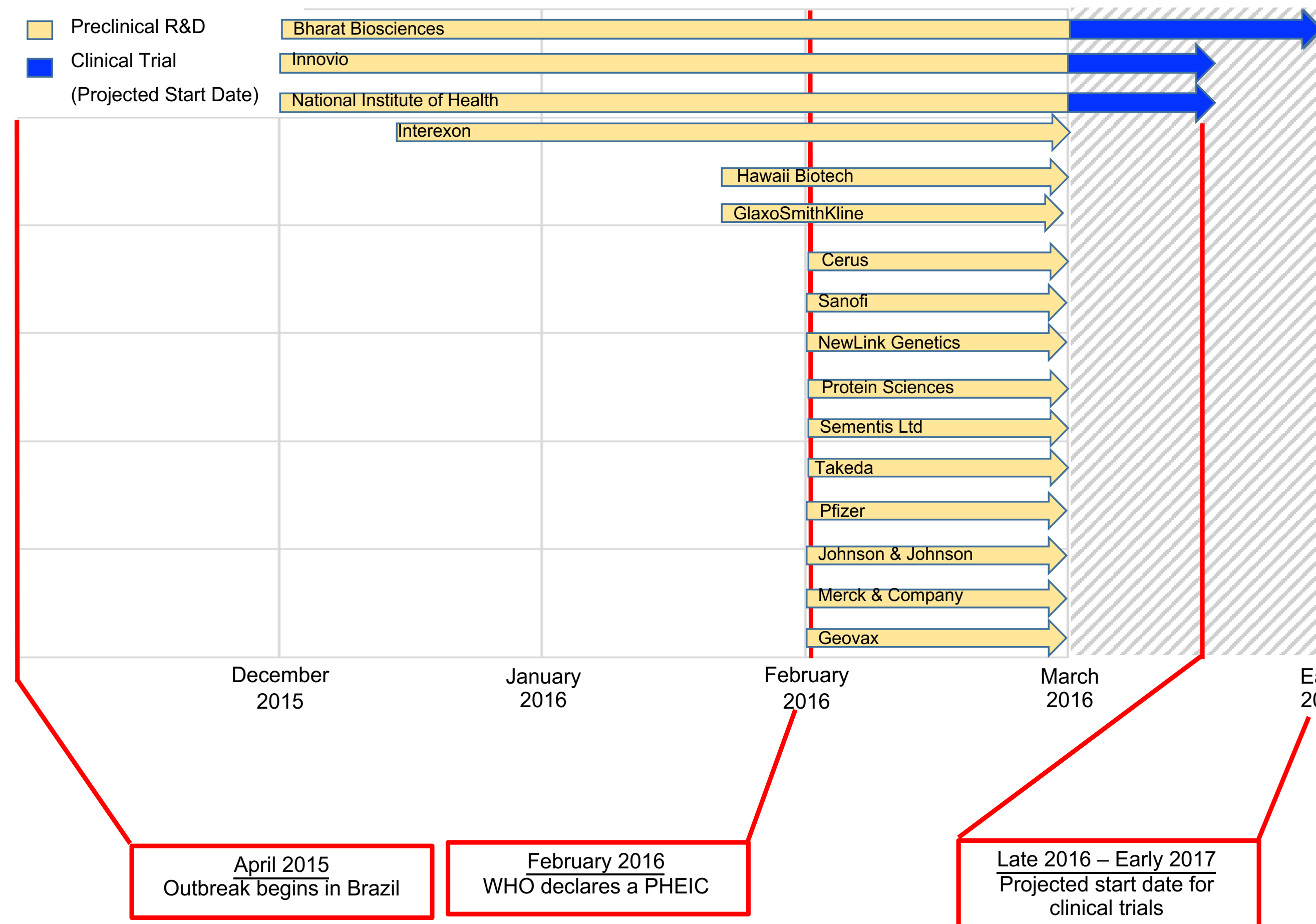


Figure 4: Partnership Breakdown

PLAYER	CLASSIFICATION	ROLE
Inovio Pharmaceuticals	Company - Small	Research & Development
MedImmune	Company - Small	Research & Development
GeneOne Life Sciences	Company - Small	Research & Development
University of Pennsylvania	Academic Institution	Research & Development
Defense Advanced Research Projects Agency, USA	Government Agency	Funding
Inovio Pharmaceuticals	Company - Small	Clinical Trials
MedImmune	Company - Small	Clinical Trials
GeneOne Life Sciences	Company - Small	Clinical Trials
University of Pennsylvania	Academic Institution	Clinical Trials

PLAYER	CLASSIFICATION	ROLE
Bavarian Nordic	Company - Large	Research & Development
Johnson & Johnson	Company - Large	Research & Development
National Institute of Allergy and Infectious Disease (NIAID), USA	Government Agency	Research & Development
Inserm, France	Government Agency	Research & Development
World Vision of Ireland	Non-governmental Organization (NGO)	Research & Development
Grameen Foundation	Non-governmental Organization (NGO)	Research & Development
London School of Hygiene & Tropical Medicine	Academic Institution	Research & Development
Oxford University	Academic Institution	Research & Development
Innovative Medicines Initiative	Public Private Partnership (PPP)	Funding
Bavarian Nordic	Company - Large	Clinical Trials
Johnson & Johnson	Company - Large	Clinical Trials
World Vision of Ireland	Non-governmental Organization (NGO)	Clinical Trials
Grameen Foundation	Non-governmental Organization (NGO)	Clinical Trials
National Institute of Allergy and Infectious Disease (NIAID), USA	Government Agency	Clinical Trials
Inserm, France	Government Agency	Clinical Trials
London School of Hygiene & Tropical Medicine	Academic Institution	Clinical Trials
Oxford University	Academic Institution	Clinical Trials

PLAYER	CLASSIFICATION	ROLE
BioCryst Pharmaceuticals	Company - Small	Research & Development
National Institute of Allergy and Infectious Disease (NIAID), USA	Government Agency	Funding
Biomedical Advanced Research and Development Authority (BARDA), USA	Government Agency	Funding
BioCryst Pharmaceuticals	Company - Small	Clinical Trials

PLAYER	CLASSIFICATION	ROLE
NewLink Genetics	Company - Small	Research & Development
Merck & Company	Company - Large	Research & Development
Public Health Agency, Canada	Government Agency	Research & Development
The Wellcome Trust	Non-governmental Organization (NGO)	Funding
Department of Defense (DOD), USA	Government Agency	Funding
Biomedical Advanced Research and Development Authority (BARDA), USA	Government Agency	Funding
The National Institute of Health, USA	Government Agency	Funding
Waller Reed Army Institute of Research	Government Agency	Vaccine Studies
Canadian Immunization Research Network	Government Agency	Vaccine Studies
USA, Army Research Institute of Infectious Disease	Government Agency	Vaccine Studies
World Health Organization	International Government Body	Clinical Trials
Epicentre	Non-governmental Organization (NGO)	Clinical Trials
Medecins Sans Frontières	Non-governmental Organization (NGO)	Clinical Trials
Nonwegian Institute of Public Health	Government Agency	Clinical Trials
Ministry of Health, Guinea	Government Agency	Clinical Trials
Partnership for Research on Ebola Vaccines, Liberia	Government Agency	Clinical Trials
College of Medicine and Allied Health Sciences, Sierra Leone	Government Agency	Clinical Trials
Ministry of Health and Sanitation, Sierra Leone	Government Agency	Clinical Trials
Center for Disease Control and Prevention, USA	Government Agency	Clinical Trials

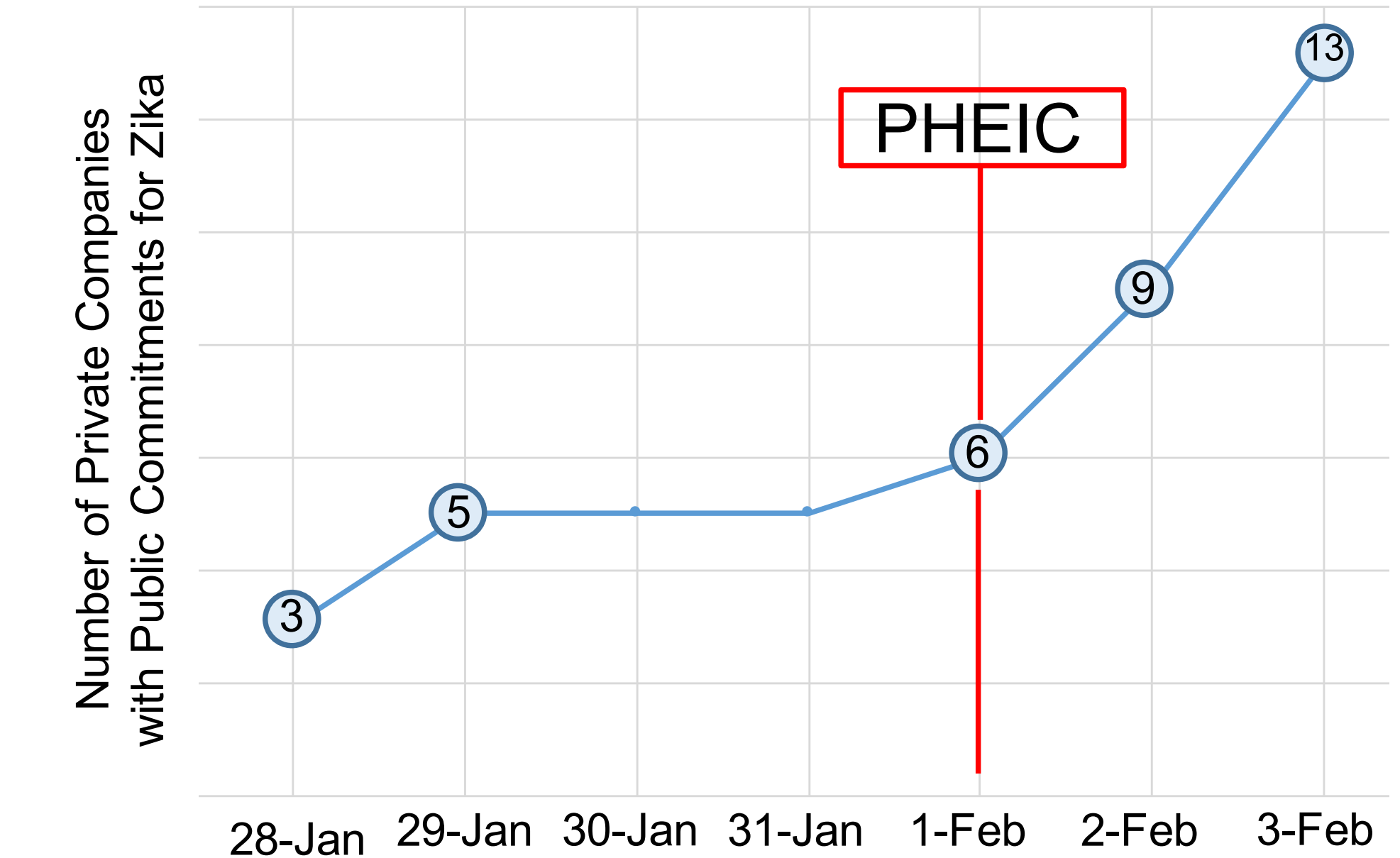
PLAYER	CLASSIFICATION	ROLE
GlaxoSmithKline	Company - Large	Research & Development
Public Health Agency, Canada	Government Agency	Research & Development
Oxford University	Academic Institution	Clinical Trials

## Stakeholder Analysis

- Public health imperative drove rapid response of key players
- Cost of drug development inhibits sustainable investment

## Rethinking R&D

Figure 5: WHO Mobilizes Private Sector



- Public-Private Partnerships (PPPs) are a model for risk-sharing and innovation
- Incentives must be tailored to meet unique partner profiles
- Pandemic response must be proactive and not reactive

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