

# Presentation on Measuring the Economic Impact of R&D Investments



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# Background

## Practitioner's Perspective on Economic Impact of Research

- Director of Economic Research at the Jacob France Institute
- Consulting Economic Analyst – Battelle Memorial Institute – Technology Partnership Practice
  - Work for Families USA on the Economic Impact of NIH Research (Gates Foundation)
  - Work with State's, Cities and Counties on Measuring and Capturing the Benefits of Federal and State R&D

# Measuring the Economic Impact of Investments in Research/Technology

1. What is Economic Impact Analysis;
2. Economic Impact Models;
3. Project Experience
  - a) Work Conducted for Families USA
    - In Your Own Backyard: *How NIH Funding Helps Your State's Economy*
    - Model Used, Data Used, Findings
  - b) Battelle Research that Pays Off: The Economic Benefits of Federally Funded R&D: The Human Genome Project
4. Role of Economic Impact Analysis

# What is Economic Impact Analysis

Economic Impact Analysis: Estimates the Impact on a Regional Economy of the Introduction of a Source of Economic Activity

Typically Uses a Model

- Most Often an Input-Output / I-O Model
- Model Analyzes Transactions Between Sectors
- The Impact of an Activity is Larger than the Simple Spending Associated with that Activity – Because of Local Purchases of Inputs – Most Importantly Raw Materials and Labor
- Model Uses Multipliers – Which Capture The Impact of a Source of Economic Activity

# What is Economic Impact Analysis

## Types of Impacts

- **Direct** = The Event Being Studied
- **Indirect** = Inter-Industry Transactions – i.e. Purchases of Inputs
- **Induced** = Change in Household Incomes – i.e. Purchases of Labor
- **Total** = Direct + Indirect + Induced

## Types of Impacts Measured

- **Output or Business Activity** = the increased output of goods and services in the economy;
- **Employment** = jobs created and supported
- **Earnings** = the additional earnings associated with the new jobs.

# Economic Impact Models

## Three Major Models Used

### 1. RIMS II – Bureau of Economic Analysis

- Spreadsheets Containing Multipliers
- Inexpensive and Easy to Use

### 2. IMPLAN – Minnesota IMPLAN Group

- Flexible / Adjustable
- User Friendly Approach
- Variety of Inputs
- Fiscal Impacts Included

### 3. REMI – Regional Economic Models Inc

# Work Conducted for In Your Own Backyard: *How NIH Funding Helps Your State's Economy*

## 1. Model Used = RIMS II

- Multiplier Report for 50 States
- Spending Adjusted to reflect the difference in purchasing power using the Biomedical Research and Development Price Index (BRDPI)
  - <http://officeofbudget.od.nih.gov/gbiPriceIndexes.html>

## 2. Data Used

- 2007 NIH Extramural Research awards made to each state.
  - [http://report.nih.gov/award/trends/State\\_Congressional/StateOverview.cfm](http://report.nih.gov/award/trends/State_Congressional/StateOverview.cfm)
- Understates the Economic Impact of NIH on Maryland/The Capital Region
  - Extramural Research = 83% of Research Funding – 10% is Intramural – Mostly at NIH Campus in Maryland – **Over \$3 Billion**

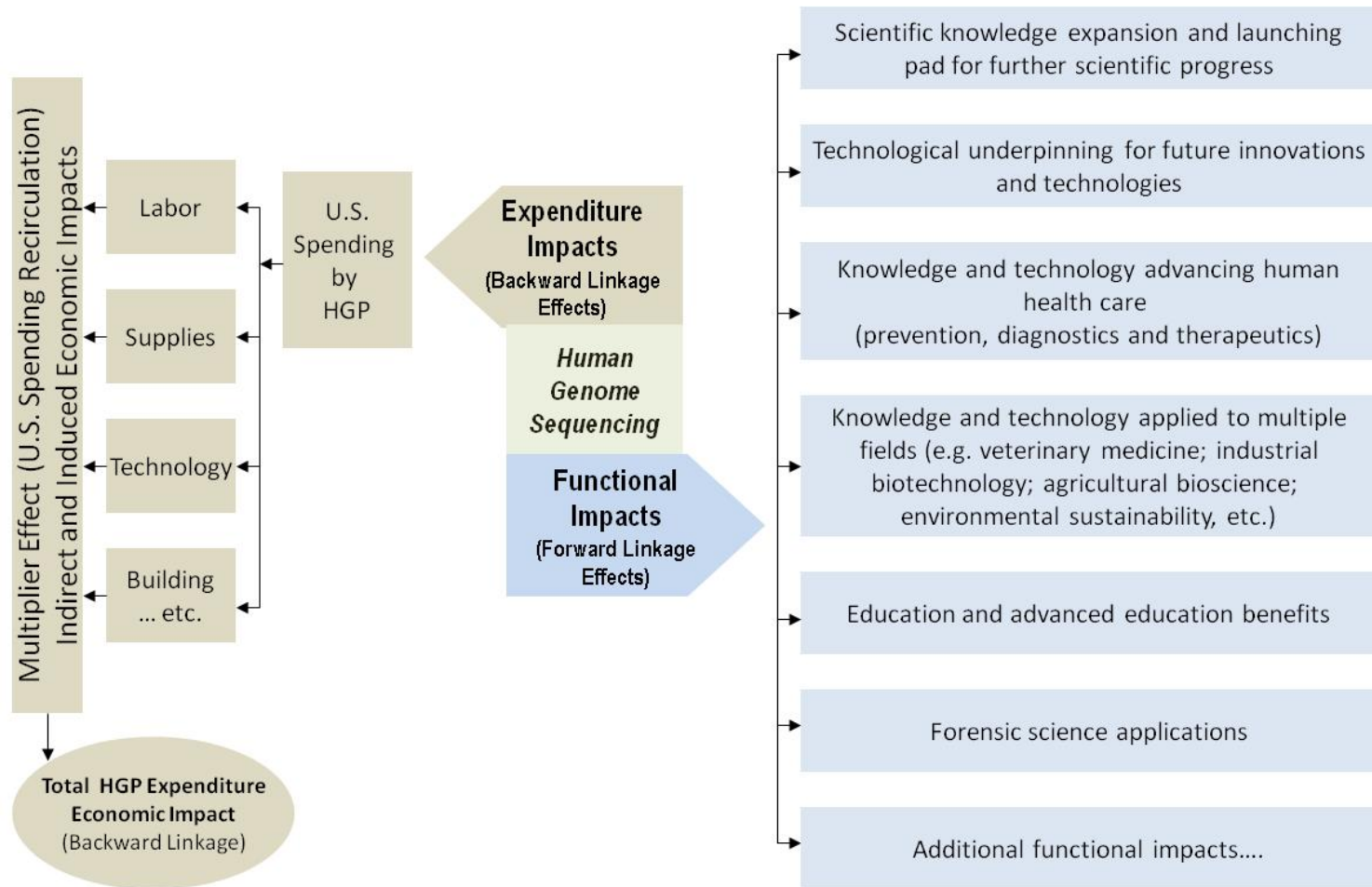
# Work Conducted for In Your Own Backyard: *How NIH Funding Helps Your State's Economy*

## **Findings**

- NIH made \$22.8 billion in grants and contracts to universities and other research institutions in the 50 states in FY 2007.
- NIH extramural research generated a total of \$50.5 billion in new state business activity.
- NIH grants and contracts created and supported more than 350,000 jobs that generated wages in excess of \$18 billion in the 50 states. The average wage associated with the jobs created was \$52,000.
- Overall multiplier over 2.0
  - Business activity generated per dollar of NIH funding ranged from \$2.49 (Texas) to \$1.66 (South Dakota).
  - The 10 states that generated the most economic activity per dollar of NIH funding were Texas (\$2.49), Illinois (\$2.43), California (\$2.40), Georgia (\$2.36), Colorado (\$2.34), Pennsylvania (\$2.32), Tennessee (\$2.32), Utah (\$2.30) Ohio (\$2.29), and New Jersey (\$2.26)



# Battelle Approach: Research that Pays Off: The Economic Benefits of Federally Funded R&D: The Human Genome Project



## Impact of Genomics and Genomics-Enabled Industry Activity 2010

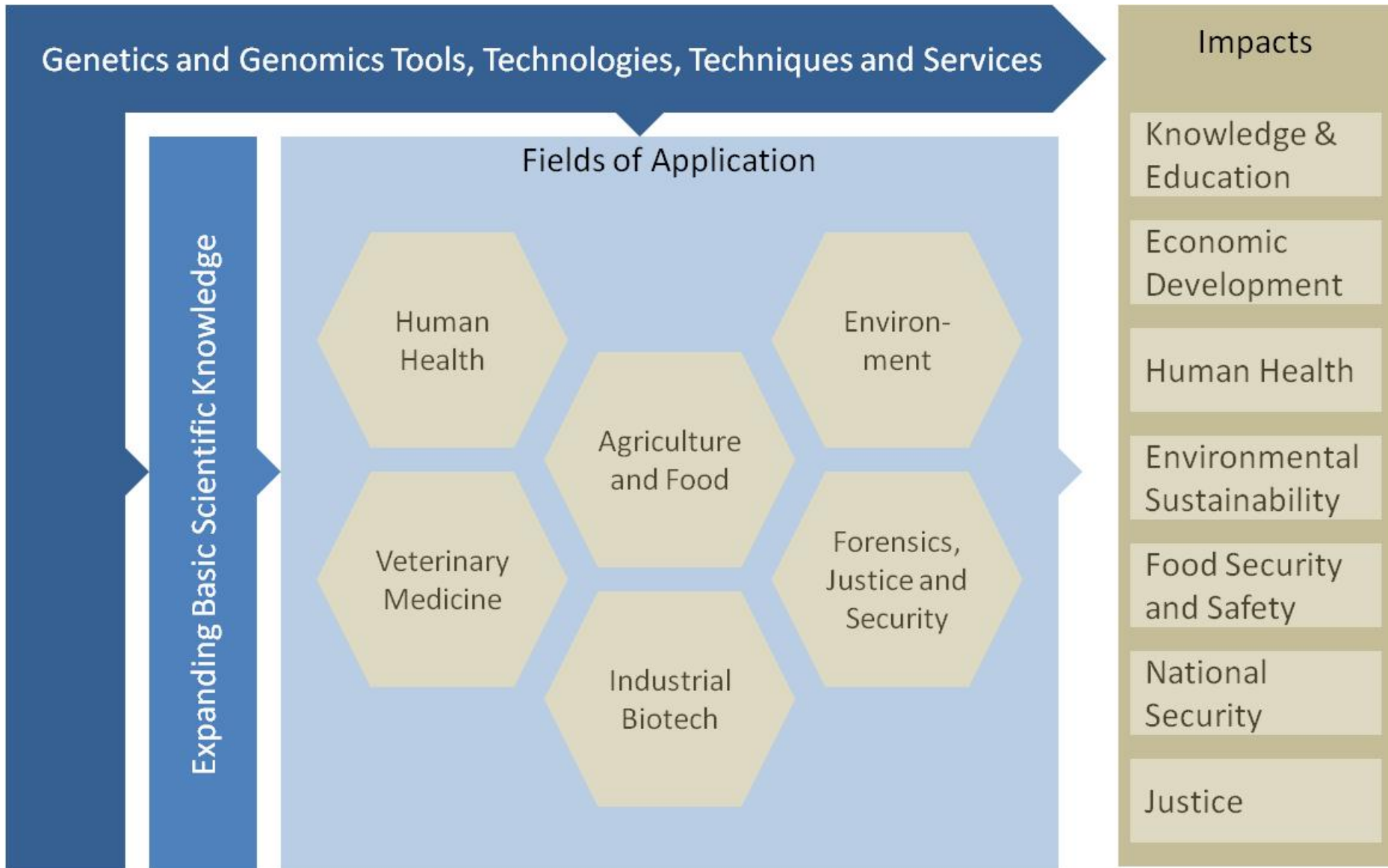
(in Millions, 2010 \$)

Impact	Employment (Jobs)	Personal Income	Output	State/Local Tax Revenue	Federal Tax Revenue
Direct Effect	51,655	5,577.2	22,627.5	212.3	952.2
Indirect Impacts	109,520	7,593.1	22,725.9	922.5	1,522.8
Induced Impacts	149,185	6,835.7	21,792.6	1,244.0	1,468.4
<b>Total Impact</b>	<b>310,360</b>	<b>20,006.1</b>	<b>67,146.0</b>	<b>2,378.8</b>	<b>3,943.4</b>
Impact Multiplier	6.01	3.59	2.97	11.21	4.14

In 2010 alone, genomics and associated research and industry activity directly and indirectly generated:

- \$67 billion in U.S. economic output
- \$20 billion in personal income for Americans
- 310 thousand jobs.

# The Functional Impacts of Genomics



# Role of Economic Impact Analysis

## National Level

- Demonstrate / Measure the Impact, Importance and Economic Contribution of Industries, Programs, and/or Policies
  - Examples: Economic Impact of NIH / Economic Impact of Medicaid
  - Economic Impact of the HGP
  - Industry Studies – BIO, PhRMA, IT - Apple

## State/Local Level

- Analyze the Economic Impact of Developments, Industries, Policies and/or Projects
  - Industry Studies
    - Economic Impact of the Biosciences on the Arizona Economy
  - Project Analyses
    - Economic Impact of the UMB BioPark on the Baltimore City Economy
  - University Studies
    - University System of Maryland, ISU, FSU.

# Role of Economic Impact Analysis

## Drawbacks

- In the Case of Research/Science and Technology Related Activities – Only Captures Spending Related Impacts – Misses Spillover Effects
- In the Case of Nanotechnology or Even Biotechnology (still) – Multipliers are Based on Average Industry Relationships – Not the Specific Industry-Relationships