Results-based Management of Basic Research

3 September 2009
Regional and Interregional Cooperation to Strengthen Basic Sciences in Developing Countries
Addis Ababa, Ethiopia
Greetings from Chancellor Dr. Nancy Cantor
Politics and Physics

- Einstein’s response to being asked why people could discover atomic power, but not the means to control it:

  “That is simple my friend: because politics is more difficult than physics.”
The growing research imperative

- Long-term development priorities
- Climate change
  - Adaptation
  - Mitigation
- Greater competition for funding
- Potentially larger amounts of funding

Results-based Management of Basic Research
UN report proposes new Marshall Plan to promote development and save the planet

1 September 2009 – A United Nations report launched today recommends a new Marshall Plan of more than $500 billion per year, or one per cent of global output, to help developing countries ease the impact of global warming and adjust to its effects while continuing on a path of economic growth.

“The science is clear. We need to drastically lower greenhouse gas emissions in order to protect the planet and avoid dangerous temperature rises globally,” stressed Rob Vos, a Director of the UN Department of Economic and Social Affairs (DESA).

“If we do not significantly reduce emissions the damage to poor countries as a percentage of GDP [gross domestic product] will be up to more than 10 times greater than in the United States and most other developed countries,” Mr. Vos told reporters in New York at the launch of the 2009 World Economic and Social Survey: Promoting Development, Saving the Planet.
## Participation in the Intergovernmental Panel on Climate Change

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<td>US</td>
<td>39.6%</td>
<td>38.9%</td>
<td>27.9%</td>
<td>33.4%</td>
<td>16.0%</td>
<td>22.0%</td>
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<td>Other JUSCANNZ</td>
<td>16.7%</td>
<td>16.4%</td>
<td>14.4%</td>
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<td>EU</td>
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<td>5.8%</td>
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<td>Total</td>
<td>771</td>
<td>586</td>
<td>222</td>
<td>619</td>
<td>375</td>
<td>259</td>
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What is Results-Based Management?

- A management approach that:
  - Focuses on performance in achieving results
  - Identifies whether planned activities contribute to achieving expected results
  - Shifts focus from activities or outputs to outcomes
  - Focuses and sharpens thinking and programming
  - Is broadly used by major funding agencies (UNDP, World Bank, EU, UK-DFID, CIDA, Sida)
What’s In It For You?

RBM helps you to:

- Better focus and manage programmes and projects
- Prove the contribution of project/programme to stakeholders, including funding organizations
- Increase funding for research
- Learn lessons for future programming
Can help ensure funding

- Can help respond to Dr. Hassan’s Challenge 3
- Prove that research and basic science can produce results (in practice)
- Eliminate argument that the funds are not well-spent
- Can provide the basis for a new approach to funding (e.g. research directed to specific adaptation and mitigation problems)
Examples of Workshops on RBM in research

- Networks and regional arrangements
  - WIOMSA
  - Bio-Earn
  - CSUCA

- Universities
  - Universidade de Eduardo Mondlane
  - National University of Rwanda
  - Universidades Mayores de San Simon and San Andres en Bolivia
  - Universidades in Nicaragua and Honduras
Results-based Management Process

I. PROGRAMME PLANNING: Formulating Strategies
1. Visioning
2. Objectives & outcomes (PIs)
3. Design & Formulation
4. Interdependencies
5. Prioritization
6. Strategic Resourcing

II. PROGRAMME IMPLEMENTATION: Monitoring, Assessing & Reporting Performance
1. Operational execution
2. Monitor progress
3. Assess performance
4. Make adjustments
5. Report performance

III. PROGRAMME EVALUATION: Appraising Results
1. Plan evaluation
2. Conduct evaluation
3. Report results
4. Follow-up adjustments

Results-based Management of Basic Research
Dimensions of a Research Problem

- Determine the name of the problem
- Sketch out the causes of the problem
- Outline the context in which it takes place, including linkages
- Determine stakeholders and actors
- Determine what is not known and identify research needs
Problem Analysis

Figure 8: Hierarchical Causal Tree

CONSEQUENCE

PROBLEM

CONDITION (BROAD)

CONDITION (SPECIFIC)

BEHAVIOR

ATTITUDE

KNOWLEDGE

general social, cultural, & political factors

CONDITION (BROAD)

CONDITION (SPECIFIC)

CONDITION (SYSTEMIC)

SYSTEMIC CAPACITY

PUBLIC POLICY

Results-based Management of Basic Research
Most problems have a long-term dimension

Most programmes are time-limited

Need to narrow the problem definition to a shorter time-period

Find a time horizon that fits normal budgeting, financing or decision-making cycle

For research this is often defined by funders
Basic RBM Concepts -
A Review

- Result
- Logical Framework
- Objectives
- Outcomes
- Outputs
The OECD/DAC Glossary of Evaluation terms:
• The output, outcome or impact (intended or unintended, positive and/or negative) of a development intervention.

It is a hierarchy:
1. Achievement of objectives (impact)
2. Obtaining desired outcomes (expected accomplishments)
3. Producing programmed output
The RBM “Logic”

Source: IAEA training

Results-based Management of Basic Research
### The logical framework

- **Main basis for determining results**
- **Key term is outcomes**

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Outcomes</th>
<th>Performance Indicator</th>
<th>Source of data</th>
<th>Means of obtaining data</th>
<th>Assumptions</th>
</tr>
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</table>

Specific Objective 1:

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<td>1.2</td>
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Example: Microbiology research at the Universidad Nacional Autonoma de Honduras

“Mycobacterium tuberculosis, drug-resistance, spread and immune response of patients with tuberculosis infection in Honduras”
## LOGICAL FRAMEWORK

### Objetivo Específico 1: Implementar en la red nacional de laboratorios una técnica alternativa para la detección temprana de drogas resistencia en Mycobacterium tuberculosis mediante la comparación con el método de referencia.

<table>
<thead>
<tr>
<th>Productos</th>
<th>Resultados Directos</th>
<th>Indicador de Desempeño</th>
<th>Fuente de Datos</th>
<th>Método para obtener los datos</th>
<th>Sesiones</th>
<th>¿Cuándo?</th>
<th>Responsable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporte técnico del estudio piloto</td>
<td>Publicación en Peer-Reviewed Journals</td>
<td>Revista Internacional en la Cen fue publicado</td>
<td>Análisis de Archivo (papel web) y Análisis de Comunicado (Memorias)</td>
<td>Fondos disponibles</td>
<td>Octubre 2010</td>
<td>Dra. Leilany Pineda Dra. Santa Rosales</td>
<td></td>
</tr>
<tr>
<td>Los manuscritos de los Artículos a ser sometidos para publicación</td>
<td>Divulgación de los resultados en Conferencias Nacionales e Internacionales</td>
<td>Memorias de las conferencias</td>
<td>Análisis de Comunicado (Memorias)</td>
<td>Fondos disponibles</td>
<td>Mayo 2010</td>
<td>LNR-TB Dra. Leilany Pineda Dra. Santa Rosales Dra. Carol Rodríguez</td>
<td></td>
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Most often the results chain takes the form of a results framework.
Types of research results

- **Academic track**
  - Research results used by other academics
  - Research improves credibility of the university
  - Quality of education improves

- **Non-academic track**
  - Research results used for policy
  - Research results applied by industry, government or local communities
Many projects say that their objective is to develop capacity.

How do you measure capacity?

Capacity is measured by use:
• Connection of post-graduate education and use of thesis results
• Networks increase inter-university cooperation
• Research is used by intended beneficiaries
**Objective:** Solar power initiatives provide 8% of total energy required.

**Outcome:** Use of photovoltaic cells that are adapted to the country including means of manufacture.

**Output:** Research reports on effective photovoltaic cells.
Objective 1: 10% of total energy derived from renewable sources by 2020

Outcome 1.1: Solar power initiatives provide 8% of total power

Outcome 1.1.1: Photovoltaic technicians use their training to set up micro-solar installations

Output: Photovoltaic technicians trained

Outcome 1.1.2: New types of solar panels based on local needs and manufacturing capabilities are patented and used

Output: Research reports on improved solar panels
Outcome 1.2: Energy conservation reduces household use by 25%

Outcome 1.2.1: National policy adopted & enforced for electrical efficiency of appliances

Output: National policy proposals for electrical efficiency of appliances

Outcome 1.2.2: Increased use of compact florescent light bulbs

Output: Low cost access to compact fluorescent light bulbs
Linkage of Elements

- Is the problem one on which the project or programme can have an impact?
- Does the objective focus on the problem to be addressed?
- Are the outcomes intermediate changes needed to achieve the objective? And, how do you expect to verify the change has happened?
- Will the outputs help lead to the outcomes?
Objective

- An overall desired achievement involving a process of change and aimed at meeting certain needs of identified end-users within a given period of time.
- The situation you will observe at the end of a specific period.
Criteria for Good Objectives

- Specifies an observable end-state
- Is measurable (uses descriptive terms such as increase, eliminate, establish)
- Identifies the end-user (who or what is supposed to change)
- Identifies the time-frame
ICGEB-TWAS-UNESCO/IBSP Joint Project in Basic Molecular Biology

• aims to promote research on plant and animal pathogens that affect agricultural productivity in developing regions

• create a network of laboratories in this area of research for South-South and North-South co-operation

• building research capacity in scientifically lagging countries and in the developing world at large
Measurable terms

- End state has to be observable
  - If you can’t see it, how do you know that it is there?

- All of the descriptive terms in the objective should be observables:
  - e.g. “increase” and “eliminate” imply baselines
  - “Establish” or “create” means that you can see the organization or institution created
Point in Time

- Have to be clear about when the end-state should be observed
- Can be a programming point
e.g. medium-term plan horizon, a project or budgeting cycle
- Or, an arbitrary point in the future
- But there must be a point
Examples of Objectives

- To increase agricultural production by eliminating losses due to insect pests by 2015. (The objective is stated as an end-state – e.g., a situation where agricultural production is higher than it would have been if the pests had not been controlled.)

- To build sustainable research collaboration between Sweden and programme countries contributing to knowledge relevant to poverty alleviation within x years.
More Examples of Objectives

- To increase the use of research produced by universities and research centres in addressing climate change by 2015.

- To improve the effectiveness of the network in influencing health-related policy and interventions in East Africa by 2015.

- To establish analytical and research capacity and production of scientific knowledge in the areas of health, engineering, agriculture and environmental sciences within 2 programme cycles.
Some tips on drafting objectives

- Use the infinitive (“to ... something”)
- Make the operating verb clear (avoid ambiguous terms like “strengthen”, “enhance”)
- **Never, never** make it an activity (“to promote…”, “to support…”)
- Make it evocative
What you would like to see

An objective is the description of the end-state that should be observed at a certain point in time.

Impact is the achievement of objectives

It is the result of changes in the situation of a beneficiary population.
Outcome

- Is a *change* that leads to the fulfillment of an objective
- Is an *intermediate* change or consequence of a programme's output in the target population
- Is usually a result of the generation of several outputs
- Is observable and can be described
- Is *not* under the direct *control* of a programme/project
**Language For Results**

**Action Language**
- Expresses results from the provider’s perspective
- Can often be interpreted in many ways
- Focuses on completion of activities

**Change Language**
- Describes changes in the conditions of end users
- Sets precise criteria for success
- Focuses on results, leaving options on how to achieve them

Source: UNICEF training
Outcomes should be 'SMART'

1. Are they linked to Specific objectives?
2. Can progress be Measured (verified) for each of them?
3. Are they Achievable?
4. Are expected accomplishments Relevant to problem?
5. Can they be done in a Timely manner?

Outcomes should not be ‘AT’ (Activities or Trivial)
Num3ers

Are You a Math Genius?
Test your math knowledge with the weekly math puzzle.

Solve Now

Gym Temperature
Optimum Conditions
Muscle Soreness
Court Coverage
20m Speed
Agility

Jump
Outcome Examples: Educational Institutions

- PhD dissertations used by fellow students
- Increase in publications by faculty in peer reviewed journals
- Increased use of improved library facilities
- Recognition of programme by peer institutions
- Increased retention of PhD graduates
Outcome Examples: Research

- Increased use of research projects by government agencies
- International recognition of the quality of research
- Increase in regional multi-disciplinary research projects
- Increased use of research results by target population
- Use of technologies, tools and identified varieties in national breeding programmes
- Use of virus indexing tools for the production of clean plant materials
Outcome Examples: Networks

- Establishment of functional networks that respond to research tasks in the region
- Agreement on a strategy for intervention amongst all regional partners
- Increase in collaboration initiatives between universities in region
<table>
<thead>
<tr>
<th>Not So Good</th>
<th>Good</th>
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<tr>
<td>Able to establish a strategy for intervention</td>
<td>Agreement to a strategy for intervention</td>
</tr>
<tr>
<td>Promote a means to disseminate research findings</td>
<td>Establish a policy for effective dissemination of research findings</td>
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**Performance Indicators**

- Performance Indicators are a generic question:
  - Did the outcome (change) happen?
  - They are what will be seen if the outcome happens

- They help verify progress is being made (or not)

- They can be an early warning system for identifying problems

- Key question is:
  - How am I going to measure and collect data on it?
A practical problem

- Problem noted in a number of presentations
  - SARBIO noted the challenge of measuring impacts on persons trained and the need to have better assessment tools
Criteria for a Good Performance Indicator

- Should relate to a specific outcome
- Be clearly stated
- Be cost-effective
- Be determined by key stakeholders → increased sense of ownership
Examples of Performance Indicators

Objective: To improve the effectiveness of research programme in influencing public policy in specified areas.

PI: Extent that multi-disciplinary research is used in policy deliberations

PI: Extent that researchers are regularly involved in policy deliberations

Outcome: Increase in publications by faculty in recognized journals:

PI: Change in # of publications in peer-reviewed journals
More Outcome-Related Performance Indicators

- Increase in research projects funded: PI - number funded
- Increased analytic & research capacity: PI - number of researchers using their training in post-doctoral activities
- Increased recognition of quality of research: PI - number invitations to conferences
- Increase use of improved facilities: PI - Extent of use

Results-based Management of Basic Research
Outputs

- Are the product or service provided by your project or programme
- Help induce the intended outcome (changes)
- May require a series of outputs to achieve an outcome
- Should be expressed in tangible and measurable terms
Examples of Outputs

Product, such as
- a report or study
- a new technique developed in a laboratory
- analysis

Service, such as
- organize a donors meeting (the outcome would be the donors donate)
- inspection or servicing of an expert group meeting
- offer advice or make a recommendation
## Distinction Between Outcomes & Outputs

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Product or service provided by project</td>
<td>What happens when you provide product or service</td>
</tr>
<tr>
<td>You can produce or provide them</td>
<td>You can influence them in others</td>
</tr>
<tr>
<td>Within control of project</td>
<td>Not within control of project: dependent on others outside the project</td>
</tr>
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</table>
Examples of Outcomes & Outputs

Outcomes (outside the project)

Products:
- Reports, guides, tools, data bases, analysis, products, technique
  - Research report is ...
  - New technique is ...
  - Protocols are ...

Outcomes:
- adopted, applied, implemented, used project products or services
- ...used by manufactures
- ... adopted by farmers
- ... implemented by other parties

Services:
- Training, advice
  - Training is ...
  - Meeting participants ...

Outcomes:
- ... used by trainees on the job
- ... agree to follow-up strategy
Two Dimensions of Verification

1. Accountability: proving that you achieved ‘promised’ results

2. Management: determining process to show whether results were achieved, why or why not
   • Must plan verification in advance
   • Determine what data to collect and how you will collect it
The answers can be determined by turning the performance indicators into questions, e.g.:

- **PI = % increase in regional collaboration**
- **Evaluation question is: To what extent has there been increase in regional collaboration?**

Now, plan an information acquisition strategy to get the data that answers the question.
Many Performance Indicators are based on measuring change.

Best way to measure change is to compare future to the initial situation (base-line).

If no base-line data exists:
- Set up quasi-experimental design (control group)
- Or, find other ways to make comparisons
- Gather base-line info for future assessments
- Previous evaluations will provide a base-line
Connect the Performance Indicators with the Data Sources

- The performance indicators tell what information you need to obtain
- They point toward where the information can be found
- Sources have to be accessible and practical
Key Concepts for Verifying Results

For performance indicators & data sources

- Validity – are you measuring what you think you are?
- Reliability – if another researcher used your data collection method, would he or she acquire the same data?
Menu of Possible Data Collection Methods

- Content analysis
- Use of existing statistical series
- Focus groups/interviews
- Surveys
- Field visits
- Case studies
Making Data Collection Easier

- Set up methods early
- Involve co-partners in collection process
- Build data collection into routine administrative processes → reduces cost
  - Systematically record performance data
  - Build observations into field visit reports
  - Keep a file of newspaper clippings
Two Stages of Analysis

- Looking for two things: what happened, and why

- First stage is determining what happened

- Once that is determined can ask:
  - Why did it happen, or
  - Why didn’t it happen
What is a Result?

- Change \((\text{Time}_2 - \text{Time}_1)\)
- No change
- Comparison with standard
- Comparison with control
Need to Show Causality

- Difference has causal connection to output
- Relationship and time has to be plausible
- More than one thing could have caused change
- Would it have happened anyways?
Participatory Analysis

- Analysis can benefit from people with different perspectives looking at the same data.
- Value in diverse feedback.
- Advantages to involving those being evaluated (more likely to use conclusions and be committed to results).
Ensure periodic self-assessment and evaluation

- Point made by Sir John Ball
The self-evaluation permitted a review, for the first time, of the use being made of research results from Sida/SAREC supported projects. While these had not always been systematically recorded, the evaluation permitted identification of a large number of instances where use of UEM research had led to policy changes, affected negotiations, permitted researchers to apply their work as part of panels, led to changes in practices as varied as building construction, water use, energy use and veterinary health. The evaluation concluded that this use is one of the most important results of achieving a critical mass of researchers.