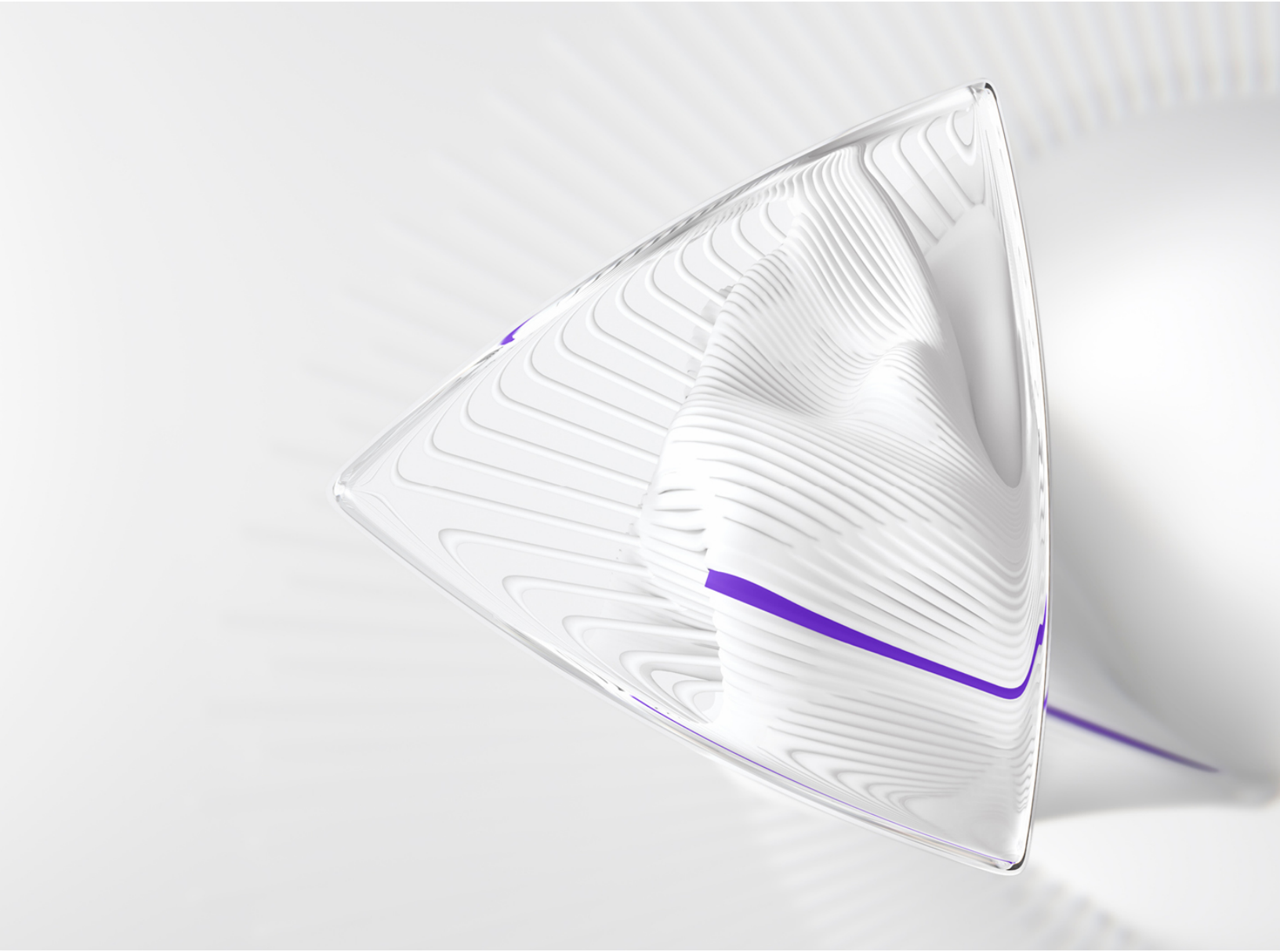
Clarivate™

Clarivate Consulting Services White Paper

The importance of an evaluation framework in R&D management

Combined with proactive program evaluation, an evaluation framework brings clarity to program goals and maximizes investment in conducting R&D and in carrying out evaluation efforts to measure and assess program impact.



About A&G Consulting

Improve research performance and focus your investments with Consulting expertise and guidance that draws connections between research and downstream impact. The Academia & Government Consulting team of research leaders and data scientists apply decades of experience, quality data, and specialized approaches to provide decision inputs to help answer your complex questions.

The purpose of this white paper is to introduce R&D program staff to the importance of following an evaluation framework.

This model can:

- guide the definition of program goals through a logic model,
- identify data needs at both program initiation and midpoints,
- establish evaluation implementation strategies and metrics, and
- define benchmarks that will be relevant to assessing program impact.

The increasing need for evaluation in R&D management

Funding organizations that support research and development (R&D) are under increasing pressure to assess the outcomes of their research and training programs to improve program management and demonstrate impact to diverse stakeholders.

Likewise, national governments are expanding regulations dictating how research funding is allocated and mandating periodic research evaluation exercises. The United Kingdom Research Excellence Framework (REF) and the Australian Excellence in Research Assessment (ERA) are examples from regions where governments have long had a top-down approach to managing R&D. Even in the United States, where R&D priorities have traditionally been funded from the bottom-up, recent accountability measures are shifting that dynamic. For example, the 2018 Foundations for Evidence-based Policymaking Act requires United States agencies to appoint an Evaluation Officer and to institutionalize program evaluation activities among many other data and evidence focused requirements[1].

We see that evaluation practitioners recognize the value of regular assessments for R&D program management. However, despite their efforts, we continue to observe a disconnect between policy makers when promoting evidence-based management, as R&D managers often remain unfamiliar with program evaluation frameworks or lack engagement with evaluation activities.

In our own discussions with agency leaders and program managers, we see an opportunity for deeper appreciation of the value that these practices have for efficient and effective R&D management.

Some frequently cited reasons that evaluation was not widespread in R&D program management include:

- **Limited budgets:** Insufficient operating budget is planned for evaluation, resulting in compromises in data collection and assessment of funding attribution.
- **Low awareness:** Unfamiliarity among program staff with program evaluation concepts and capabilities for managing or carrying out evaluation activities.
- **Competing priorities:** Complexity of program design means incorporation of evaluation activities at the outset has not historically been a priority.
- **Resource restraints:** Perception of an overwhelming burden on the R&D workforce to support evaluation efforts.

In this white paper, we introduce agency program staff to concepts, data and tools that Clarivate has called upon when supporting and advising clients on R&D program evaluation.

[1] See **https://www.congress.gov/bill/115th-congress/house-bill/4174**

The benefits of program evaluation in R&D management

Research program evaluations may be conducted for a variety of purposes. Most commonly, a research agency may periodically evaluate progress of awardees towards the achievement of programmatic goals.

Similarly, a research agency may conduct a comparative evaluation of similar programs across different divisions to determine best practices toward the attainment of desired outcomes. Grantees should also evaluate their progress to determine whether they are accomplishing the goals stated in their applications.

Improvements in program management and performance, implementation of program reforms, development of new program goals and best practices sharing are just some of the program activities that are bolstered by evaluation activities. With such clear benefits to program management, evaluation should be considered a mission-critical program activity.

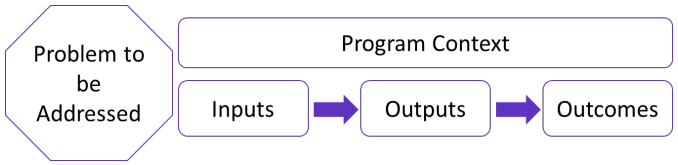
To evaluate R&D activities in an effective and meaningful way, we recommend that R&D program staff and evaluation officers establish a framework at the outset that will serve as a guide for subsequent evaluation activities. A **logic model** provides program evaluators with a view of the different features that could be incorporated into an evaluation.

Although it may seem initially daunting, this effort also encourages measurement of only those components most relevant to program goals. The logic model can be used to identify the types of information required to conduct an effective evaluation, including additional information that should be collected during annual progress reports or surveys administered during or subsequent to participation in the program. Identification of data collection needs is particularly important when minimal information is captured within internal databases, or is not maintained in a uniform manner – making follow-up on program outcomes very challenging.

In this white paper, we aim to introduce R&D program staff to the importance of following an evaluation framework that will:

- guide the definition of program goals through a logic model,
- identify data needs at both program initiation and midpoints,
- establish evaluation implementation strategies and metrics, and
- define benchmarks that will be relevant to assessing program impact.

Figure 1. Generic logic model for research programs



Source: Clarivate Consulting Services

Using a logic model as a tool to guide program evaluations

Developing a logic model helps evaluators define measures of program success and data required to perform an effective evaluation. A logic model provides a visual method of presenting the relationships between an observed situation and the resources put into a program to alleviate the problem by reducing these relationships into quantifiable components.

Use of a logic model can help evaluators determine which program components are working in concert to achieve goals, and which components result in gaps to achieving success. A logic model can also help identify areas of a program that could be improved with additional resources.

A basic logic model consists of inputs, outputs and outcomes (see Figure 1):

- Inputs include those items and activities that are invested toward resolving the problem and achieving program goals.
- Outputs are measurable intermediate products expected to result from program participation, while outcomes are the expected impacts of the program on participants and program stakeholders.

Logic models may also incorporate context, which allows evaluators to consider the role of the research, training or funding environment or the effect of certain policies on the implementation and outcomes of a program.

Begin with the end in mind

Starting with desired outcomes encourages program administrators to consider more thoughtfully the situation the program is intended to impact, the desired outcomes, the behaviors or processes that need to be changed to achieve desired outcomes, the activities that facilitate these behavioral or procedural changes and the resources required to support these activities.

Within the framework of the logic model, the goals of a program should be further refined to those that are short-term – measuring the more immediate effects – versus those that assess the broader, long-term effects of the program.

While achievement of program goals may be the ultimate measure of a program's success, intermediate measures may be the most accessible means for monitoring and determining the effectiveness of a program. For each program goal, a series of questions can help determine how program success can be best measured while also determining additional information/data collection needs.

Outputs are activities that can demonstrate the effectiveness of a program towards enacting desired change, and thus can provide information that allows evaluators to monitor the implementation and performance of a program throughout its duration. Outputs also can serve as indicators to detect program components that are contributing toward the achievement of short- and long-term program goals, as well as those that may need to be revised to achieve intended outcomes. Program outputs should reflect the ultimate goals of a program.

In addition to representing intermediate steps towards program goals, it is critical that outputs be measurable, allowing evaluators to compare the outputs of program participants with those of a comparator group to determine intermediate program effects and whether inputs or program policies need to be adjusted.

What data are needed for program evaluation?

Determining the data collection needs to produce an informative evaluation can be daunting; however, development of thoughtful evaluation metrics through use of a logic model can make this process easier and avoid collecting extraneous data. Defining the list of data elements allows evaluators to determine the best sources from which the data should be collected, and whether additional collection efforts are needed.

The data collected for each component of the logic model should reflect the goals of the program. For instance, a common short-term goal of mission-oriented research programs is the development of a proof-of-concept product for testing.

We know that we should be collecting information about the research program's outputs, but we also need to collect data that reflect "the broader product development landscape" in this field. To address this, we can consider those outputs or activities that would be "expected", such as publication and uptake of research findings, participation in scientific conferences as an attendee or presenter, or application for or receipt of subsequent development funding.

"We know that we should be collecting information about the research program's outputs, but we also need to collect data that reflect 'the broader product development landscape' in this field."

Many R&D program evaluations rely on bibliometric data sourced from the **Web of Science™.** As the original science citation index, this database is the gold standard for evaluations of R&D initiatives focused on advancing our knowledge base in program areas and stimulating new research as captured in conference proceedings and in the world's highest quality peer-reviewed research.

For mid or long-term goals, such as innovation or product development, **Derwent World Patent Index™ (DWPI)** serves as an excellent source of information on intellectual property protection and the evolution of patented technologies to products. For the life sciences sector, **Clarivate life sciences and healthcare solutions** provide the most comprehensive set of data on R&D activities that lead to drugs and treatments for a wide variety of diseases.

For R&D activities and outputs that are not captured in widely available data sources, we also offer data collection tools to facilitate the collection of data from program participants. **Converis™** can be used to collect virtually any scholarly and scientific activity that grantees participate in, either through direct data entry or automated data flows from internal institutional data sources.

In many cases, evaluators may find that they have a rather extensive list of possible outputs. A common mistake in evaluation planning is that some data points are collected because these data points are easy to collect. Therefore, an important step when finalizing the evaluation plan is to review evaluation questions, ensure that the outputs address the questions and determine how program impact will be assessed using the identified outputs.

Indicators facilitate benchmarking in program assessment

Use of a logic model for planning an evaluation encourages development of a list of the data elements required to determine if a program has achieved its goals, and from there, consideration of whether outcomes can be measured through existing metrics or if new program metrics need to be developed.

Examples of common evaluation metrics include:

- number and quality of publications,
- uptake of research findings as measured by citation of research articles,
- number of subsequent patent applications and awards,
- attainment of subsequent product development milestones,
- product commercialization, and others.

However, metrics vary depending upon the goals of the program(s) being evaluated, and it may be necessary to establish new measures of programmatic success. Thus, rather than using a traditional linear perspective to guide the evaluation – e.g., X resources were applied, so we got Y – a logic model encourages a multi-dimensional approach.

For the evaluation of R&D programs that regularly produce new knowledge as captured in peer-review literature, we use benchmarking tools such as **InCites Benchmarking & Analytics™**, which leverages the Web of Science data and has built-in baselines that allow evaluators to determine when research performance resulting from a R&D program is outperforming research within the same field and within regional, national or institutional geographies. InCites also captures the common evaluation metrics that all R&D program evaluators are looking for, allowing remaining evaluation budgets to be focused on key program outputs that are of greatest impact to stakeholders.

Clarivate has also developed a report that can be commissioned to focus on key research program performance and compares that to up to five similar research programs. This report has commentary that allows program staff with little or no experience in research evaluation to understand what aspects of the research program are performing well and what aspects need further attention.

Getting the most out of program evaluation

The ultimate goal of a R&D program evaluation is to assess the extent to which a program has achieved progress towards intended goals. Although optimistic program directors hope that the evaluation process will show how well a program is working, it is likely that regular assessment of program outputs will identify areas in which adjustments could be made to improve outcomes.

At the program level, this can mean tweaking program inputs (e.g., additional funding, increasing the length of funding, etc.) or identifying new data sources to enrich outputs collected. In some instances, evaluations may reveal areas in which broader programmatic or even institutional policy changes need to be enacted to achieve desired outcomes. This may range from the types of data collected from the participant as part of a progress report to how programs and goals are described in the funding opportunity announcement. Although program administrators would likely prefer evaluations to yield positive outcomes, the findings from all evaluations can be viewed as opportunities and evidence for changing program or institutional policies to improve outcomes for research and development programs.

Conclusions

Research and development program evaluation can seem daunting, but is instrumental to ensuring program alignment with intended goals. It is crucial to establish an evaluation framework to document program objectives, to define program outputs and outcomes, to identify data sources for collecting program information and to develop indicators and metrics that are meaningful to evaluating program performance. Combined with proactive program evaluation, the evaluation framework brings clarity to program goals and maximize agency investment in both conducting R&D and in carrying out evaluation efforts to measure and assess program activities.

Speak to our consultancy team to learn how you can leverage program evaluation to maximize your institution's investment in R&D.

About Clarivate

Clarivate™ is a leading global provider of transformative intelligence. We offer enriched data, insights & analytics, workflow solutions and expert services in the areas of Academia & Government, Intellectual Property and Life Sciences & Healthcare. For more information, please visit clarivate.com.