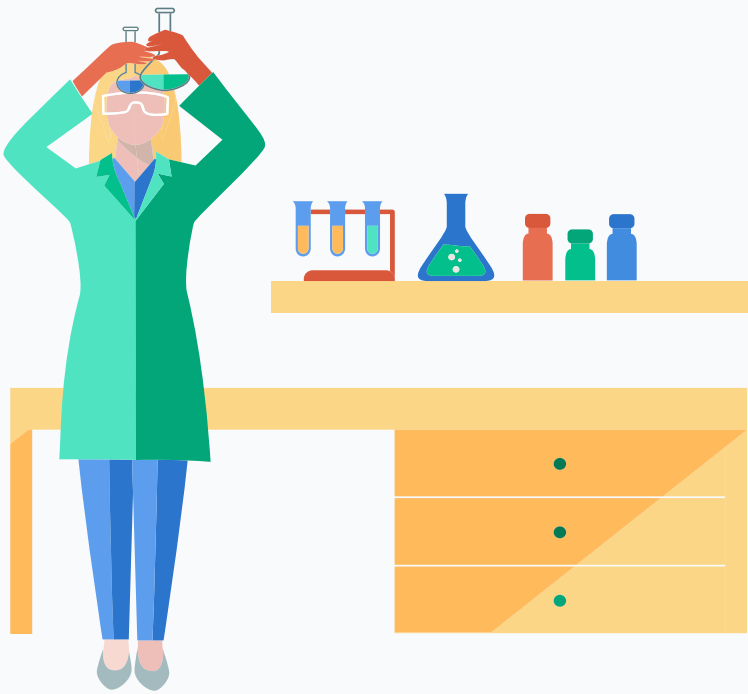
Benchling

The Three E's of Measurable R&D

Scientists Group Heads Executives

Given the rising costs, protracted timelines, and increasing complexity of biologics R&D, scientists, group heads, and executives all need to take a data-driven approach to optimizing their own processes and decision-making. Especially for companies working in emerging drug modalities, knowing exactly what to measure – and what actions to take in light of certain data – can give you a competitive advantage.

In this article, we explore a framework for scientists to measure the success of their work.



Efficiency

The time and resources you spend to generate your outputs.

Effectiveness

The quality of your outputs and how successful your processes are at generating desired outputs.

Enhancement

The extent to which your process changes have improved the Efficiency and Effectiveness of your outputs over time.

EFFICIENCY

How much time do I spend on a particular repeatable process?

How long does it take you to generate that batch of constructs? To run that QC assay? You probably don't need to set a timer going every time you sit down at the bench, but having a decently accurate idea of your own throughput can highlight which areas are ripe for improvement. Or, break it down by units of time: How many assays can you run in a week?

What consumables do I require for this process, and how much time do I spend searching for them?

Measuring your consumables usage doesn't have to be as fine-grained as tracking each pipette tip you use. But for high-cost reagents such as antibodies, tracking how much you use and where the remainder of it exists in the lab is part of making any process more efficient. Knowing that a particular consumable is actually already in a fridge down the hall can significantly speed up your work, since you don't have to wait for a new order to be delivered.

For a particular process, how much time do I have to spend on non-research activities?

Searching for samples across numerous fridges and freezers can often feel like the most frustrating part of research. Similarly, searching for the right data across spreadsheets, emails, and file sharing systems can also eat up a surprising amount of time. For each of your projects, consider how much time you spend on non-research activities of all types, and which ones in particular take up the most time.

EFFECTIVENESS

For a particular process, what's our average yield?

Decision-quality insights begin with fundamental questions. Each time you run a process, how much of your desired output are you actually producing relative to your target output? Track your yields over time to generate an average, and continue to refer back as you iterate.

Which conditions lead to the most effective outputs?

Comparing assay data across conditions is critical to determining which candidates and/or process variations to move forward with. Consider how you're linking assay data to samples and experimental conditions, and how you're storing that data for future queries. For each process run, how does the effectiveness of your output differ from historical averages?

Are our outputs leading to success for downstream teams?

Whether you're working in protein purification, screening, bioprocessing, or any other biologics R&D team, the effectiveness of your outputs matters most for the teams downstream of you. What happens after a given output leaves your hands? Which assays are going to be run on it? How did the results compare with expectations, and what can you learn from this?

ENHANCEMENT

How have my yields increased over time?

Think about measuring and adjusting your processes for greater Effectiveness and Efficiency as an experiment in and of itself. Tracking the yields that your most typical processes are generating is the most straightforward way to substantiate the improvements you've made to your own workflows. What's the average yield of an assay you're running today, as compared to six months ago?

For a particular repeatable process, to what extent have I decreased the amount of time it takes?

Any assessment of the changes in yields has to be balanced out by an assessment of the changes in overall throughput; yields might have increased, but if the process takes significantly longer as a result, it might not be worth it. How many assays can you run in a week, as compared to six months ago?

How have process changes positively impacted the team(s) downstream of me?

Compared to the yields and throughput of your own processes, measuring the impact of your process changes on downstream teams is more difficult. What have downstream teams been able to do as a result of changes in yields and throughput? What are the larger business impacts of these improvements?

Want to learn more about metrics-driven R&D? Click below.

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