



LETTERS

edited by Jennifer Sills

NextGen VOICES

Results: Definition of Success

In January, we called on young scientists to answer these questions: What is your definition of a successful scientist? How has this definition changed between your mentor's generation and your own?

We heard from more than 150 young scientists. A sample of the best responses can be found below. To allow for as many voices as possible, in some cases we have printed short excerpts from longer submissions. To read the complete versions, as well as many more, go to <http://scim.ag/NextGen2Results>.

Submit Now: Experiences That Changed Us

Add your voice to *Science*! Our third NextGen VOICES survey is now open:

Describe a specific experience and how it changed your science, training, or career goals.

To submit, go to <http://scim.ag/NextGen3>

Deadline for submissions is 18 May. A selection of the best responses will be published in the 6 July issue of *Science*. Submissions should be 250 words or less. Anonymous submissions will not be considered. Please submit only once.

direction of a discipline or scientific community. It is discipline-driven, requires specialization, and is measured by the number of publications and citations. In contrast, influence in society-at-large corresponds to meeting great societal challenges. It is problem-driven, requires interdisciplinarity and engagement with nonacademic actors, calls for a responsible social role of science, and is measured by impact in society...

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SUCCESSFUL SCIENTISTS EXCEL ON MULTIPLE levels; they conduct research, teach, and publish, and they serve the research community by mentoring students and writing grants. Today, there are increasingly more alternatives to a strictly academic career path. For example, researchers also work as entrepreneurs in start-up companies, act as consultants, or write as science journalists....



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IN EARLIER GENERATIONS, SCIENCE WAS MORE of a small-group endeavor. The key requirement for scientific success was in-depth expertise in one narrow field and the ability to publish in that field.

A successful scientist today is one who can bring people together into large-scale projects that require several different areas of expertise. Such endeavors require both scientific and translational vision. Also, it is crucial to have the ability to speak the language of several disciplines at once. Most important, a successful scientist must be



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NextGen Speaks

...IN THE PAST 40 YEARS, IT SEEMS THAT THE concept of a successful scientist has drifted from the depth of his knowledge to the quantity and impact of his publications....

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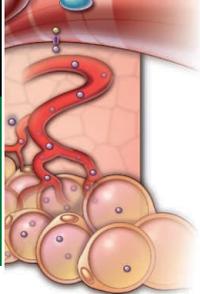
...TODAY'S SUCCESSFUL SCIENTISTS MUST BE able to innovate—thinking of novel scientific concepts that not only address hypotheses, but also captivate investors who may be willing to fund research. They must be able to collaborate, not just within their university, but also internationally and across university-industry partnerships. They must be flexible and willing to use their science in a multitude of application areas, allowing for multiple funding opportu-



...INFLUENCE IN ACADEMIA HAS BEEN THE dominant criterion of success so far, but the next generation of scientists will be evaluated in terms of their influence in society. Such a change in how success is defined will not come without consequences for the practice of science. Influence in academia corresponds to the ability to shape the research

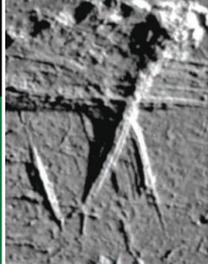


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able to inspire people with different training and skills to come together and work toward the overall vision....

PAVITRA KRISHNASWAMY

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A SUCCESSFUL SCIENTIST IS ANYONE WHO makes a meaningful, searchable, and unforgotten contribution to the body of human knowledge. The findings need not be extraordinary, popular, or even widely recognized, but the knowledge must

be shared and permanently recorded so others may learn and build on it.

NEILSON NGUYEN

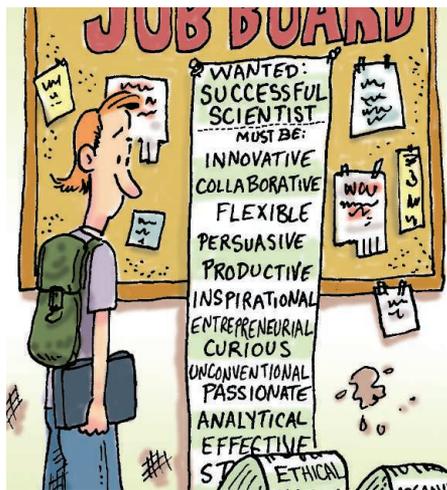
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A SUCCESSFUL SCIENTIST REMAINS CURIOUS like a young child. Scientists question the surrounding world, and this inquisitiveness is what contributes to a “successful scientist.” ...As Steve Jobs suggested, “Stay hungry, stay foolish.” Staying hungry means to always be curious to learn and achieve more, and staying foolish is to keep an open mind, defy rules, and dare to take unconventional paths.... As a high school student passionate about science and math, I will strive to grow up to be like a curious child again because I hope to treasure this important attribute.

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... AS THE BREADTH OF KNOWLEDGE CONTINUES to expand at an astronomical pace and the tools of our trade become more powerful, yet more specialized and complex, the environment in which young scientists seek



success has correspondingly changed. Even navigating the sea of publications is a daunting task. Breakthrough discoveries are hard to come by today, and we must recognize small discoveries as victories. But the nature of the scientist remains the same.

We strive to have an impact on our field. We define success as making a meaningful contribution to the fabric of knowledge....

SUSAN DEUPREE

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THE DEFINITION OF SUCCESS has not changed. As my mentor says: A successful scientist is one whose name in textbooks is moved from the “name index” to the “subject index.”

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...TODAY, SO MUCH INFORMATION has been generated that the success of a scientist depends much more than in previous generations on how well she is able to extrapolate profound

insights from this vast information base. Furthermore, the amount of relevant data is no longer limited to the research area to which the scientist belongs.... The future of a successful scientist therefore depends on how well she is able to look both deep and wide and, most important, on knowing what to look for.

ANNELENE GULDEN DAHL

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YOU’LL FIND TODAY’S SCIENTISTS ALL OVER THE world: in the lab, in the Amazon, on Capitol Hill, or in a Sonoma vineyard. Considering this diversity, it’s difficult to come up with a universal metric for success—number of publications doesn’t cut it anymore. Success could be developing a new tuberculosis treatment, teaching chemistry to underprivileged high school students, tracking down illegal drug traffickers, or inventing a new flavor of ice cream. Scientists succeed by providing a tangible benefit to society, be it through public or private means.... They identify societal problems that they are passionate about and work toward solving them. The most successful ones always remember that science is not just for scientists.

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...TODAY’S SUCCESSFUL SCIENTIST is an effective manager, a shrewd technocrat, and a learned businessman who knows not only how to generate but also how to sell his science.... A successful scientist has the ability to make sense of all this data, and can even take the findings of a failed experiment and include them in the next grant application....

KINGSHUK PODDAR

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OUR MENTORS CONSTANTLY reminded us that failure wasn’t an option, hard work was the key to success, and being successful meant starting with securing a

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tenured-track position and steadily advancing within our narrow and well-defined communities. Success was a long list of awards, publications, and achievements at the end of our professional careers.... The next generation will teach us that failure is a learning experience, that work is play and both can be a game, and that success is measured in the many facets of the work-life balance for each individual person....

JEFF D. HAMANN

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A SUCCESSFUL SCIENTIST IS ONE WHO IS ABLE to resist the temptation to lie about any aspect of his or her research and still publish unexpected, good results. He or she does not care about political trends (and maintains the spirit of discovering new frontiers).... Perhaps definitions are needed to make things happen.

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...FIFTY YEARS AGO, A SUCCESSFUL scientist was still predominantly a discoverer, adventurer, teacher or pioneer. Today, the description more often resembles that of a successful businessman.

MICHELE WEBER

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I BELIEVE WE ARE CURRENTLY WITNESSING THE second transition in what makes a successful scientist. My mentor's mentor, not to mention previous generations, was able to define success in terms of the quality and quantity of research output. Although this remains undeniably important to any meaningful definition of success, by my mentor's generation, this had become insufficient. By then, the ability to communicate one's findings fluently and persuasively had become a

key facet of success. A scientist who worked hard to make her or his name synonymous with a particular technique or research area effectively guaranteed that those seeking assistance in that field would initially turn to that scientist. Such collaborations could catalyze the transition from a competent to a world-class researcher. I believe that for my generation, a truly successful scientist is not only productive in terms of research output and in communicating with other scientists,

but in communicating the importance of their work to a wider lay audience. An increasingly Web-savvy general public is trawling the Internet for answers, and the successful scientist needs to ensure that their research is presented both accurately, and in a manner comprehensible to nonscientists....

DUNCAN WRIGHT

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A SUCCESSFUL SCIENTIST IS AN OXYMORON. Even the most highly regarded researchers have to concede that their paths to the top were paved with the smoldering remains of failed experiments, rejected papers, and fortunate serendipity. What sets such people apart, however, is natural curiosity, idealistic passion, and the boundless ingenuity which fuels their drive toward trial-and-error and thickens their skins to the sharp barbs of failure. Humility is the noblest trait of good scientists, and the courage to admit ignorance is their most valuable tool.

Unfortunately, the commercialization of science and the commoditization of knowledge mean that most modern scientists do not have the luxury of failure to guide their research. For them, failure does not mean feedback; failure means cutbacks. So they are forced, instead, to sell their wares to grant agencies with self-assurance and academic arrogance.

Nevertheless, the supply of young scientists is clearly outstripping its demand, so there must still be motivation to enter the scientific world. Maybe the idealized stories of Darwin, Fleming, and Feynman are enough to extinguish our cynicism and inspire us to continue our quest for knowledge. So, to me, a successful scientist is anyone who stirs up in others the curiosity to explore the splendor of the natural world.

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...A SUCCESSFUL SCIENTIST FOSTERS THE CONSTRUCTIVE use of science to increase human knowledge for a better life instead of promoting its destructive use by nations to foster their competitive interests as world powers....

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A SUCCESSFUL SCIENTIST IS ONE WHO HAD luck at any point in his scientific career and then built on it by working hard to complete the story....

SARA SERAG



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...THE REAL MEASURE OF A SCIENTIST'S GREATNESS is the inspiration he or she passes on to others. Despite a growing societal fixation on money and fame, this definition of success has been true for many generations. Fostering an environment of learning and excitement in science is, perhaps, the most important endeavor one can undertake....

SARA CHODOSH



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...MY MENTOR AND HIS GENERATION BELIEVE that a scientist is someone who does academic research. I believe that a scientist is someone who has been trained to think like a scientist. Because of this broadening of the definition of scientist, there must be a broadening of the definition of success. Only in academic research are the metrics for success numbers of papers published, talks given, or grants received. I believe that success in any career path should be quantified by subjective metrics such as "Am I happy? Am I contributing? Do I believe in what I am doing?" Therefore, a successful scientist is anyone who has found a satisfying career path in which they use scientific skills such as organization, problem-solving, and critical thinking.

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Letters to the Editor

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