Surfing on the hype waves or drilling deep for knowledge? A perspective from industry

Originally published in:
Infozine S2

Nadine Schneider and Nikolaus Stiefl
Novartis Institutes for Biomedical Research

Surfing on the hype waves or drilling deep for knowledge? A perspective from industry

Today, it is easier than ever to get scientific information from all over the world. Scientific publications, conference proceedings and talks, blogs, preprints, podcasts, recorded lectures, contributions on social media platforms, and many more provide access to knowledge and information. In the past, most of the scientific results were discussed by small groups of scientists in labs, at conferences or in access-restricted journals. Today, science is debated more publicly in blogs, forums, or published in open-access journals or pre-print servers. This great evolution allows scientists worldwide to better connect and also enables less well-funded universities to better participate in the scientific community. At the same time, this brave new world creates new challenges: quality vs. quantity of scientific publications due to missing peer-review, or just overlooking important contributions due to the sheer amount of new publications. In fields such as data sciences and informatics, this can even reach a point where ease of access to information becomes the key to its relevance for the community: *If it is not available it does not exist.*

Today, it sometimes seems antiquated to drill deep into one special research topic rather than to surf the next hype wave. Is there a good strategy to find the right balance between the two approaches? And if so, how can this strategy be adapted so that scientists from both worlds, industry and academia, profit most?

The way scientists in industry tackle research questions is certainly different from the way scientists in academia work. In early pharmaceutical research, the major part of the work is performed in project teams, usually a consortium of experts in different fields. In medicinal chemistry projects, for example, when trying to find a new medicine for a certain disease, many scientists have to work together: analytical and organic chemists, *in-vitro*, *in-vivo* and structural biologists, and today, also data scientists. For the individual scientist, being able to speak and understand the language of the various disciplines is essential. Without a high-level understanding, they are not able to adjust their own experiments to the information available. In other words, they need to be able to surf each discipline in order to drill deep into their own specialty. Whereas in academia, drilling often means developing a novel tool, a new assay or a sophisticated synthetic pathway, in medicinal chemistry projects, drilling means combining all the different data in order to gain an in-depth understanding of the underlying problem. This allows the respective experts to adapt and plan their next steps, such as the best synthesis, the assay that provides most insight or the optimal read-outs to guide the next experiment.

Focusing on solving the next problem is often driven and constrained by the allocated time frame and financial budget of a project. Often, decisions need to be taken pragmatically and, more often than not, solving the problem is just good enough. Unfortunately, sometimes, the curiosity of scientists might remain partly unsatisfied when time or budget constraints do not allow for a really deep dive into a scientific question. To fill this gap, industry relies on academia to help with basic research. Recently, various programs have been initiated to open the framework and enable closer partnerships between industry and academia:

- Various pharmaceutical companies offer on-site post-doc programs. Here, junior scientists profit from the experience they gain in an industrial environment. At the same time, industrial researchers quickly reach a deeper insight into novel techniques or special areas of research they do not usually have time to dig into.

- If there is a true need for experience in a certain field, companies collaborate or consult with academic experts to bring the knowledge in-house. This type of drilling helps the industrial partners to immediately tap into an in-depth expert knowledge, and get an opinion on specific scientific questions. To the academic collaborators, apart from potential funding, this provides an opportunity for surfing the "industrial problem wave" – getting insights into real world applications related to their field of expertise, which can in turn lead to novel and applied research questions.

- For research areas that need to be approached using diverse scientific disciplines, consortia between academic and industrial partners are formed. Here, similar to industrial projects, a mix between drilling and surfing is often necessary to cover the different topics. Frequently, these consortia work on cutting-edge methods, where academia is enabling industrial experiments with basic scientific research. The results in turn allow the academic partners to improve their methods much faster.

In essence, there is no preferred option between surfing and drilling. Even though it might sound preferable to be an expert by drilling deep into a research topic, being able to also understand and have a high-level knowledge of multiple disciplines is key in modern science. Disciplines inspire each other and engender hybrid approaches spanning multiple fields (e.g. DNA-encoded chemical libraries, artificial intelligence (AI)-driven chemical synthesis platforms). The more biology, chemistry, physics, data science, and other fields grow together, the more scientists need to be able to combine both surfing and drilling. This is also reflected in the various interdisciplinary studies appearing around the globe. The principal challenge for future researchers will be to figure out when to best apply which strategy. Certainly, the balance between surfing and drilling changes during a scientific career. Initially, building up an in-depth expert knowledge that should be expanded to a broader generalist skillset is a great foundation to be able to surf while drilling deep. We believe that only this phenotype of scientist will succeed in the long run – be it in academia or in industry.

Dr. Nadine Schneider
Investigator II
Novartis Pharma AG
Novartis Institutes for Biomedical Research (NIBR)
Global Discovery Chemistry/CADD
4002 Basel, Switzerland
nadine-1.schneider@novartis.com
ORCID 0000-0001-5824-2764

Dr. Nikolaus Stiefl
Senior Investigator I
Novartis Pharma AG
Novartis Institutes for Biomedical Research (NIBR)
Global Discovery Chemistry/CADD
4002 Basel, Switzerland
nikolaus.stiefl@novartis.com
ORCID 0000-0003-2562-7080

Citation: Schneider N, Stiefl N: Surfing on the hype waves or drilling deep for knowledge? A perspective from industry. Infozine **2018**, Special Issue 2, 26–27
DOI 10.3929/ethz-b-000294375

Published: November 15, 2018