



Putting Life Science Research Under the Microscope

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Life science research has formed the way we view the world around us. A host of different technological advances over the last century has enabled the sector to grow and evolve at an outstanding rate, leading us to a previously incomparable understanding of biological systems.

In order for researchers to ensure that this trend continues and to improve and develop their research, the key is to understand the sector today and anticipate future changes and developments. The challenge has always been in finding this information, and the LifeSight report, published in July 2014, aimed to rectify this.

By gathering the thoughts and opinions of over a thousand life science researchers, the report provided a unique insight into the sector as a whole, identifying the challenges and opportunities set to impact life science research both today and into the future. According to LifeSight participants, researchers of all disciplines are finding themselves encountering similar problems due to the current economic climate. However, there are also opportunities in the form of upcoming technologies and increased communication.

Collaboration and communication

It is increasingly difficult in today's world for any sector to develop without some form of collaboration and data sharing. One of the key trends recognised by the life science research community as having an impact on their daily work is the way in which they communicate, not just with each other but with the wider world.

There was a time when life science researchers were self reliant, however, that approach has altered dramatically, with large and small companies, often of different disciplines or nationalities, now collaborating with each other and joining forces. The benefits of these collaborations include expertise, technology or facility.¹ In addition, the rise of the internet has allowed for communication between institutions to become even easier.

Increased communication could have some unexpected advantages. Those looking to acquire funding, for example, may find that the complementary skills provided by different life science researchers may help projects to obtain grants.

The challenge of funding

Access to funding has decreased following the economic downturn in 2008, which led to many government budgets being slashed. Many of those questioned expected the decline to continue over coming years. One recent example of this occurred at Kings College London, where academics demonstrated over a "crippling" number of researchers being made redundant following reduced budgets.²

There are limited grants available and funders are being increasingly careful and particular about where money is allocated. Many life science researchers feel that areas such as translational research and clinical research, appear more likely to receive funding as opposed to some others. In addition, funding is expected to become more concentrated around centres of excellence, making it more difficult for external institutions to access resources.

Publishing

Researchers are under increasing pressure from their funders to produce scientifically reproducible work. The main way of achieving this is by getting their work published in the public sphere. By having your name in print you not only improve reputation

and make funding more likely but it could open the door into additional research opportunities. Therefore when it comes to the future of life science research publishing is regarded as one of, if not the most important aspect in life scientists working lives.³

Many across the life science community feel that researchers who spend time and effort adding value to their data should be acknowledged. The main goal and aim is access to scientific publications, both for professional life scientists and the interested. In theory this is more achievable due to the rise in online journals.

Furthermore, many feel that the huge amount of investment currently required to access scientific material puts it out of reach of the majority of the population. In 2012, it was reported that British universities pay approximately £200m a year in subscription fees to journal publishers⁶. In the same year, Harvard University aimed to reduce its own costs for subscriptions by encouraging members to make their research freely available through open access journals. They were also recommended to resign from publications which required payment to view articles⁵. Free access to scientific publications is therefore seen as the next opportunity for life scientists and peer recognition.

New and Future Technologies

Improvements in instrumentation allow laboratories to focus on delivering results more rapidly and accurately. These added technologies play a key part in aiding the other key trends, such as collaboration and publishing.

New developments are pushing the life science research sector into new areas, with many laboratory managers and users feeling positive about adopting new technologies. These range from the every day, such as mobile devices, to more specialised equipment. Microscopy, in particular, has been recognised by life science researchers as one of the most exciting areas to watch within life science technology.

Microscopy has had to strike a careful balance between achieving high resolution images and acquiring them quickly. Time is always a priority within the laboratory, however, this is being increasingly compromised by the demand for large, and more high quality images, especially when working with complicated biological structures. Recent developments in technologies, namely

super-resolution microscopy, may help researchers achieve this balance more effectively. The dynamic information with large statistics provided by these techniques opens the door to a range of new applications – from dynamic vesicle movements in the sub-100nm range to fluorescence images of sub-cellular structures, making it an exciting area of development. Many feel this technique can significantly increase our knowledge of cellular molecular interactions and dynamic processes

Big Data

Big data is a key factor in the life science research sector. Researchers are not only expecting techniques to change, but also the managing of large amounts data once it has been generated. Accessing big data has become a regular occurrence - for example, Merck Research Labs in the US have next generation genomic sequencing that can create a terabyte of data per sample.⁴

Alongside the exciting opportunity that big data presents, there are challenges. This is especially true in the field of visualisation, where there is the question of how researchers will manage the huge amount of additional, valuable data that may be produced by high resolution images. This is a challenge which still needs to be properly addressed, but once solved, could help pave the way for a whole new era of data management.

In Summary

It is only through viewing the life science research sector as a whole, and by speaking to researchers directly, that it is clear to see that researchers have shared similar experiences. Due to these changes, future life science research is expected to not only delve into new areas, but to also do so in a more insightful and novel way. Researchers will have a sector which is not only international but more accessible.

By staying aware of the key trends, researchers will be able to anticipate changes in a way that will make them ideally placed for the advances of the future. The LifeSight survey, which is set to take place every year, will continue to pull together the vital information on the sector in order to assist researchers in making these important decisions.

To download the 2014 LifeSight report, and to register to take part in the 2015 survey, visit www.leica-microsystems.com/lifesight

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Biography

Joanne comes from a biomedical and research science background, and joined Leica Microsystems in 1997 as an application specialist. For the next few years of her career, Joanne concentrated on product management for a wide variety of microscopy products and spent time managing projects and groups in Leica Microsystems facilities in Germany. In 2011, she made the decision to concentrate on marketing, bringing more than 17 years of valuable experience to her current role as marketing manager for life science for Europe, the Middle East and Africa, concentrating on confocal and Super-resolution microscopy. Joanne is currently based in the Cambridge area.