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BC INNOVATIONS | TRANSLATION IN BRIEF

AUTOMATED FOR THE PEOPLE

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Last month, the Global Biological Standards Institute (GBSI) held its annual meeting, this time with a focus on automation tools whose low cost could enable wider access by researchers for enhancing the reproducibility of preclinical research.

"Affordable, accessible tools -- robots, instruments, software, etc. -- are contributing to democratize scientific discovery, putting sophisticated but affordable technology in the hands of more scientists than ever before, and making protocols and results easier to share," GBSI founding President Leonard Freedman told BioCentury after the meeting.

GBSI is a non-profit founded in 2012 with a mission to improve reproducibility in preclinical research by devising standards for reagents and protocols. The organization's scientific advisory council (SAC) includes representatives from academia, industry, publishers and the NIH's National Center for Advancing Translational Sciences (NCATS).

The meeting presentations highlighted technologies developed by small companies and academics for automated and computer-driven sample handling, design and monitoring of experiments, and sharing of protocols and data that could bring uniformity to research programs at separate institutions and a level of precision that human handling doesn't provide.

Though the spotlight was on technologies and potential solutions, the discussion stopped short of proposing guidelines for using automated equipment. Nor did it delve into validation data to demonstrate the levels of precision provided by the research tools.

Robotics company OpenTrons highlighted its single- and eight-channel pipetting robots with costs beginning at $3,000 -- in line with GBSI's goal of generating accessible technology that can improve quality control. Standard systems typically cost around $20,000.

Other companies presenting products aimed at saving researchers' time and increasing reproducibility included bioinformatics company Synthace Ltd. and software companies Riffyn Inc. and TetraScience Inc. Synthace, which just closed a $9.6 million series A round, uses its Antha operating system to translate lab protocols to automated systems that conduct experiments to improve reproducibility. Riffyn's Scientific Development Environment (SDE) is a cloud-based program that optimizes experimental design through data analysis. TetraScience provides hardware and software that monitor lab equipment like freezers, and automatically report out-of-spec fluctuations to lab personnel, helping to limit any performance flaws that contribute to experimental variability and reagent decline.

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Douglas Densmore, associate professor of electrical and computer engineering at Boston University, and Mark Merrill, co-founder of Poncho Solutions LLC, discussed software for optimizing complex areas of research, such as synthetic biology.

As director of the Cross-disciplinary Integration of Design Automation Research (CIDAR) group at Boston University, Densmore leads a group that develops both experimental and computational systems to simplify and speed the experimental workflow in synthetic biology. Merrill said similar goals are addressed by the Aquarium software system that can design experiments and manage a synthetic biology lab's experiments.

Other topics that dominated presentations were optimization and sharing of protocols through sites like Lenny Teytelman's Protocols.io, along with accurate data recording and storage, with solutions like sciNote's open source electronic notebooks. Discussion around these tools raised unresolved issues, such as the growing need for better data archiving in the age of big data.

Two panel discussions were led by Freedman and Nancy Kelley, president and CEO of the Nancy J. Kelley & Associates healthcare consulting firm, where she has spearheaded the construction and launch of the New York Genome Center and similar initiatives.

The panel examined equipment costs, need for operator expertise and other hurdles to adopting new experimental and data sharing technologies. Robert Seamans, associate professor at New York University's Stern School of Business, told the meeting that use of automation is growing rapidly in the biomedical manufacturing field -- a commercial appetite that should spur progress in the basic research space.

"We need to encourage the transition from traditional research environments to adaptable environments equipped with new tools that encourage compliance with standards in biological discovery," Kelley told BioCentury after the summit. "We'll also have to figure out how to sustainably fund advancements in accuracy."

Freedman added: "Engineers and biologists are working together to bring new inventions and technologies that are redefining the lab environment and workflow characteristics at every step of the scientific process."

Previous GBSI meetings in 2014 and 2016 focused on the need for cell line authentication and quality standards for research antibodies, respectively (see **"A New Standard in Reproducibility."** *BioCentury Innovations* (Jan. 23, 2014); **"Aligning Incentives."** *BioCentury Innovations* (Oct. 13, 2016)).

On Monday, GBSI announced it would receive $2.34 million over five years from NIH for an experimental design training project dubbed PREPaRED (Producing Reproducible Experiments by Promoting Reverse Experimental Design), in which GBSI and academic collaborators will use a reverse engineering approach to examine data from studies and work backwards to define optimal protocols and workflows.