EFPIA, it was clear that the only way to restore European competitiveness in drug development was through collaboration."

The IMI funds multinational consortia of companies, universities, hospitals, small businesses, regulatory agencies, and patient organizations. Projects address areas ranging from diabetes to schizophrenia. From the perspective of managing one of the world's largest private-public partnerships, Goldman says that teamwork among diverse entities can happen "if all parties agree to work toward common objectives, and if each partner is given a clear mission and is carefully evaluated to make sure they are adding value."

The IMI acts as a trusted neutral party that brings businesses, universities, and government agencies together. By cooperating, these diverse entities can take on challenges that are important to all partners, but neglected because they are high risk or have low profit potential, such as developing new antibiotics. Goldman says the IMI also provides a platform for agencies such as the U.S. Food and Drug Administration and the European Medicines Agency to discuss novel regulatory approaches to getting drugs to patients quickly while ensuring safety and efficacy. As part of the IMI's educational mission, it has five programs for training in regulatory science, including programs in pharmacovigilance and new approaches to toxicology.

GlaxoSmithKline, headquartered in London, is participating in IMI antibiotic initiatives. **Andreas Heddini** is a medical advisor with the company, and confirms the importance of the IMI in bringing together parties whose interests don't always align. The IMI is crucial for advancing antibiotic development, says Heddini. "This is a critical area for infectious disease, but it has been neglected for decades. The initiative is great because it has three components: it leads to an increased understanding of resistance mechanisms, brings new candidate drugs forward, and provides a way to share data, including about what does not work."

Data and knowledge-sharing are also essential to the TB Drug Accelerator program. This tuberculosis initiative is just one of many programs supported by the Bill & Melinda Gates Foundation, a philanthropic organization based in Seattle that invests in global health. The TB Drug Accelerator partners include the U.S. National Institutes of Health, six research institutions, and seven pharmaceutical companies. The Wellcome Trust, a charitable organization based in London, is also a contributor.

A major challenge to fighting tuberculosis is the six-month treatment regimen, says **Ken Duncan,** Gates Foundation deputy director of Global Health Discovery. The TB Drug Accelerator program is seeking medicines that shorten the therapy to a month or less. Companies in the partnership supply compound libraries and drug discovery expertise to the effort, while academic partners contribute knowledge about the disease and facilities for screens and assays. The Foundation, says Duncan, provides financial support and project coordination, setting timelines and milestones and monitoring progress. "Our most important function," he says, "is integration—bringing everybody together."

Duncan, who spent 16 years at GlaxoSmithKline working on diseases of the developing world, says companies in the TB Drug Accelerator program have an unusually open agreement. This includes sharing drug candidate structures and positive and negative results. The consortium will put data in the public domain as quickly as possible, to help prevent research redundancy. While the commercial potential might not be immediate, Duncan says the collaboration could yield concrete rewards for the companies, such as new R&D avenues from identification of novel drug targets. In addition, he says, "the scientists get to apply their energy and expertise to help solve a medical problem and have an impact on global health."

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Featured Participants

Bill & Melinda Gates Foundation
www.gatesfoundation.org

GlaxoSmithKline
www.gsk.com

Icahn School of Medicine at Mt. Sinai
www.mssm.edu

Innovative Medicines Initiative (IMI)
www.imi.europa.eu

Lilly
www.lilly.com

Medtronic
www.medtronic.com

Pfizer
www.pfizer.com

University of Copenhagen
www.ku.dk/english

University of Huddersfield
www.hud.ac.uk

WellPoint
www.wellpoint.com

Additional Resources

Danish Industrial PhD Program
scim.ag/Z3JiNU

Marie Curie Initial Training Networks
scim.ag/Y2Mxmw

Royal Society Industry Fellowships
scim.ag/WujWao

Where We Go From Here

Patients and patient advocacy groups are now joining private-public partnerships as advisors, connections to trial participants, and conduits for results. Potential users of new therapies can provide valuable insights during development. Patients can also help companies and regulatory agencies explain their products and policies to the general public.

Collaborations among industry, academia, foundations, governments, and end users are becoming more common. The result is a dynamic R&D environment that fits the networked, integrated, and interdisciplinary way people live and work today. Driving open innovation is tight budgets all around. "Everybody is under pressure—academia, pharmaceutical companies—it encourages collaborating effectively," says Mt. Sinai's Aaronson.

"To the EC and EFPIA, it was clear that the only way to restore European competitiveness in drug development was through collaboration."
—Michel Goldman

Regardless of partners, collaborative success rests on three principles: a mutual interest in a common, achievable goal; constant communication about expectations, timelines, and rewards; and transparency throughout the project. Joe Sweeney says, "In my experience, almost all roadblocks to collaboration have not been the project but problems with human interactions—a lack of understanding about requirements. It's important to have conversations in which all partners explain what they need from the collaboration: funding, deliverables, publications, patents. A good industry-academic partnership is set up from the start as a win-win for all sides."

Chris Tachibana is a science writer based in Seattle, USA, and Copenhagen, Denmark.

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