

# KNOWLEDGE NETWORKS

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**Imagine a world where ideas are not constrained by governments, corporations, universities or other walled institutions.** Where knowledge is open, and the exchange of that knowledge travels in multiple directions, heedless of privilege, power or politics. Imagine how quickly we could solve major world issues—and, as important, issues that affect only the remote, poor, or oppressed. The Knowledge Networks in this paper rise above those institutional boundaries, and are making the world a more sustainable, safer and healthier place—and show us how we can all contribute and learn from each other in a way that benefits all.

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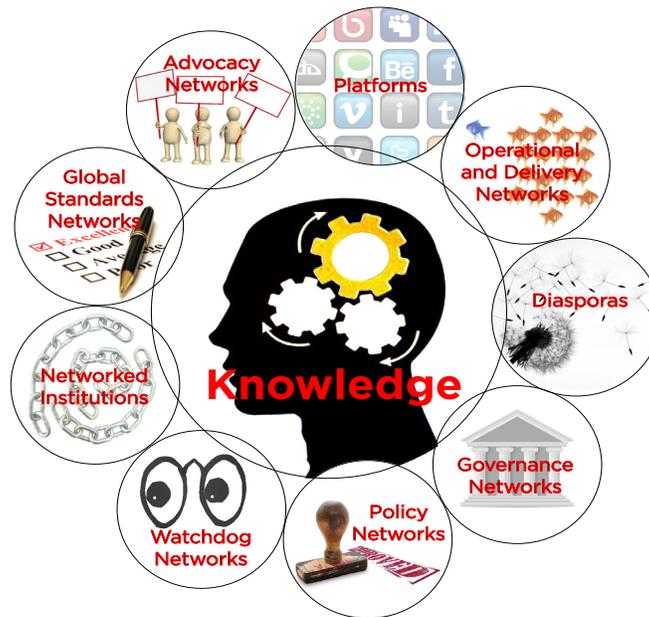
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## Idea in Brief

If you were to draw a Venn diagram<sup>1</sup> of Global Solution Networks, the knowledge networks would sit in the center, overlapping all the networks defined in the Global Solution Networks rubric.<sup>2</sup> Knowledge networks are not only the collaborative incubators of new ideas, policies and methods; they are the origination points for disseminating this new thinking to other solution networks, and the broader world.



This paper is an analysis of three knowledge networks: the Structural Genomics Consortium, OPENPediatrics and the Climate and Development Knowledge Network. All three of these networks have leveraged technology to share and coordinate learning, engender a multiple-direction interchange of information and create an ever-evolving and improving knowledge base that is open and equally accessible to all in the network—and the world more broadly.

The influence of these networks has transcended traditional political and corporate boundaries. Knowledge networks are enabling best practices, allowing access to current research and data and creating a pathway to new policies—both within and without government—that better their fields of inquiry and, in many cases, save lives. Perhaps most important, knowledge networks demonstrate, through the similarities in their ways of operating, that the principles guiding them can be applied by those seeking to create new knowledge networks with similar goals.



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## The Knowledge Network Generally

Envision this scenario: a baby is born in a delivery room of a hospital, not breathing and unresponsive. Doctors and nurses rush it to the neonatal intensive care unit, where a pediatric resident intubates the newborn and starts ventilating in an effort to get oxygen flowing through its system. No luck, the infant remains unresponsive and the time for resuscitation efforts is critically short. Then the pediatric resident treating the baby remembers a graphic animation from an app developed to share best practices around thousands of facets of pediatric care. The animation had demonstrated, in simple and clear terms, how the breathing device was supposed to work. The physician, recalling the animation, sees that one of the valves in the ventilator isn't operational. He moves the valve as the app instructed; the device begins to work properly and the baby begins to breathe. A life has been saved.

This is not an imagined case, nor speculation. It actually happened at a hospital in Israel, and the program the doctor recalled was created by OPENPediatrics, based 10,000 kilometers away, in the United States.<sup>3</sup>

What can be imagined, however, is how this case—and thousands of others—might have turned out were it not for the open knowledge-sharing network that the physician was able to tap into. If the doctor's knowledge had been limited by the education she had received, by the advice of her in-hospital colleagues or even by the practices sanctioned by her national government, that baby might not have survived.

OPENPediatrics, like the other knowledge networks profiled in this report, came into existence because traditional walled institutions—whether they be academic, medical or political—often fail to channel and share the almost limitless expertise and knowledge available in the world. In many cases, these institutions actually hinder the sharing of information.

Thanks to the ready availability of the Web, and the inexpensive communications technology that makes use of it, knowledge networks are able to transcend the institutions that were once the exclusive domain of ideas. New networks allow new ideas not only to be shared between people, civil institutions and businesses, but also to be improved, shaped and enhanced by a multitude of people. As ideas spread, they also branch out and evolve, far more broadly and far more quickly than any traditional institution has ever been able to extend its influence. In fact, a non-institutional base is a strength; rather than the traditional concept of ideas flowing from a small group, at the top of a hierarchy, in one direction, the knowledge network generates ideas at the ground level, from many people, in multiple directions.



“*In all three cases, they are able to generate ideas and share knowledge at a robust level, and with more speed and efficiency, than any one of the stakeholders or traditional institutions could achieve individually.*”

While the realm of endeavor may differ, successful knowledge networks share several common attributes. Broadly speaking, knowledge networks:

- Transcend institutions, sectors, regions and/or disciplines
- Foster a culture of openness and inclusion in development of and access to knowledge creation
- Model self-organization wherein participants self-select for tasks in the network, but communicate and share in a coordinated way
- Use technology and social media to collaborate, share and access ideas and knowledge
- Enable a culture of reflection on best practices and continuous improvement of both the body of knowledge and the operation of the network itself.

## The Case Studies

### Introduction

Three case examples of knowledge networks were chosen for detailed discussion. They represent a range of disciplines and fields that clearly are not being served in the most effective way by the institutions that control most of the knowledge bases in their respective areas. This may be because of geopolitical boundaries and political expediencies (governments), or corporate competitiveness and proprietary interests (business), or an imbalance of wealth in either the literal sense or in the local availability of knowledge or access to novel ideas (universities).

One case, OPENPediatrics, seeks to improve the practice of pediatric medicine, especially at the patient care level, where access to knowledge and best practices is often limited to a small number of institutions with limited reach. Another, the Climate and Development Knowledge Network, seeks to overcome national boundaries and the limitations of large political organizations to address climate change issues by connecting ideas and experts on climate and sustainable development with governments and civil society groups who can benefit from that expertise. In particular, CDKN focuses on the “Global South” (countries in the southern hemisphere), which, besides being where climate change is striking hardest, also has the fewest resources to effect sustainable development.

A third, the Structural Genomics Consortium, facilitates the development of pharmaceuticals and catalyzes research in human health in a collaborative, non-proprietary forum that connects corporations and governments to scientists, focusing especially on less-studied aspects

of the human genome, creating a body of knowledge and ideas that is open to all, unrestricted by assertions of intellectual property.

All operate internationally, and solicit (indeed, depend on) active participation from multiple stakeholders in their areas of expertise. In all three cases, they are able to generate ideas and share knowledge at a robust level, and with more speed and efficiency, than any one of the stakeholders or traditional institutions could achieve individually. This is dependent on the use of modern technologies, which minimize what would once have been astronomical transaction and delivery costs.

## Climate and Development Knowledge Network

The Climate and Development Knowledge Network (CDKN) is a unique collaboration between government, business and civil society groups. It connects climate change and sustainable development experts in the developed world with cohorts in the developing world, or Global South, much of which is being, and will be, most dramatically affected by the world's changing climate.



A methane power plant, one of the initiatives of Rwanda's Green Growth and Climate Resilience Strategy<sup>4</sup>



But to suggest it's a one-way flow of information for "climate-compatible development" would be incorrect. "It all depends on what they ask for," says the Executive Chair of CDKN, Simon Maxwell.<sup>5</sup> The collaborations are usually driven by policy makers and leaders in the locales and communities CDKN is connected to, who understand intimately what development and climate change issues they are facing. Working with members of the CDKN Alliance—itsself a network of sustainable development NGOs and experts—a body of knowledge is growing that helps green development in all parts of the developed and developing world.

The Government of Rwanda, for example, has produced a national "Green Growth and Climate Resilience Strategy" and also established a "Fund for Environment and Climate Change" (known by its French acronym, FONERWA), drawing from the knowledge and expertise of CDKN. It's now the largest climate fund in Africa that is managed at a national government level. The strategy includes a roadmap to sustainably develop agriculture and forestry, from which many Rwandans obtain their sustenance and livelihood. The plan also encompasses the green growth of energy and transport infrastructure, aimed at helping Rwanda reach its goal of rising from "least developed" to "middle income" status on the UN Development Index in the coming decade.<sup>6</sup>

Founded in 2010 by the United Kingdom's Department for International Development, CDKN is now also funded by the Netherlands Directorate-General for International Cooperation. But here's where CDKN differs from what might appear to be a traditional NGO: it is operated by the professional-services company PricewaterhouseCoopers LLC.

"We've seen that the private sector needs to be involved in climate change and development, and there's nothing to be ashamed of with working with the private sector," Maxwell says.<sup>8</sup>

Indeed, PwC's involvement, although it raised some eyebrows in the NGO community when the contract was announced (perhaps because Oxfam was among those who bid for the contract to administer CDKN)<sup>7</sup>, is now drawing praise from the community, and is widely considered a model of corporate-NGO-government collaboration. Indeed, Ben Heaven Taylor, Oxfam's humanitarian research policy advisor, has singled out PwC's administration of CDKN as both responsive and effective: "After feedback from developing countries, [PwC] refocused the project to be demand-driven. They can listen to countries and commission the appropriate research. It's quite unprecedented in terms of scale and ambition," he says.<sup>9</sup>

Internally, CDKN has three arms of governance: the Management Oversight Committee, the Network Council and the Management Team. The management oversight committee is chaired by an official from the UK Department for International Development and includes CDKN's CEO and an official from the Netherlands' Directorate-General for International Cooperation. This committee reviews the funding allocated to CDKN, as well as the operational goals for the organization.



The governance body for CDKN is its Network Council, which includes PwC as well as the six international NGOs that take a lead role in facilitating CDKN's work. The Network Council oversees the operation of the organization with a "light touch," and drafts the medium- and long-term work programs and financial plans. In this sense, CDKN's goals are set not by its upper management, but by its delivery teams on the ground in Asia, Africa and Latin America, where the NGOs are based.<sup>10</sup>

CDKN's Management Team is comprised of the CEO, COO and regional leaders. It meets quarterly to evaluate and plan strategy and address issues that come up in the day-to-day operations of the network.

It's worth pointing out that in two separate reviews in 2013—one conducted by the British government and one by the Netherlands—CDKN is seen to operate with spectacular efficiency, and is more than meeting expectations in forging new, collaborative and effective relationships with multinational stakeholders such as the World Bank, the Green Climate Fund, United Nations Environment Programme and other partners. "Evidence suggests that CDKN's role has been transformational already in ensuring greater southern representation and voices in these fora and linking national and regional experiences with the global debates," the UK government's report says, adding that this is happening despite the lack of an expected, new, UN-brokered agreement of climate change action.<sup>11</sup>

CDKN is highly dependent on technology in its collaborative efforts, and uses the web to publish policy briefs, case studies, film and multimedia presentations as well as arrange consultations with remote locations in sustainable development. One of its programs, for example, provides knowledge and technical support for climate-talks negotiators—as well as a forum for collaboration—for some of the poorest and most-affected areas and countries in the world, including The Least Developed Countries Group, the Africa Group of Negotiators, Alliance of Small Island States and Coalition of Rainforest Nations. This helps the nations that are members of these groups have more meaningful involvement—and actually get heard around important issues in their regions—at IPCC meetings and in other, traditional international governance institutions.

Moreover, CDKN facilitated the Climate Knowledge Brokers' Group, which brings together the managers of NGOs and civil society websites focused on climate change issues, and includes initiatives on adaptation, mitigation, energy, climate finance and other issues to create cross-disciplinary online linkages. One project coordinated by CDKN, for example is the Reegle thesaurus API, which introduced standard, multi-lingual tagging which helps those websites adopting it to accurately share resources—and find them—as well as create spinoff applications that can be used by policy makers. It also helped create the Climate Knowledge Navigator to help address what Maxwell calls the "Where do I start?" problem when faced with the mass of largely non-curated climate-change information online.<sup>12</sup>

CDKN has scaled its operations to collaborations with groups and governments in 74 countries since its inception in 2010.<sup>13</sup> Indeed,



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its main mandate in support of locally owned and managed policy processes with “knowledge management” becomes more effective as collaborative information sharing expands.

CDKN operates on an assumption—grounded in evidence—that climate change is no longer an environmental issue but a core economic issue, and, as a report commissioned by the UK government concludes, is filling an important gap between governments and NGOs that neither is able to fill.<sup>14</sup>

From assisting the governments in Peru, Rwanda, Kenya and Columbia in implementing national climate strategies, to facilitating support for climate negotiators from the Marshall Islands, to creating software that helps those new to the web navigate its myriad resources, CDKN is a leading knowledge network. It is succeeding because, in part, it is circumventing large, governmental agencies and international bodies like the United Nations Intergovernmental Panel on Climate Change (IPCC) and building and nimbly sharing knowledge that is desperately needed in areas traditional institutions can’t or don’t always reach.

Indeed, the silo-busting combination of a group that is funded by government, acts in the capacity of a multi-disciplined NGO and is operated by one of the world’s largest management consultancy corporation is truly forging an original path, one that deserves emulation.

## OPENPediatrics

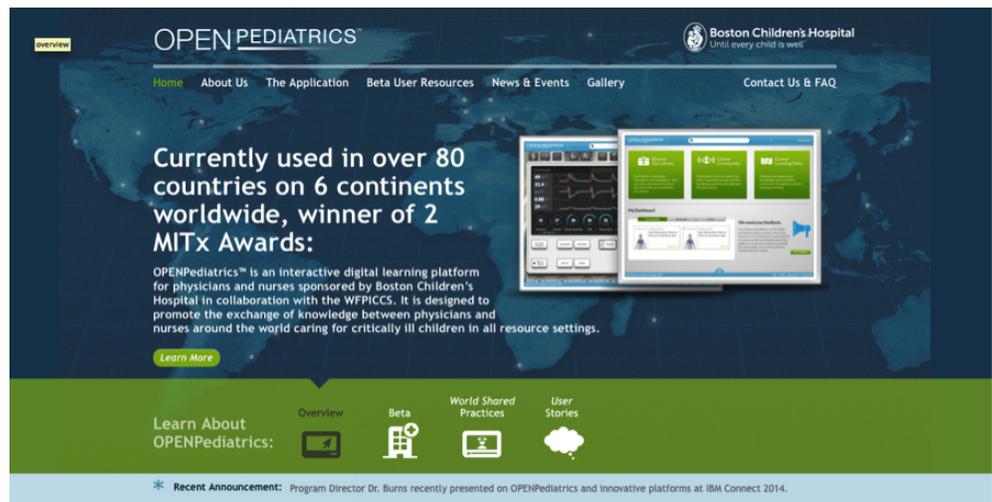
As a discipline with knowledge at its core, and where standards vary considerably across nations and, especially, the world, healthcare is one of the most obvious and applicable areas for a knowledge network’s viability.

And within health care, pediatrics is one of the most pressing issues in terms of distributing and sharing knowledge across borders. In Africa, one in five children will die before reaching five years of age. That compares to one in 115 in the United States.<sup>15</sup> Africa faces 24 per cent of the global burden of disease, but only has two per cent of the world’s doctors. Sierra Leone has fewer than five doctors per 10,000 people.<sup>16</sup>

Those are some of the reasons why in 2009, Jeff Burns, the chief of critical care at Boston Children’s Hospital and faculty member of Harvard Medical School, came up with the idea for OPENPediatrics—a collaborative, downloadable, web-based platform for teaching, exchanging ideas, and sharing best practices in pediatric care.

“Globally, only two per cent of health care dollars are spent on health care education,”<sup>17</sup> says Burns, who remains the program director of OPENPediatrics. And, “Even as hard-earned medical knowledge has exploded in the scientific revolution of the last century, the means by which this information is taught has not fundamentally changed.”





OpenPediatics.org, a Web-based platform for teaching, exchanging ideas and sharing best practices in pediatric care<sup>18</sup>

He explains the problem this way: “Efforts to expand the global access to medical information remain dependent on students going to the place of teachers, or less commonly teachers going to the students in remote parts of the world. Heroic efforts to provide medical missions to fill this gap are noble for the communities that can be reached, but they are inherently ineffective in addressing the scale and scope of the need that exists across the world.”<sup>19</sup>

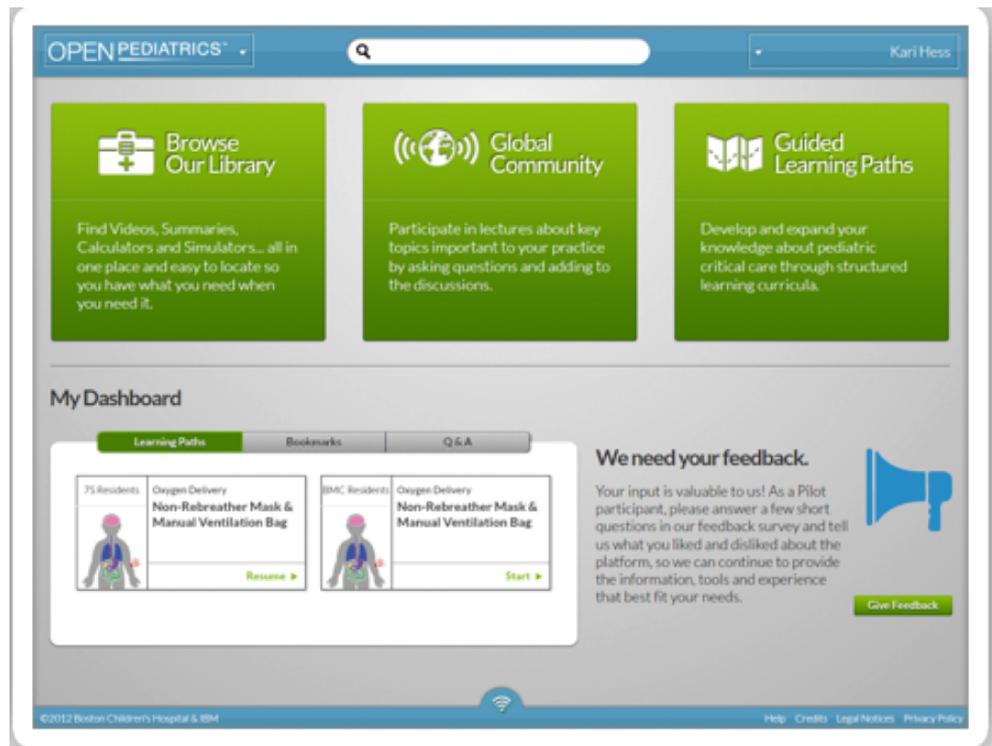
OPENPediatics seeks to change that. Recognizing that technology has enabled communications efficiencies inconceivable even a decade ago, Burns aims to tear down the walls of medical schools and teaching hospitals. And while acknowledging the efforts of NGOs like Doctors Without Borders, he says the key is to make knowledge around pediatric care accessible in the remotest corners of the planet, so doctors and nurses in these places can learn and adapt the best practices in modern care.<sup>20</sup> Again, the key is technology. He points out that between 1990 and 2011, mobile phone users, for example, went from 11 million people to 5.6 billion, or 80 per cent of the world’s population.<sup>21</sup> Similarly, in 1990, the US accounted for 75 per cent of all internet users. In 2011, it accounts only for 11 per cent of all users, with the biggest growth in the developing world.<sup>22</sup>

But online access to teaching materials is only part of the equation. As with the Climate and Development Knowledge Network, there is also a need to curate the vast amount of health-related material available online—something that OPENPediatics manages with the help of a network of doctors and nurses around the world. “A paradox of the present state of the internet is that while access to information is becoming easier,” he says, “it is more challenging to manage and sort through this vast amount of information to access content which promotes effective means of gaining knowledge, understanding and critical thinking.”<sup>23</sup>

OPENPediatics’ platform for knowledge exchange enables peer-to-peer interactivity among its users. A self-contained application, it offers

guided learning in the form of videos and multimedia, information on demand and shared practice forums, where doctors and nurses can exchange ideas about patient care and medical issues, learning and teaching at the same time. “Virtual device simulators allow medical professionals to practice without touching a real patient,” says Burns. “Just as in the video games that are so addicting to the current generation of teenagers, technology-based learning is adapted to the pace of the user, simultaneously presenting information in multiple visual and auditory modes, which capitalizes on different learning styles.”<sup>24</sup>

Since releasing in beta in 2010 to a small number of physicians, OPENPediatrics has blossomed into a thriving knowledge network. It is now used in 80 countries on six continents,<sup>25</sup> and, because it is a self-contained, self-perpetuating platform, it is almost infinitely scalable. The access is free, and the program is available either online or as a standalone application. Doctors and nurses are encouraged, and expected, to contribute their knowledge and ideas in a continuous dialog. Indeed, OPENPediatrics depends on its collaborating physicians and nurses for immediate and continual feedback, encouraging identification of knowledge gaps and help in filling them. Content is peer reviewed by designated experts who vet contributions to ensure accuracy and effectiveness.<sup>26</sup>



The OpenPediatrics App, a platform for teaching, exchanging ideas and sharing best practices in pediatric care.<sup>27</sup>

OPENPediatrics has not only broken down the borders between specialty hospitals and remote caregivers, and between disciplines



“*OPENPediatrics has not only broken down the borders between specialty hospitals and remote caregivers, and between disciplines of medicine, but also between political boundaries, affluence and poverty, and even between doctors, nurses and community health workers.*”

of medicine, but also between political boundaries, affluence and poverty, and even between doctors, nurses and community health workers who all contribute to the platform.

OPENPediatrics was originally a collaboration between Boston Children’s Hospital, Harvard Medical School, the Kennedy School of Government at Harvard and IBM, which helped develop the software. The organization is administered by a team of doctors at Boston Children’s hospital, with an administrative staff that oversee the day-to-day operations, and it is governed by an external advisory board that includes experts in learning technologies, a representative from MIT’s OpenCourseWare program and Harvard Business School.<sup>28</sup>

However, in practice, OPENPediatrics is now effectively a decentralized network, with policy generated collaboratively by many of the world’s largest pediatric hospitals. On the fourth Tuesday of every month, representatives from pediatric hospitals around the world gather online to address issues in the management of the network and delivery of information, problem solving, and to comment on the latest additions to the learning repository.<sup>29</sup> The next transformation will come when OPENPediatrics moves out of its beta phase (expected soon) and the platform is deemed sufficiently stable in a technological sense. Currently, the beta application has a limited number of users; once out of beta, it will be fully open and accessible to any pediatric healthcare provider in the world.<sup>30</sup>

As a paradigm-shifting initiative, OPENPediatrics is helping, with its technology and collaborative expertise, to reduce the death rate among children, especially in underdeveloped parts of the world with little or no access to advanced pediatric care. As Burns points out, OPENPediatrics, in the last number of months alone, has presented its model to seven international conferences, including the Economist Global Healthcare Summit in London, England. Burns himself won the MITX 2013 Visionary Award. And there are two more critical signs that the world is validating OPENPediatrics knowledge network model: since 2012, the staff has more than tripled in size, and contributions from independent donors have increased dramatically.

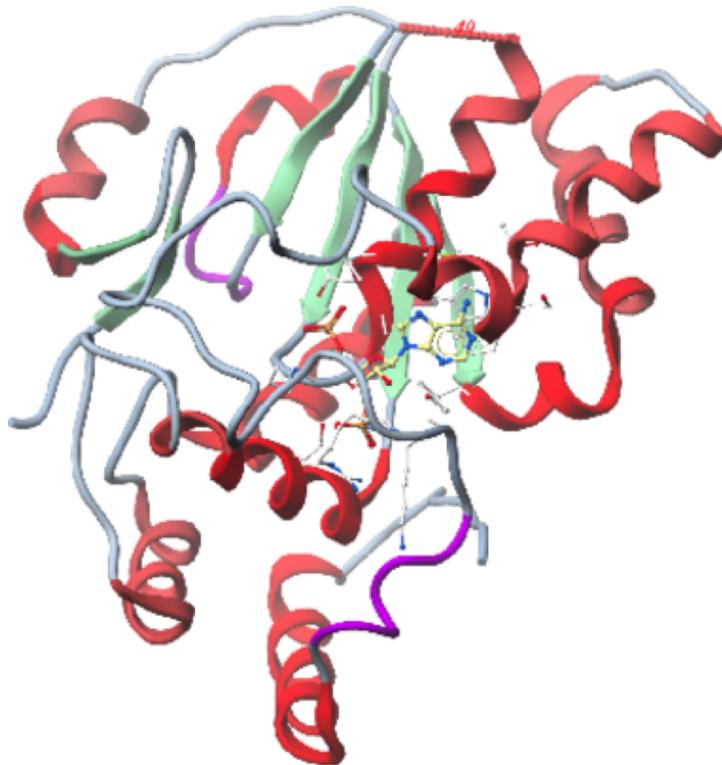
As one attending physician in Lusaka, Zambia, wrote on the OPENPediatrics website last month, “My opinion is that for [those] who have no adequate resource materials, this application is very useful and a long awaited development. Please keep it up.”<sup>31</sup>

## The Structural Genomics Consortium

Drugs are the most costly part of medicine for a reason: it takes a great deal of time, research and, of course, money, to develop them. Which is why drug discovery tends to be the realm of large, well-funded corporations driven by profit.



This causes two challenges as far as public health is concerned: The first is that drug companies tend not to invest in research that doesn't have the potential for a large payoff. The second is that the research those companies do undertake is proprietary, and the results, if they don't lead to a profitable drug, may be discarded. It's a walled system, one that squanders many opportunities for advancing knowledge in a critical area.



An example of protein structures that the SGC has shared with the community for knowledge creation<sup>32</sup>

This doesn't sit well with Aled Edwards, a biochemist who is the director of the Structural Genomics Consortium (SGC). SGC was born out of his frustration with those constraints and this public-private research group studies those parts of the human genome that are thought to be less likely to lead to drug discoveries. More important, the research is done with an important distinction: all of the work, the results and the compounds created are open source, free from any patents or intellectual property considerations, and are available to anyone who wants to use them. And it turns out that there is lots of appeal in the less sexy aspects of human genetic code. Started as a partnership between the University of Toronto and Oxford University in the United Kingdom, with some funding from the government of Ontario, SGC has blossomed into a flourishing knowledge network—with nine of the world's largest pharmaceutical companies signing on to be funding and research partners, and happily checking their intellectual property and patent claims—and a good chunk of their business model—at the door.<sup>33</sup>

*“ We’ve observed that there’s no conflict between data sharing and high-profile publications. Because the more you share, the more people contact you, the more ideas you have together, the larger academic network you have, the more knowledge you gain and the faster you can publish high quality science.”*

The output of SGC has been prodigious by medical research standards. In the past five years, its work has accounted for around 25 per cent of the global output of novel human protein structures.<sup>34</sup> Edwards attributes that to the open access and collaborate knowledge sharing that is SGC’s hallmark.

He cites as an example a project shared by Oxford and Harvard universities. Working collaboratively, scientists created a molecule to inhibit a protein in the human body linked to leukemia—one that was long considered too difficult to inhibit. The project began in January, 2010. The peer-reviewed paper about the molecule was published nine months later—itsself a considerable achievement. In eighteen months, however, there was a compound available that was sent to hundreds of labs around the world, free of charge, so they could build on the knowledge base established by SGC. “All of a sudden we’ve gone from, ‘How in the world are we going to think about these diseases?’ to a molecular pathway to a drug. All in 18 months. We would still be talking to lawyers, and we would not have picked up a pipette in the lab if we’d had to think about who owns the intellectual property before we started that experiment,” Edwards says.<sup>35</sup>

It was initially difficult to convince scientists to work in the open domain, he says. Institutional academic structures force researchers to compete for grants, which causes them to keep their work under wraps. Governments actually encourage industry players to file for intellectual property, he adds, because that’s an obvious route to monetize successful research. But it doesn’t serve the public. “In no endeavor in the world where you’re in a knowledge-poor environment does keeping things secret help.”<sup>36</sup>

As far as the scientists go, Edwards says sharing knowledge has generally helped careers, not hindered them. “We’ve observed that there’s no conflict between data sharing and high-profile publications. Because the more you share, the more people contact you, the more ideas you have together, the larger academic network you have, the more knowledge you gain and the faster you can publish high quality science.”<sup>37</sup>

And big pharma knows that it can’t afford to do the sort of “pre-competitive” research of the kind SGC performs. So corporations like GlaxoSmithKline, Bayer, Novartis and Lilly—to name a few—happily contribute to the research because it helps lay the groundwork for their own drug development.

SGC has become so successful, in fact, that the US-based think tank RAND just completed an analysis of SGC (to be published in February, 2014) and is urging other scientific research ventures to copy their model.<sup>38</sup>

Internally, the scientific leads at SGC set its strategic direction every four years, and work to milestones that are reviewed by an advisory board with representatives from public and private funders.<sup>39</sup> All the research data goes into a publicly funded government online repository, which is shared around the world. “We’re probably the most overseen academic project around,” Edwards says.<sup>40</sup>



Using technology developed within the consortium, “tools” such as chemical inhibitors are created at a sunk cost of around \$4 million each.<sup>41</sup> These are “given away” to most labs who request them, so long as the knowledge they generate is public and open access. Normally, Edwards says, these tools would be subject to onerous legal transfer agreements, but SGC doesn’t require them. Conservatively, this has saved “about 100 person years of lawyer time.”<sup>42</sup> In 2013, the SGC gave away 1,500 of those chemical inhibitors.<sup>43</sup>

As collaborative projects, SGC disseminates its findings through databases and through traditional peer-reviewed academic literature—but there is never any intellectual property filed on the science.<sup>44</sup> The result, measured in academic terms, is more than 100 papers published in collaboration with scientists around the world, and with numerous pharmaceutical companies.<sup>45</sup>

Edwards says one of the challenges SGC faces lies in securing sustainable funding, because the open access, knowledge-sharing model that has both public and private contributions “doesn’t fit into any box, and is thus hard for people to wrap their heads around.”<sup>46</sup> Having said that, Edwards points out they’ve been in operation for more than a decade, and have committed funding through several partners until 2020. And he adds that interest in the SGC model of sharing ideas and knowledge is growing every year.<sup>47</sup>

Moreover, if it runs into a problem it can’t address internally, the network SGC has engendered allows it to tap into expertise around the world. “Our mission gives us a sense of purity that makes people happy to help,” Edwards says.<sup>48</sup>

Edwards adds that SGC plans to increase its scope in the near future by forming open access knowledge collaborations with hospitals. Ultimately, he says, he wants to “foster an open and seamless collaboration among industry, scientists, doctors, patients, universities and hospitals. The fun part will be organizing it to ensure it’s a smashing success.”<sup>49</sup>

## A New Paradigm for Knowledge

It’s hard to visit a news site or examine a twitter feed today and not see reports of some conflict regarding the use of knowledge: between nations, between governments and civil society, between corporations and between universities. While those traditional institutions certainly generate and curate a tremendous amount of ideas, and continue to do so, it’s clear that there are alternatives that are becoming more prevalent because of their inherent, and at times, radical openness, and their leveraging of technology to communicate, disseminate, debate and improve.

In some areas knowledge networks have become the *de facto* way we assemble and integrate information. It’s difficult to imagine a world without Wikipedia, for example. With its strong community of contributors engaged in knowledge exchange, and an effective means



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of curating that knowledge, Wikipedia draws on the ideas of millions around the world. Many are experts and thought leaders in their fields; others are “amateurs” who have a particular interest in a subject. The result is the same: a knowledge network that has become indispensable in our modern, connected, instant-on, information-hungry era.

Other projects, like Galaxy Zoo, have harnessed the knowledge and ideas of people from multitudes of demographics and parts of the world to create a network that shares knowledge to sift through data and answer big scientific questions at a pace inconceivable a decade ago. First launched in 2009, the online citizen science project enabled interested volunteers to help scientists at Oxford University classify the millions of galactic images they had stored up in their databases. It was originally hoped that 20-30,000 people would take part. But after three years, a community of more than 275,000 users made nearly 75 million classifications of one million different images—far beyond the project’s original goal of classifying 50,000 galaxies. If the scientists behind the project were still laboring on their own, it would have taken them 124 years to classify that many images.

These massive online knowledge networks have traversed geographical boundaries, crossed and merged disciplines, encircled multiple stakeholder groups and laid the groundwork for a new form of collective intelligence that will help humanity tackle many of the issues facing the world.

But alongside these large online knowledge networks is a space for smaller targeted knowledge networks that are breaking into areas traditionally reserved for—and often jealously guarded by—stakeholders and groups who have held a proprietary interest in maintaining the status quo.

And in democratizing these areas in knowledge and ideas, and creating a barrier-free means to access and participate, it’s being shown that the possession and distribution of knowledge isn’t a zero-sum game, even in the most competitive of environments. Indeed, as these three knowledge networks show, all who join or participate lose nothing, but stand to gain immensely.

The broad principles that knowledge networks share (collaboration, accessibility and openness across political, stakeholder and disciplinary boundaries) are universal. Analysis shows those principles apply in almost any case: business, academic or government.

It’s almost a cliché that pharmaceutical corporations hoard knowledge for profit and destroy whatever they’ve learned that can’t be applied for that profit, in order to prevent someone else from doing so. But those very same corporations are recognizing the reality that while communication and collaboration costs have shrunk to almost zero, the cost of research, as science moves into more technical research challenges—especially in the realm of drug discovery—is becoming prohibitively high. This as the patents on numerous profitable, existing drugs are expiring before new products can replace them.<sup>50</sup> So it makes sense from a business standpoint to participate in the sharing of research and ideas in order to advance that



*“...developing international policy is a process so encumbered by politics and national interests that generating any kind of consensus—beyond a weak affirmation of ideals—is nearly impossible.”*

most costly and time-consuming aspect of pharmaceutical research. And that means working with competitors, and sharing proprietary knowledge and ideas. It means the work gets done apace, and, more important, the overall knowledge repository widens which benefits all—and leads to life-saving health products and technologies from which all benefit: those suffering from difficult-to-treat diseases will see their lives improved and shareholders will see increased dividends as ideas get to market sooner, and more medical conditions are tackled effectively. This is a model that clearly translates to any business endeavor that traditionally places a high priority on proprietary research. With the transaction costs of collaboration reduced almost to zero, the business case for knowledge sharing, especially when it comes to best practices, is solid.

The same is true in academic research, where scientific and other knowledge enquiry has been treated with intense proprietary concern, thanks to the institutional model of university culture, where individual researchers and the academies themselves are recognized through the individual accomplishments of faculty, and honored with grant money.<sup>51</sup>

But individual research labs are facing the same issues pharmaceutical companies face: the cost of solitary research is increasing as the transaction costs of sharing knowledge have dropped. Many scientists, and some institutions, have realized that they still receive credit in collaborative knowledge sharing, and that the benefits—more rigorous, efficient research that gets published sooner because peer review is inherent in the collaborative process—outweigh proprietary interest. In this case, the adage is true: a little credit goes a very long way.

Similarly, specialist hospitals like urgent pediatric care facilities have long had a proprietary interest in exclusivity within a particular region or market. And many have had outreach programs in other cities and parts of the world where their expertise and knowledge is applied. But those programs are costly, limited in scope and location, and inefficient compared with the concept of leveraging technology to create an always-on network of ideas and best practices that pediatric caregivers can access and contribute to without cost—even if they are in an area without regular internet access. As examples have shown, in a field where time is so often of the essence, knowledge networks have proven to be a lifeline in critical care—literally. Does this diminish the brand of a particular hospital? Hardly. Medicine, as a field of enquiry and knowledge delivery, has ethics at its core. One might argue that collaborative sharing of best practices—knowledge that is available to all its practitioners, which allows those practitioners to contribute—is an ethical imperative.

Arguably, the biggest silos of information and knowledge are governments. This is understandable, as governments, municipal, territorial or national, have a strong interest in protecting and enhancing the lives of their citizens. But as austerity measures become the norm, and populations grow, it's time to assess whether governments are the most able curators of this knowledge and expertise. The flattening effect of the web



“A knowledge network is only as good as the breadth of its collaborators.”

makes it possible for small groups of like-minded people to share ideas and information around issues of national and global importance.

It has been shown time and again that national governments can be hamstrung in developing public policy as they navigate the competing interests that vie for political attention. The imperative for policy to address climate change may make the strongest case for the viability of the knowledge network. One need look only so far as the most recent IPCC meetings to see how developing international policy is a process so encumbered by politics and national interests that generating any kind of consensus—beyond a weak affirmation of ideals—is nearly impossible.

Yet there are knowledge networks working quietly, and efficiently, to achieve the sustainable development goals massive agencies like the IPCC are trying to get governments to agree on—by sharing and developing knowledge collaboratively, and making that knowledge available without cost where it is needed most, in some places where sustainable development isn't merely an “green” alternative, but an economic necessity. The money governments spend to ensure the survival of these knowledge networks—networks that efficiently and effectively do work governments are too institutionally encumbered to do—is well spent.

## Implications for Network Leaders

What can network leaders learn from the Climate and Development Knowledge Network, OPENPediatrics and the Structural Genomics Consortium? While every knowledge network will be different in size, scope and design, each of the three case studies demonstrates attributes and facilities that anyone seeking to build a knowledge network should consider.

**Leverage technology to enable real-time engagement among researchers and practitioners.** Knowledge networks are made possible because the traditional transaction costs of collaboration are very low. Even a decade ago, the idea that an expert on sustainable development could collaborate, in real time, with a policy planner on a remote Pacific island was the stuff of science fiction. Now it can be achieved for almost no cost at all. Moreover, that collaboration can effortlessly scale to a real-time network of policy makers, planners, professors, developers and NGOs, all communicating simultaneously and updating documents on the fly. Similarly, a few short years ago, it was inconceivable scientists could combine ideas instantaneously to boost the productivity of microbiological discovery. Or that a nurse in a refugee camp in Sudan could watch a video, on her cell phone, of the best practices in administering oxytocin to a mother who might otherwise die in childbirth.



*“...a true knowledge network creates an environment where all who participate gain, and nobody loses—and even those who stand outside the network benefit from the knowledge it provides.”*

Web-based technology is cheap, effective, disruptive and leaves almost no carbon footprint. Take full advantage of it.

**Build a wide, cross-disciplinary support and collaboration base.** A knowledge network is only as good as the breadth of its collaborators. The Climate and Development Knowledge Network succeeds in large measure because it is supported by an existing group of governments, NGOs, academics and other experts—groups that might not otherwise have the capacity to connect, especially across geographic and disciplinary boundaries. Indeed, a knowledge network draws strength when it is able to create a framework for what might usually be competing interests or groups to come together, share ideas and create synergies.

**Ensure there are metrics to assess the efficiency and effectiveness of the knowledge network.** The Structural Genomics Consortium is able to quantify the number of drugs its research has helped bring to market and the number of peer-reviewed papers it has published, and see how its collaborative, patent-free model compares to the “go-it-alone” traditional model of pharmaceutical companies and pure academic researchers, and it can demonstrate to those who fund it—and draw from its abilities—that it is a worthwhile endeavor. This ensures two things: that the participants see value in their contributions, and that the model continues to attract new collaborators as the network grows. Similarly, OPENPediatrics provides a collaborative review process in the form of real-time meetings among the world’s leaders in pediatric care. This ensures that all facets of the field are being addressed, and that the material being collectively produced is scientifically rigorous and effective.

**Build accountability into the network.** All three of the networks in this report are transparent in their governance and operations; they file regular, public reports and are scrutinized by their funding partners. Moreover, there is a place to voice dissent in a productive way, and to accommodate suggestions in a process of continuous improvement. Regular, webcasted meetings of officials from contributing pediatric hospitals, for example, provide clear insight into governance and policymaking that all collaborators, and even the general public, can access in a well-curated way. Like the metrics described above, built-in accountability ensures collaborators that their contributions are being recognized, and also serves as a tool to allow new partners to join the network with confidence.

**Don’t be afraid to start small, but make your network scalable.** When the Structural Genomics Consortium began, it was a collaboration between two universities, one government and several pharmaceutical companies. But its knowledge-sharing model, with the above four elements baked in, made it almost infinitely and painlessly scalable. Now, leading by example, it has broadened to include almost every major pharmaceutical company in the world as well as numerous other academic institutions and government research bodies. Similarly, OPENPediatrics began as a collaboration between one hospital, a computing company and a university. Now it is poised to be on every pediatric caregiver’s computer in the world, and able not just to deliver knowledge, but receive it.



Ultimately, with all these elements together, a true knowledge network creates an environment where all who participate gain, and nobody loses—and even those who stand outside the network benefit from the knowledge it provides.

When that occurs, the knowledge network becomes an organism that is far more powerful than the sum of its parts: lives are saved, global issues are addressed and challenges are met with the collective might of collaborative ideas.



## Endnotes

- 1 A Venn diagram or set diagram is a diagram that shows all possible logical relations between a finite collection of sets. See Wikipedia for a full explanation: [http://en.wikipedia.org/wiki/Venn\\_diagram](http://en.wikipedia.org/wiki/Venn_diagram)
- 2 Don Tapscott, "Introducing Global Solution Networks," [www.gsnetworks.org](http://www.gsnetworks.org), 2013.
- 3 "User Stories," OPENPediatrics—Until Every Child Is Well, Web, 2 January 2014.
- 4 <http://cdkn.org/project/a-strategic-framework-for-rwanda/>
- 5 Vincent Bevins, "New climate network to help developing countries," *The Guardian*, 12 March 2010, Web.
- 6 "Case Study: Rwanda's Fund for Environment and Climate Change," CDKN Annual Report, 18 September 2013, pdf.
- 7 Bevins, *ibid.*
- 8 *Ibid.*
- 9 *Ibid.*
- 10 "Governance Structure," Climate and Development Knowledge Network—Supporting climate compatible development, Web, 28 December 2013.
- 11 "CKDN Mid-Term Review Summary," CKDN External Evaluation Review, 15 March 2013, pdf.
- 12 "Supporting Negotiators from climate-vulnerable countries," CDKN Annual Report, 18 September 2013, pdf.
- 13 "Foreward," CDKN Annual Report, 18 September 2013, pdf.
- 14 "CKDN Mid-Term Review Summary," *ibid.*
- 15 "Why OPENPediatrics is needed," OPENPediatrics—Overview, 2 January 2014, Web video.
- 16 *Ibid.*
- 17 *Ibid.*
- 18 [www.openpediatrics.org](http://www.openpediatrics.org)
- 19 Jeffrey Burns "OPENPediatrics: scaling beyond the walls of the hospital in a global healthcare world," *Arab Health Magazine*, April, 2013, 42-23, pdf.
- 20 Burns, *ibid.*
- 21 "Why OPENPediatrics is needed," *ibid.*
- 22 *Ibid.*
- 23 Burns, *ibid.*
- 24 *Ibid.*



- 25 “About Us,” OPENPediatrics—Overview, 2 January 2014. Web.
- 26 Burns, *ibid.*
- 27 <http://www.openpediatrics.org/the-application/overview/#prettyPhoto>
- 28 “External Advisory Board.” OPENPediatrics—Overview, Web, 2 January 2014
- 29 Burns, *ibid.*
- 30 “About Us,” *ibid.*
- 31 “User Stories,” *ibid.*
- 32 <http://www.thesgc.org/structures/2h8k>
- 33 “Partners,” SGC—Structural Genomics Consortium, Web, 6 January 2014.
- 34 “Science,” SGC—Structural Genomics Consortium, Web. 6 January 2014.
- 35 “Open Source Knowledge,” Narrated by Don Tapscott, ReCivilization, CBC Radio, 29 January 2012, Radio.
- 36 *Ibid.*
- 37 *Ibid.*
- 38 Aled Edwards, “Re: Anthony Williams/Don Tapscott research,” Email message to the author, 9 January 2014.
- 39 *Ibid.*
- 40 *Ibid.*
- 41 *Ibid.*
- 42 *Ibid.*
- 43 *Ibid.*
- 44 *Ibid.*
- 45 *Ibid.*
- 46 *Ibid.*
- 47 *Ibid.*
- 48 *Ibid.*
- 49 Edwards, *ibid.*
- 50 “Open Source Knowledge,” *ibid.*
- 51 *Ibid.*



## About the Author



Adam Killick is a longtime producer at CBC National Radio's *As It Happens*, and was the producer of the groundbreaking "ReCivilization" radio series with Don Tapscott and Anthony D. Williams, which aired on both *The Sunday Edition* and *Ideas*. The concepts investigated in that series are similar to many of those that underpin Global Solution Networks. He is the author of one book and several thousand journalistic articles, and his work has appeared in most major Canadian newspapers and magazines, as well as in the US, UK and Australia. Adam has twice won Canada's *National Magazine Award* for his long-form journalism.



## About Global Solution Networks

Global Solution Networks is a landmark study of the potential of global web-based and mobile networks for cooperation, problem solving and governance. This research project is a deliverable of the GSN program, offered through the Martin Prosperity Institute at the Rotman School of Management, University of Toronto.

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Ten Types of Global Solution Networks

