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Data Science: A Powerful Catalyst for Cross-Sector Collaborations to Transform the Future of Global Health—Developing a New Interactive Relational Mapping Tool (Demo)

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ABSTRACT

The increasingly complex and rapidly changing global health and socioeconomic landscape requires fundamentally new ways of thinking, acting, and collaborating to solve growing systems challenges. Cross-sectoral collaborations between governments, businesses, international organizations, private investors, academia, and nonprofits are essential for lasting success in achieving the Sustainable Development Goals (SDGs), and securing a prosperous future for the health and well-being of all people (United Nations, *n.d.*). Our aim is to use data science and innovative technologies to map diverse stakeholders and their initiatives around SDGs and specific health targets—with particular focus on SDG 3 (Good Health & Well Being) and SDG 17 (Partnerships for the Goals)—to accelerate cross-sector and multidisciplinary collaborations. Initially, the mapping tool focuses on Geneva, Switzerland as the world center of global health diplomacy with over 80 key stakeholders and influencers present. As we develop the next level pilot, we aim to build on users' interests, with a potential focus on non-communicable diseases (NCDs) as one of the emerging and most pressing global health issues that requires new collaborative approaches. Building on this pilot, we can later expand beyond only SDG 3 to other SDGs.

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In September 2015, 193 world leaders adopted, on behalf of the peoples they serve, a historic decision on a comprehensive set of 17 Sustainable Development Goals (SDGs) and 169 targets urgently needed to shift the world onto a more sustainable and resilient path (United Nations, *n.d.*). All countries and stakeholders, acting in a collaborative partnership, made a commitment to implement this plan by 2030. The SDGs seek to build on the Millennium Development Goals (MDGs) and complete what the MDGs started. The SDGs balance the three dimensions of sustainable development: economic, social, and environmental. These three dimensions of sustainable

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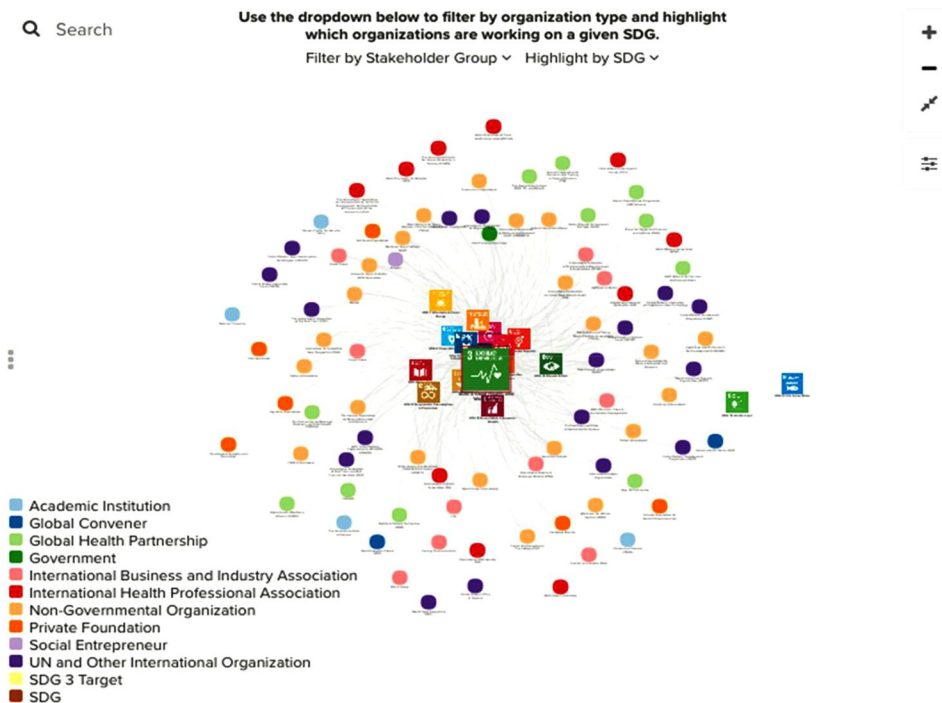


Figure 1. An interactive relational map of key public and private actors in global health in Geneva, Switzerland, the world center of global health diplomacy. See reference for a link to the map. (Global Health Actors in Geneva, 2017). *Note.* SDG = Sustainable Development Goals.

development are interlinked via a set of complex relationships. For example, environmental factors can influence social and economic outcomes. Given that health and well-being are essential ingredients for achieving sustainable development outcomes (Copenhagen Consensus Center, 2015; Lancet Commission on Investing in Health, 2013), we selected SDG 3 (Good Health & Well-being) and SDG 17 (Partnerships for the Goals) as areas for our research. Our focus was to use data science and innovative technologies as a new catalyst to converge diverse stakeholders around specific SDG targets to collectively accelerate reaching the Goals (Figure 1).

No organization can solve complex health challenges alone

The rapidly growing burden of non-communicable diseases (NCDs) looms with over 75% of deaths occurring in the developing countries, becoming only more complex as the world's population ages, our lifestyles change, and environmental challenges grow. According to the World Health Organization, worldwide obesity has nearly tripled since 1975, causing increased rates of heart disease and stroke especially in low- and middle-income countries (World Health Organization, 2017a). Although it is largely preventable, curbing global obesity requires a population-based, multisectoral,

multidisciplinary, and culturally relevant approach (World Health Organization, 2017b). According to the Global Action Plan for the Prevention and Control of NCDs 2013–2020, “Non-communicable diseases (NCDs)—mainly cardiovascular diseases, cancers, chronic respiratory diseases and diabetes—are the biggest cause of death worldwide” (World Health Organization, 2013). Additionally, what some may consider diseases of the past, like tuberculosis (TB) or cholera, are still devastating killers. We know the solutions but these diseases remain rampant, in large part due to the lack of integrated approaches and effective collaborations. According to the Stop TB Partnership nearly 1.8 million people lose their lives each year to TB, making it today, 135 years after the discovery of the bacterium, still the leading global infectious killer (Stop TB Partnership, 2017). Accelerated cross-sectoral and multidisciplinary coordination and action involving health and other sectors in a combined biosocial approach for sustainable development is the only way of stopping TB (Ortbald, Salomon, Bärnighausen, & Atun, 2015).

Rapidly changing environment

At the same time, a shifting socioeconomic environment and increasing health expenditures require innovative financing solutions and a fundamentally changed approach to public and private collaborations if we are to address health challenges and achieve universal health coverage. For the first time in history, more than half of the world’s 100 largest economies—in terms of government revenue or corporate turnover—are companies, not countries (Green, 2016), and, therefore, businesses from all industry sectors have a critical role to play in achieving the SDGs (Business and Sustainable Development Commission, 2017). United Nations agencies have overlapping mandates and are slow to act without effective partnerships. Recently, the activity and influence of nonprofit organizations has grown significantly around the world (Casey, 2016). The emergence of nongovernmental actors along with organized citizens’ voices and coalitions is ever more powerful in shaping our future.

No single organization is equipped to solve increasing global health challenges alone. Extensive literature and practice are available about various cross-sector partnerships in global health. A selection of this literature is included in our references (Buse & Harmer, 2007; Forum on public-private partnerships for global health and safety, 2017; Frenk, 1993; Independent Evaluation Group, 2016; Kickbusch, 1998; Reich, 2002; World Economic Forum, 2016). Over the past few decades, a number of groundbreaking public–private partnerships and alliances like The Global Fund to Fight AIDS, Tuberculosis and Malaria, UNITAID, Gavi, the Vaccine Alliance, Roll Back Malaria, Stop TB Partnership, The Partnership for Maternal, Newborn & Child Health, Global Alliance for Improved Nutrition and several others have been developed to tackle global health problems. Nevertheless, solutions and

financing have been framed around specific diseases or sectors causing silos to emerge. How can we tap into the capabilities and resources of various public and private stakeholders using data science and technology to bridge these silos and build a more effective collaborative system, accelerating the delivery of sustainable solutions?

A new tool to help navigate partnership opportunities

In this current era of technological revolution, as some call it the Fourth Industrial Revolution (Schwab, 2017), we have a unique opportunity to use technologies for finding the best strategic partners and accelerating effective collaborations among diverse stakeholders and sectors, globally and locally. It is perhaps surprising that, in our interconnected world, technologies have not been extensively used to catalyze and cultivate strategic relationships between organizations.

Global Development, a new kind of consultancy focused on building collaborative ventures to address health systems challenges and sustainable development, partnered with Columbia University's Mailman School of Public Health and Kumu, a data visualization platform startup, to conceptualize and develop an interactive, visual tool of global health stakeholders. Our aim was to create a tool for the public good and as an open data platform, to foster and accelerate the development of cross-sector partnerships, which enable bringing sustainable solutions faster to scale.

As the launchpad for our pilot we chose Geneva—the world center for global health and multilateral diplomacy, which hosts likely the highest number of key influencers in global policy making, financing and implementation of various programs and initiatives in global health.

We developed a database and “sense-making” system map of over 84 global health stakeholders based in Geneva. Stakeholders were sorted in the following 10 categories (listed alphabetically): academia, global convener, global health partnership, government, international business and industry association, health professional association, nongovernmental organization, private foundation, social entrepreneurship, and the United Nations and other international organizations. Each stakeholder's activities were mapped across nine targets defined in SDG 3 (Good Health & Well-being), as well as their focus on other SDGs (1–17). Additionally, we included in the database their mission, annual budget, staff size, headquarter location and regions of focus. For a more visually appealing and clearer look, we represented organizations by their logo, and SDGs by their formal symbols.

The organizations in the mapping tool were elaborated and finalized using both online research and e-mail inquiries sent to each organization. In addition, in-person interviews were conducted with a number of organizations for qualitative feedback on making the map useful and user friendly.

This multistakeholder map, displayed relationally, is only a first step to help organizations and individuals identify synergistic partners and visualize how to best facilitate new collaborations between stakeholders of all types. It enables bridging silos in a highly fragmented global health landscape.

Future vision to accelerate collaborations

This initial prototype generated excitement and positive response from its participants and users. It addresses the present lack of awareness of innumerable private and public sector actors and their extensive and sometimes duplicating activities. It also helps to visualize the interconnected nature of health and health systems with other systems, such as food, environment or education, and opportunities for partnerships. For example, users from nonprofits, academia, businesses, and others found it very useful to visualize an overview of stakeholders, and learn about the diversity of potential partnership opportunities which they had not explored before. Several users, including students of global health and sustainable development, found it to be an effective and much needed educational tool. Students used it to learn about various stakeholders and possible cross-sector partnerships as well as find training or job opportunities.

Suggestions for next level prototype

The development of the next level prototype is underway. Suggestions for future development included developing different use-cases for specific topics and geographies, making the tool more transactional and open source, enabling the development of a more collaborative community. This would require testing the prototype and making it more robust and user friendly.

In addition, it would be useful to explore the integration of text mining and smart classification to speed up research and extraction of relevant data from online sources, while also adopting the use of a more relevant type of database (NoSQL, e.g., MongoDB, OrientDB, etc.) to represent more complex relationships. Early discussion is underway to standardize and publish an open ontology/taxonomy for representing data of this type, that could be queried and utilized by other consumers of data (e.g., as part of the open data framework).

Based on received feedback, NCDs emerged as one of the highly desired future directions. Specifically, mapping key actors, their projects and investments in select low- and middle-income countries, or cities, to help drive collective impact at scale in this currently highly fragmented area. Another expressed potential area of interest is to adapt the tool for various membership-based coalitions, such as the Global Health Council; NCD Alliance; Stop TB Partnership; Partnership for Maternal, Newborn & Child Health; and other global, regional, or local alliances in global health.

Moving beyond global health

Furthermore, moving beyond the global health space, this tool can be used to help build global collaborations across other interrelated areas of the SDGs such as education, clean water and sanitation, food security, clean energy, gender equalities, and others. This has already been demonstrated using similar mapping approaches in a previous generation of action-research, where actors (and their actions) were classified and visualized, have already demonstrated value in helping set policy and guide investments for adapting to the impacts of climate change (EAD, 2013).

Conclusion

For us as human beings, relationships are at the core of our well-being and prosperity. Like never before, the opportunity to use data science and human capital in novel ways to enhance relationships among organizations, can help accelerate solving the challenges that we face in global health and beyond. Along with suggestions and enthusiasm received from our users, we are open and excited to further develop strategic collaborations and significantly improve and test this demo.

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