

tinkering toward innovation

Sources of innovation are expanding. Increasingly, innovations are emerging from the worldwide practice of tinkering—experimenting, testing, probing, and making incremental improvements to existing tools and processes. Tinkerers range from the highly motivated patient seeking to improve his or her health, to the entrepreneur trying to come up with the next successful health or wellness product or service. While the tendency is to look at this practice as isolated individuals pursuing personal interests, these efforts collectively represent a new source of innovation from the bottom-up. The capacity of organizations to evaluate and integrate the global practice of tinkering will be critical for strengthening the innovation pipeline and improving both individual and collective health and well-being.

From testing the definitions and accepted measurements of health and well-being, to targeting and treating networks of people with similar health affinities, to experimenting with new ways to deliver care, tinkering is creating new ways of treating illness and building health capacities in our bodies, networks and the environment.

bodies:
a proliferation
of new tools and
new choices

Most of us unknowingly tinker with our health. We all have idiosyncrasies when dealing with the onset of a cold or coping with mental health conditions, we try out different diets, seek advice from doctors as well as friends, and make small adjustments to our lifestyles. Over the next ten years, we will complement existing tools with an expanding landscape of offerings that will provide a rich context with which to tinker and uncover practices best suited to our health needs. Advances in mobile abundant computing, bioinformatics, and other sciences and technologies will augment our capacity to experiment on, repair or improve our bodies. These small-scale experiments will lead to new recommendations, therapies, and trusted information sources.

networks:
experimenting with
social interventions

Our social surroundings are important determinants of our health. Recent discoveries have shown that the community of people around us has greater impact on our health than previously imagined. Not only do we rely on social communities for emotional encouragement and support in achieving our health goals, our social networks are also critical influencers of health behaviors and attitudes. For instance, researchers Nicholas Christakis and James Fowler illustrated that individual behaviors can spread through a social network in their book, *Connected*. As we increase our understanding of specific levers in a social environment that influence our health status, it will enable more social interventions. Imagine providers shifting from treating individuals to treating groups of people connected in a network.

environments:
mending
communities

Sensors and sensor mapping, abundant mobile computing resources, and augmented reality technologies are enabling more of us to tinker with both our physical and built surroundings. As access to these new technologies grows, we'll see new forms of visualization; bottom-up community asset maps, maps of emotional states such as stress and anxiety, and new ways to visualize the location and distribution of a community's risks and health resources. The information unveiled by the new mobile tools and sensor technologies will continue to improve our ability to tinker with our environments in an effort to make them more visible, safer, and healthier.

—Rachel Maguire

an interview with **Josephine Green**



Josephine Green was appointed Senior Director of Trends and Strategy at Philips Design in 1997. She left Philips in 2009 to return to the United Kingdom. She promotes new thinking and new knowledge in the field of social foresight, innovation, and change. Her advocacy in this field is based on the belief that we need different ways of thinking, being, and doing if we are to live well, prosper, and safeguard the future.

by **Rachel Maguire**

**Research Director
Health Horizons Program**

Rachel applies trends in new media and mobile technologies to her health systems expertise to study how personal technologies are informing health care practices.



Rachel: Explain what you mean by a social industry.

Josephine: A social industry is something that responds to a social need rather than an individual or a consumer need, and that has a social outcome. I'd rather talk about social solutions because industry smacks of a 20th century kind of paradigm. Social solutions build up social enterprises, or social industries.

Rachel: Why do you see social industries, or social solutions, as the engines of growth in the next decade?

Josephine: Understandably, in the 20th century, we were seduced by technology. Technology became the driver. The big transformational changes of the 19th and 20th centuries were very much techno-market based and they were driven through giving consumers things that they didn't have—televisions, cars, etc. I don't think the consumer paradigm will drive [growth] because we are facing so many social challenges—they range from aging to care to chronic illness to transport to education. So, we have to reinvent most of the social solutions from the 19th and 20th centuries. This places the social industries as a driver of growth and prosperity because it's what, at this moment in time, is most needed. The interesting thing about social industries and social [innovation] is it normally happens when there is a widespread social need and there is a new widespread technology available.

Rachel: How does tinkering fit into this transformation to social industries such as health?

Josephine: Whereas the language of the past was about planning, measuring, and controlling, I think the language of the future will be about experimenting, learning, and constantly adapting. In other words, how we think about being in the world will be no longer [in terms of] planning, controlling, regulating, managing, but rather learning, experimenting, adapting constantly [and] collectively.

Rachel: What are the barriers to encouraging more social solutions?

Josephine: Our critical problem lies now in our organizational structures—the pyramid, fairly authoritarian, command-and-control, top-down, highly-bureaucratized kind of environment. In the more linear mechanistic world of the 20th century, we had a funnel model of technology. We could, in a way, make it linear and think that we could predict it. Now, people have come out of their boxes and technology has come out of its box. [People] are increasingly moving from the back end to front end of innovation and creating their own everything—movies, films, political movements. What we're [seeing]—and this on a global scale with six billion and growing—is that we have nothing that's predictable or linear. There are too many touch points. We have chaos and we have complexity. We have constantly emerging, complex evolving systems.

If you try to [capture this innovation] in a funnel model, or a hierarchical top-down model, you lose so much knowledge and information. What we're seeing is the big word, decentralization, to cope with the complexity. And that means decentralizing innovation. It actually means taking innovation and decentralizing it in terms of moving it to the front lines of the system. There are certain companies now looking at the decentralization of strategy. All because these companies know that they're not getting the creativity, they're not getting the innovation they need, because of the bottlenecks and the hierarchies and the politics and everything that we know about.

Rachel: How will social innovation evolve?

Josephine: Social innovation involves many different participants. It can start from a grassroots movement, it can start top-down from a government or a company, it can start from an NGO. It can start from a social entrepreneur. It normally starts from a mix of these. But any social solution normally is involving a lot of actors. And therefore, that kind of funnel model, and market research and all the things that we used to do, are not useful or meaningful in a multi-stakeholder, multi-actor, social innovation context. And therefore, the only thing we can really do is equip everybody in our society to be able to think intelligently in the moment and to act.

When you liberate people to be the creative, experimental, collective innovators that they're capable of being, then [the effect] is exponential. It means that your [organization] creates more all the time, but in a much more resilient and robust way because it's there in the place where it needs to be. [Social solutions] will be rooted in the realities, the local social environmental, and historical realities of the place.

Rachel: How will the global practice of tinkering scale?

Josephine: I think there we will need to be clever. Some things I think are scalable. I think it's in the process that we will come out smiling, not in the product. Because the process of enabling people to continuously learn and experiment and innovate, [will result in] something that makes sense for you as a group.

Rachel: What will the role of large organizations be in small-scale experimentation?

Josephine: You could imagine companies being much more decentralized, involved in the tinkering, internal and external, but then maybe their business model will be through scaling. Companies can facilitate the coming together [so that] many different actors [can] find systemic and radical solutions because, as we know, a radical solution can't happen with just one company. It has to involve many different players and actors through the whole chain. And [organizations] have the power to do that.

tinkering as social innovation

The dominant engines of growth for the 21st century will not be the automobile, technology, telecommunications, or energy industries. Instead, according to Geoff Mulgan of the Young Foundation, social industries will account for an estimated 30% of the global economy. Blending private and public forces, social industries encompass the business of responding to social needs by generating social solutions. Social industries in health design and develop market offerings aimed at improving health and enhancing the experience of well-being while solving a social need.

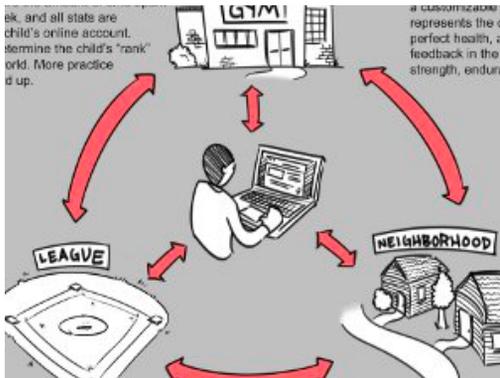
Social solutions will come not from market-led or technology driven innovation, but from more social innovation. Some social innovations—new tools, concepts, approaches, and organizational structures—will be generated in policy and not-for-profit circles, and in companies' boardrooms and R&D labs.¹ Yet, most social innovation will come from individuals working alone or in networks, tinkering with existing systems—testing, probing, and making incremental improvement to tools and processes already in place.

To benefit from innovations emerging from the global tinkering culture, organizations operating within the social industries of health and well-being will have to undergo structural changes. To flourish, they must adapt to the iterative, experimental, and informal methodology of the tinkerers who will fuel the innovation pipeline for social industries.

what drives tinkering in health and well-being?

According to social scientist and researcher Dr. Alex Soojung-Kim Pang, “People who engage in tinkering do so because they are driven by a desire to experiment, to make existing technologies more useful and to customize them to better suit users’ needs.” In the health and well-being space, tinkerers tend to be people motivated by a desire to optimize their healthspan. Aging cohorts around the globe are trying to safeguard their future health by tinkering with their bodies, networks, and environments. A growing global population of people with chronic conditions are also tinkering, making incremental repairs to their biological health while gradually improving their social and physical surroundings. They tinker to build the narrative of what’s wrong with them, to create a response or a treatment, or to manage a disease with modalities such as diet and exercise. Finally, a global cadre of health enthusiasts has embraced tinkering, maximizing their well-being by striving to make their bodies, minds, networks and environments function as efficiently and effectively as possible.

These proposed projects tinkier with existing infrastructure to improve people’s relationships with local communities and build health capacities



Inter Connected Sports

Source: BodyShock/Timothy Hicks



Green Clinic Lab

Source: BodyShock/Lorenza

tinkering with well-being

In an effort to move beyond purely biomedical models of health, tinkerers are developing new ways to understand and measure well-being. Eventually, these projects may lead to new interventions aimed at improving long-term health as part of broader efforts to improve psychological, social and environmental well-being.

Cape Area Panel Study

A true sense of well-being depends on more than our health status. Our economic and social well-being may have more impact on our sense of well-being than whether or not we have been diagnosed with a medical condition. Some researchers are now tinkering with the definition of well-being by adding social and economic data to the health information that they collect. For instance, in Cape Town, South Africa, the Cape Area Panel Study tries to understand the variance in South Africans' sense of well-being by extending data collection beyond traditional health factors (including mental health) to include income and consumption, crime, social connectivity, family formation, and schooling.

Fragile Families and Children Wellbeing Study

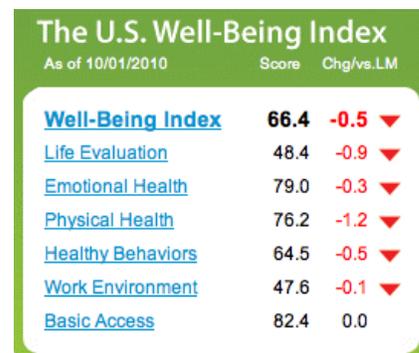
Predicting the likelihood that a child may become obese is a complex undertaking, extending far beyond diet and opportunities for regular exercise. Fragile Families and Children Wellbeing Study, a joint project between Princeton University and Columbia University, is examining many possible determinant factors in childhood obesity. The factors include parental resources (economic status, family structure, and parental mental and physical health), and material resources (home learning materials, food security, neighborhood safety, and access to medical care), in addition to the child's biological and emotional health.

National Accounts of Well-being

An independent "think and do" tank, The new economic foundation (nef) has established a program called National Accounts of Well-being to broaden the way we measure and compare European countries beyond traditional economic indicators. Offering new metrics for gauging societal progress, nef surveys the personal well-being of a country's citizenry, taking into account emotional well-being and self-esteem, social well-being, and feelings of well-being in the workplace.

The Gallup-Healthways Well-Being Index

In the United States, Gallup and Healthways have teamed up to create the Gallup-Healthways Well-Being Index to measure "what people believe constitutes a good life." Each day, phone interviewers ask thousands of Americans to evaluate their current life situation, emotional and physical health, work environment, types of behaviors possibly affecting their health, and access to food, health care, and a safe and satisfying place to live.



Gallup-Healthways U.S. Well-being Index

Source: Gallup-Healthways

tinkering with product innovation

Instead of hoping for the next big breakthrough, networked researchers are tinkering with approaches to conducting research and development. These efforts are propelling diverse advances ranging from improvements to pill-bottle design to generating new knowledge of biology that will bring safe and effective therapies to market more quickly.

Cuba's Biotech Pipeline

According to a World Bank report, "At present, nearly 80% of finished pharmaceutical products used in Cuba are locally made."² Knowledge sharing and incremental innovation are at the heart of Cuba's success in producing a thriving biotechnology pipeline. The knowledge sharing is derived from Cuba's commitment to maintaining a sound organizational integration of health, education and scientific research. The basis for incremental improvements comes from the "synergic and innovative networks" comprising research facilities, regulatory authorities, the health system, and the biotech organizations.³ At present, the Cuban biotech industry has more than 1200 patents and has developed vaccines against hepatitis B and monoclonal antibodies to treat cancer.⁴ By enabling faster, more accurate feedback across the network, Cuban scientists are able to develop, test, and then tweak and tinker with new therapies almost immediately.

BioCurious

Taking a page from the hacker community in the technology industry, the BioCurious community aspires to cultivate a hackerspace for the biotech world. Driven by a growing number of citizen scientists and the falling cost of tools required for biological engineering, a DIY "garage biology" movement is taking shape. BioCurious enables citizen scientists to tinker and experiment in a community lab setting.

SIMpill

Thanks to tinkering by one general practitioner, improvement in medical adherence—from tuberculosis to birth control—is enhanced by gentle reminders. South African physician Dr. David Green developed SIMpill, an ordinary pill bottle with an attached SIM card and transmitter device. In a South African pilot study, TB patients were given their medication in a SIMpill bottle. Each time a patient opened the bottle, the transmitter sent an SMS (Short Message Service) message to a central server. If the pill bottle was not opened within a designated time frame, the server sent a reminder message to the patient, family member, or caretaker. As a result of the SIMpill program, the number of people who stayed on the medication for six months rose from 22% to 86%–92%.



A SIMpill bottle's SIM card and transmitter

Source: Flickr user:connectologist

ENDNOTES

1. S Nambisan, "Platforms for Collaboration" *Stanford Social Innovation Review*, Summer 2009. http://www.ssireview.org/articles/entry/platforms_for_collaboration
2. Kaplan W, Laing R, "Local Production of Pharmaceuticals: Industry Policy and Access to Medicines. Health, Nutrition and Population Discussion Paper," The World Bank (January 16, 2005). As cited in Andrés Cárdenas, "The Cuban Biotechnology Industry: Innovation and universal health care" Institute for Institutional and Innovations Economics, Germany: University of Bremen, (November 2009).
3. Andrés Cárdenas, "The Cuban Biotechnology Industry: Innovation and universal health care" Institute for Institutional and Innovations Economics, Germany: University of Bremen, (November 2009).
4. Patricia Grogg, "World Class Pharma that Puts People First" in IPS (December 1, 2009). Online: <http://ipsnews.net/news.asp?idnews=49490>.

tinkering with care systems

Across the globe, health practitioners have begun tinkering with methods and approaches for improving community health and delivering better care. These “micro-innovations” are advancing immediate and long-term health in underserved communities globally.

Institute for Innovations in Social Healthcare

The non-profit Brazilian Institute for Innovations in Social Healthcare (IBISS), operates under the tinkering model by going into the *favelas* and directly asking residents not only *what* they need, but also *how* they would organize resources to meet those needs. IBISS then launches a small program based on the residents’ suggestions and, if the program is successful, lobbies the government to adopt it on a wider scale. Currently, about 62 active projects are working under this model.

Community asset mapping

Community asset mapping to determine health risks and resources is no longer the exclusive domain of government agencies. In Nairobi, Kenya, the non-profit Jhpiego supports residents in creating maps and directories that visualize the geography of health risks and opportunities in the urban slums. Systematically mapping assets as well as risks to health and well-being in informal urban settings, residents are building a stronger community health infrastructure for the urban poor by tinkering with a new cartography of health.

The Heart Institute of the Caribbean

Cardiovascular disease is the number one cause of death, hospitalization and disability in the West Indies, yet preventive care and treatment for heart disease often requires travel to the United States, a prohibitively expensive option for most of the population. Tinkers like Dr. Ernest Madu are experimenting with the present-day approach for cardiovascular care in search of more cost-effective and equitable solution. Dr. Madu opened the Heart Institute of the Caribbean (HIC) in Kingston, Jamaica to treat those suffering from cardiovascular disease with diagnostic services and treatment that are local and more affordable. By offering world-class imaging services and treatment, the HIC attracts residents who are able to pay for the services, but who would otherwise have to travel outside the country for care. These payments by local patients help offset the losses incurred by HIC in providing cardiovascular services to the poor at significantly reduced cost.

Aravind Eye Care System

By tinkering with the delivery method for eye care services, the Aravind Eye Care System, founded in Madurai, India, has transformed the provision of eye care services. Finding inspiration in the operating principles behind the McDonald’s hamburger chain, in 1976, Dr. G. Venkataswamy designed a process for high-volume production of cataract surgery. By standardizing the process for cataract surgery, the ophthalmologist reduced the cost of cataract treatment—a \$2500-\$3000 intervention in the United States—to about \$300 in rural India. In 2003, Aravind became the largest single cataract surgery provider in the world, without compromising on quality. Year after year, the Aravind system outperforms Western hospitals in quality metrics.



Community Outreach at Aravind Eye Care System

Source: The Aravind Group

Our ability to see the lasting, transformative effects of tinkering on our capacity for individual and collective health and well-being is limited if we view small-scale experiments underway as isolated examples. In fact, the global practice of tinkering is filling today's pipeline of social solutions. The following are response strategies to the forecasts in this perspective. They can be mapped onto the "Well-being Response Landscape" described in the Overview: they are immediate, intermediate or long-term, and are aimed at either treating or managing illness or building new health capacities.

Foster a culture of tinkering within your organization

Networked tools and technologies allow individual tinkering, as well as social tinkering that builds on the experiments of others. Instead of characterizing tinkering as a "weekend activity," we should consider it a core practice for innovation and work to integrate it into the formal innovation process. Organizations should encourage individual and collective tinkering with goods and services, and experimenting with organizational assumptions and processes. (Immediate capacity building response)

Integrate tinkerers and tinkerer-insight into your product development process

Tinkering is thriving thanks to a global system that makes people and resources highly connected and mobile. Connecting the growing knowledge production network to your organization's product development process will enhance innovation. (Short-term capacity building response)

Look for multi-scale interventions being defined, tested, and refined by tinkerers

Not all tinkering is taking place at the level of the body. People are experimenting with social and environmental interventions directed at networks of people who share health affinities. These experiments will improve our ability to tinker with our networks and environments to gain emotional and practical support for dealing with illness. (Long-term illness response)

Create tools for lightweight, continuous experimentation

New product offerings will serve as additional tools and resources for an expanding population of tinkerers. Solutions that enable individuals and groups to conduct experiments and tinker, either to treat illness or improve health, will be a new market in the coming decade. (Short-term illness response)

Prepare for failure

Most tinkering has neither a plan nor a proven track record for success. As a result, organizations must learn to make allowances for unplanned, non-results-driven tinkering. (Immediate capacity building response)

Micro-innovation vs. central control

Seamlessly integrating global, small-scale experimentation and innovations into an organization's R&D pipeline may require a decentralization of control over research, design, and even strategy.

Local solutions vs. economies of scale

Successful tinkering practices highlight the importance of understanding health and well-being needs within a local context. Developing and implementing local solutions instead of standardized solutions may challenge traditional economies of scale.

Overarching vision vs. continuous experimenting

Strategic planning sets an organization on a very specific course. Multi-scale, diverse experimentations may be viewed less as sources of innovation and more as distractions from the predetermined, fixed direction of the organization.

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