

driven by an economic logic that is part and parcel of the current crisis. In the pursuit of short-term financial growth, government policy and stock markets have supported a research and development boom in biotechnologies and pharmaceuticals,² ignoring the growing dissonance between profitable technologies and the needs of patients and health systems for affordable, cost-effective, clinically relevant, and user responsive innovations.³ While the economy might have supported costly and misaligned research and development processes through the late 1990s, not a single health-care system can today afford each and every new medical innovation brought to market. There has never been a better time to rethink what principles should underlie health technology development.

Expertise in health services and policy research can help us design brilliant technologies by explaining what makes certain technologies superior from a health-care system perspective. Technology design processes usually begin with identifying a value proposition latent in the new technology—that is the value it will create for users. For example, chronically ill patients might appreciate a monitoring device that is discrete, portable, energy efficient, and that makes a difference in their daily lives by extending their ability to detect and act on a serious physiological imbalance. Medical specialists might, on the other hand, prefer a device that registers and downloads from a distance a large amount of clinically relevant data. Different users often desire different latent attributes. Hence, health technology developers need to be told explicitly what health-care systems' needs and challenges are and how to address them wisely.

Health services and policy research can serve the twin goals of health and wealth, but the economic crisis should encourage creative reinvention not repetition.

We declare that we have no conflicts of interest.

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Mental health: integration is the key to the revolution

As we still lack a fundamental understanding of pathophysiology¹ for any of the mental illnesses, something revolutionary is required to make significant advances in reducing the mental health burden of disease. Recent advances in neurobiology, indicating that at least five major psychiatric disorders appear to share several genetic risk factors, further undermine the validity of our psychiatric nosological system and point to a fundamental change in understanding of the nature and origin of mental illness.² But while genetics and neurobiology might have sown the seeds of a revolution, evidence indicates that these fields, as isolated areas of investigation, are unlikely to fulfil the revolution on their own. Priebe and colleagues³ state that neurobiological phenomena are ultimately meaningless unless they are linked to the real lives of people in their social reality.

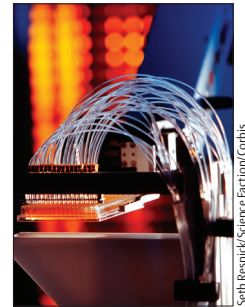
Unlike other areas of medicine, the illness of mental illness will not be found in an isolated organ or a disembodied tissue sample. Mental illness is characterised by distress. To understand this distress, symptom

patterns, biochemical profiles, and genetic signatures alone are insufficient. A revolution is required that integrates currently distinct, specialist areas of research, to investigate lives as they are lived, and the distress that is generated when they are disrupted.

One path to integration might involve identifying common processes and mechanisms across different levels of human functioning, which affect daily living. Control—the regulation of internal states in the context of unpredictably varying external circumstances⁴—might be one such process. Control, achieved through the mechanism of negative feedback, is well established in biochemistry and physiology, and is also important psychologically and socially. Disrupted control processes are a feature of many forms of psychopathology so the restoration of control might be therapeutically effective across a range of mental health problems.

Conceptual integration will not be enough to revolutionise mental health. Methodological integration is also required. Integration might be advanced methodologically by synthesising results from large epidemiological studies, smaller experimental studies, qualitative studies, and building functional models. Methodological benefits might also accrue by shifting focus from independent and dependent variables to controlled variables—ie, recognising the purposeful behaviour of individuals.⁵

Discovering how genetic and biochemical characteristics interact with individuals' daily conduct will be a major advance. The union of previously separate fields of research is essential for the revolution to gather momentum. The knowledge generated from such integrated programmes of research will improve treatments and minimise the suffering and cost inflicted by mental health disorders on both individuals and societies.



Seth Reardon/Science Faction/Corbis

I declare that I have no conflicts of interest.

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allowing for the submission of any domain name type. This led to nearly 2000 applications, including four for .health. Yet, in this round of proposals, applicants for .health are exclusively for-profit, non-public, private sector companies that have few if any restrictions on future .health use.

The list of applicants includes companies that have private equity or venture capital backing and that largely would offer services on a first-come, first-served basis. There also seems to be no representation from developing countries or international and intergovernmental organisations. Indeed, ICANN's expensive application fee (US\$185 000) and high maintenance costs (\$25 000 per year) are clearly outside the reach of many budget strapped global health organisations.⁴

In response, the international community, WHO, countries including Mali and France, civil society, and even ICANN's own independent watchdog have lodged formal objections on grounds that the domain will not be used in the public interest. These objections have largely been upheld by ICANN's At-Large Advisory Committee and Governmental Advisory Committee, which is delaying the impending launch of .health originally scheduled for 2013.⁵

This delay is fortuitous because it provides the international community and WHO with a short-window of time to intercede and call for .health to be treated as special and different from other domains. This should begin with recategorisation of .health as a sponsored generic top-level domain, which would allow enforcement of rules, eligibility for future uses and registrants, and require it to be operated in the interest of the global health community. Hence, by securing .health as a global public good and not a private interest, development of a dedicated and safe online space for health can become more than just a virtual reality.

We declare that we have no conflicts of interest.

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Ensuring the future of health information online

The future of critical health information on the internet is for sale to private bidders, who have no discernible expertise in public health or medicine. Possibly as early as November, 2013, the rights to a new website suffix dot health (.health), alongside familiar ".com" and ".org" domains, are likely to be awarded to a for-profit company by the Internet Corporation for Assigned Names and Numbers (ICANN), a non-profit organisation that controls all internet naming. This will effectively privatise all future uses of the .health domain and could have a profound effect on health information access and quality for generations to come.

More than a decade ago, WHO and consumer groups called for a dedicated and safe space for health information on the internet by proposing their own .health domain.¹ In 2000, ICANN rejected this request.² Since then, the use of the internet for health information has rapidly proliferated, with an estimated 100 000 health-related websites with little or no quality assessment of content.^{1,3}

In 2008, ICANN decided to create new generic top-level domain names



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