On MegaBrain Projects

Steven Rose

This October, the EU launched its Human Brain Project (HBP) with an estimated budget of €1.2 billion. It is one of the two winners of the “grand challenge” competition awarded under the EU’s flagship Future and Emerging Technologies programme (the other is on the potential of graphene). The Project’s goal is “to build a completely new information computing technology infrastructure for neuroscience and for brain-related research in medicine and computing, catalysing a global collaborative effort to understand the human brain and its diseases and ultimately to emulate its computational capabilities”.

The HBP website claims that the Project has been formulated after consultation with three hundred experts in neuroscience and computing, but, judging by the coverage in the scientific press, many neuroscientists are sceptical. I don’t think it is a matter of sour grapes for those outside the network of collaborating labs, but something more fundamental. Is the time ripe—do we know enough—to begin to build an entire human brain *in silico*? And even if we could, would such a model really, as it claims, cast light on the causes and treatments of brain—let alone mental—diseases and disorders? It sounds more like one more push in Europe’s long running battle to keep abreast of advances in information technology.

The project is surrounded by all the now obligatory public relations trappings; an independent Ethical, Legal and Social Aspects oversight group, the promise to hold regular “Citizens” Conventions to assist in decision-making, Stakeholders’ meetings, and so on. I may be permitted a certain sceptical air of *déjà vu* at this point. Back in 2004, under the auspices of the EU, a consortium of academic institutions, convened by Belgium’s King Baudouin

Foundation, launched a major public consultation, the “Meeting of Minds”, into citizens’ views on future directions for brain research. I was one of the expert neuroscientists consulted, but was also fascinated to observe how such consultations proceeded. Citizens’ panels met nationally and internationally with experts and facilitators, and, by 2006, had formulated a set of recommendations to be presented to the European Parliament, ranging from the establishment of a pan-European ethical committee to focussing research into mental illness while avoiding medicalisation of social problems. If the HBP is the response, it hardly reflects the aspirations of the European citizens as presented to Parliament.

Hard on Europe’s heels came the announcement by US President Barack Obama of a parallel mega-brain project under the laboured acronym BRAIN—Brain Research through Advancing Innovative Neurotechnologies—budgeted at \$3 billion over 10 years. The project builds on an earlier proposal, more attractive to most neuroscientists than Europe’s silicon brain, to generate a dynamic map—the Brain Activity Map—of the connectivity of all the neurons in the human cortex, or initially more modestly, of a few tens of thousands in the mouse brain. Once again, BRAIN has attracted soaring rhetoric. The project would be “transformative”, it would solve “the mystery of the 3 lb of matter that sits between our ears”, and it would be a wealth generator. It would focus on the new technologies—optogenetics, nanoparticles, miniaturized neurop probes, DNA computing—required to begin to trace and record neural connections. Once again, much of the neuroscience community remains cautious, doubting that such mega projects are the way forward.

The parallels between HBP, BRAIN and the Human Genome Project (HGP) of the 1990s are explicit, even as to the wealth-creating potential: Obama referred to the Battelle Memorial Institute’s estimate that each federal dollar spent on the HGP generated \$141 to the US economy. But the brain is not the genome. The molecular biologists who pushed for the HGP had a clear goal: to sequence three billion bases of the human genome. It could be done, even with the technology available at the time, because it was clear both what had to be sequenced and, in principle, how to do it. But there is no such clear goal for the new projects, because there is no clear understanding of how the brain, still less the mind, works and at what level, from the molecular to the systems, it should be studied. Despite the bold claims of the reduction of mind to brain, of “synaptic selves” and “molecular cognition”, and that everything from romantic love and political preference to consciousness itself can be reified and located within brain structures, much is still at the level of handwaving. In short, we need better brain theory, rather than more accumulation of data.

It is salutary to recall that under US President George Bush, the NIH designated the 1990s as “the decade of the brain” while the first decade of the millennium was to be the decade of the mind. Twenty-five years on, and despite the huge expansion of the neurosciences, with the diagnoses of mental disease and disorder running at record levels and with no new treatments in sight, perhaps a little humility would be in order.

Conflict of interest

The author declares that he has no conflict of interest.