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News and Views

Materials witness: Fab DIY

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Fixing the bathroom sink has persuaded me of the merits of personal fabrication. It was a Sunday evening, and I could not reconnect the water supply until I'd fitted two old taps with non-standard pipe gauges. With the tools described in Neil Gershenfeld's new book *Fab* (Basic Books, published in April), I could have created a customized adapter from metal tubing.

Personal fabrication, says Gershenfeld, of MIT's Media Lab, is about making 'anything you want', for a market of one. He describes how his team has put together desktop fabrication systems that cost around \$20,000, incorporating cutting tools such as lasers and jets of abrasives as well as additive tools such as 3D printers that create objects layer by layer from fusible powder. These devices are linked to computerized design tools, and are integrated with standard microprocessor components for making controllers and sensors.

A system like this is hardly within the means of ordinary consumers, but it is a lot more amenable than an industrial factory, and more versatile too. And Gershenfeld claims that the current models are just bridging systems, the equivalent of the microcomputers that paved the way from mainframes to the PC. He says that in 10-20 years the computer and printer on your desk will be accompanied by a personal fabricator, at a comparable cost.

His goal is to produce fabricators that work digitally, with microscopic building blocks that can be assembled accurately and reversibly. Digital assembly, he says, gives the same kind of error tolerance that digital logic brings to information technology.

The most inspiring aspect of *Fab*, however, is that it presents a vision of personal fabrication that is not simply about creating a lucrative new consumer market. Once they had working prototypes of the desktop system, Gershenfeld and his colleagues took them not to venture capitalists but to Ghana, India, to remote Norway and inner-city Boston, to discover how people in developing countries and under-resourced communities would respond to the chance to make (almost) anything.

Valuable and imaginative ideas began to emerge at once. Developing countries, says Gershenfeld, have no lack of expertise and initiative; no extensive training is needed to put the technology to use. What they lack is the physical means to convert needs to solutions – and that is what personal fab offers. Whether it was milk-analysing meters or radio monitors for wandering sheep, the desktop fablabs could address highly individualized needs in a way that mainstream industry never will. Even inner-city children somehow found their way to making inventive devices.

Gereshenfeld says that the implications of personal fab go still deeper. He thinks that an open-source ethos for disseminating design solutions, combined with the possibilities that the technology offer for investigating how things work, could take science itself out of the institutions such as MIT and into the hands of a community that currently lacks the means to explore and experiment.

I fixed the sink, by the way, but the details were painful and messy. Get me a personal fablab.