

Eureka! How to make the next great discovery

By Chris Tachibana

Two innovation experts advise managers on generating future breakthroughs

The lone scientist in the laboratory, suddenly stumbling upon a groundbreaking discovery, is a good movie image, says Robert D. Austin, Professor of Managing Creativity and Innovation at Copenhagen Business School, but doesn't represent true innovation.

- The eureka moment does happen, but it always follows from a tremendous amount of preparation. That said, there's a long history of accidents leading to innovation in science, says Austin.

He tells of the researcher who absent-mindedly licked his finger, which had traces of the ulcer drug he was working on. It failed as a drug, but eventually became the artificial sweetener aspartame.

- Of course, accidents can't be planned, so it's important to establish an environment that allows creativity, and then inject a little accident, advises Austin.

Managers looking to the future need ways to jump-start after the economic crisis. Based on his studies of breakthroughs in fields from aerospace to the arts, Austin offers these suggestions for turning accidents into innovations.

Early failures and the space to develop

In addition to preparation, Austin says innovation comes from going in a new direction, and mining earlier failures for potential gold. Austin describes his case study for the Harvard Business School on the innovation in "Kind of Blue", the revolutionary 1959 album from jazz trumpeter Miles Davis. Austin says,

- This is an interesting case to managers because of its commercial success. Davis and his band were the best in the world, and could have continued along and been comfortable financially. But they had exhausted their current technology, the intricate be-bop style. Companies have the same problem when they have played out the innovation that made them successful, and now they aren't producing anything new. Davis and his band took a risk, detaching from the system that was successful for them, and inventing a radical new style.

Austin explains how this illustrates two keys to innovation. One is giving people the space to be creative. Davis turned his group 180 degrees and let them go.

- Instead of generating ever more complex be-bop, he turned to simplicity. Playing less

complicated music gave the band spare technical capacity. Davis didn't tell people what to do, which forced them to listen and react to each other. In a business context, it's good practice for companies seeking innovation to put people into a situation they didn't expect, but one that they are technically well equipped to handle. The lesson for managers is, if you want to encourage creativity, try giving people less to do, so they have spare capacity to innovate.

The other key is allowing or even encouraging accidents, to generate variation that leads in new directions. He says,

- If you listen to Davis's earlier song "Milestones", you can hear the seeds of "Kind of Blue". Companies can do this too. While they've been working hard on one innovation, they've probably been generating the seeds of the next one.

This may mean literally digging through the garbage can or lab freezer, but Austin urges,

- Always be open to finding something in your messes.

Evolution vs. recombination

Austin's vision of innovation is evolutionary—accidents lead to variation, and creative workers and managers select the best variants for development. For Andrew B. Hargadon, Soderquist Chair in Entrepreneurship at the Graduate School of Management, University of California, Davis, the biological model for innovation is recombination.

In his book, *How Breakthroughs Happen*, he proposes that discovery is the combining of existing ideas and tools, with the inventor as a technology broker, bringing disparate elements together. Like Austin, Hargadon says innovations look like eureka discoveries, but they really result from preparation.

- An example is penicillin. The popular story is that Alexander Fleming discovered the antibiotic in a sloppy experiment where mould infected his Petri dish of bacteria, but it wasn't really by accident. Fleming was already studying things with antibiotic properties, like egg whites. Fleming didn't follow through on his finding, though, and this is where recombination and networking turned penicillin into a true innovation.

- Howard Florey developed Fleming's idea. He brought in Ernst Chain, and they combined chemistry and biology to produce penicillin in quantity, purify it and test it. Florey tapped into his network in the U.S. to use government facilities for the large-scale production of corn



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liquor, to grow quantities of Penicillium sufficient for clinical trials, says Hargadon.

Not an innovation until it makes a difference

What truly turns a discovery like penicillin into an innovation, according to Hargadon, is deployment and diffusion.

- The lesson from penicillin is, it's not really an innovation until it makes a difference in the world. People need to recognize that until it affects our lives, it's not done. Managing scientists, particularly in universities, need to realize the importance of social networks in moving their ideas out of the lab. The job isn't done until their discovery is out there, changing our lives.

Like Austin, Hargadon also advises looking in all directions, even backward for discoveries.

- Scientists need to understand that the innovative process is not a straight chain of activities. The pipeline analogy is perpetuated in the life sciences because the industry is built around getting to patented molecules. But we also need to recognize other possibilities, like new uses for old molecules. Viagra was originally developed as a heart medication, but ended up being used for other purposes, he says.

- A lot is possible when you recognize that innovation doesn't emerge from just pursuing one thing. It's important to open your mind to using existing ideas in new ways. Hard work and preparation are still important, of course. As Thomas Edison said, "Genius is 1% inspiration and 99% perspiration."