How Lunatics, Experts and Connectors Help Drive Innovation

By Nathan Furr , INSEAD Assistant Professor of Strategy and Ken Gray, Director of Innovation, Caterpillar Inc

Hackers and hipsters may be behind the innovative success of today's startups, but established companies require a different skillset.

It is becoming obvious to the startup world that entrepreneurial teams based on a corporation's divisional structure work poorly.

The idea that a team should be made up of representatives from contributing divisions (such as marketing, sales and engineering) is being replaced with the concept of bringing together a hacker, a hustler and a hipster. The thinking being that the hacker creates rapid prototypes, the hustler engages customer feedback to capture users, and the hipster frames beautiful user interfaces and brings important connections to the team.

While this team structure is well suited to startups working on a blank canvas, it ignores the unique challenges faced by companies with established products and services. Consider the case of **Caterpillar Inc.** developing its 336E H **hydraulic hybrid excavator**.

When the right team asks the right questions

The Caterpillar excavator team had been under immense pressure in 2011 to **develop a diesel-electric hybrid excavator**. But after spending millions of dollars to develop a best-in-class machine, a pivotal meeting with competitive hybrid excavator customers led the Caterpillar team to realise the product was doomed to fail, just months before making the decision to scale up to production. Careers hung in the balance as leadership continued to push toward production on what could soon become (at worst) an expensive embarrassment, or (at best) a product which customers simply would not want.

A trusted engineer had approached Ken Gray, the company's global product manager for large excavators, with a radical idea: Rather than going to production with the expensive and complex machinery to convert hydraulic energy into electric energy and back again, why not rethink the entire system to capture hydraulic energy directly and re-use it? At first it seemed like a crazy idea, especially since Caterpillar had been so influenced by its proximity to the auto industry, which widely used a hydraulic-electric-hydraulic conversion process. But as the team started to explore the concept in a sequestered location near the Illinois River, it began to seem more plausible.

Ken and a colleague had provided an old prototype machine, spare parts, and just enough budget to run a bare bones experiment for a small, passionate team to demonstrate that their idea would really work.

Ideas often arise out of the diversity of a team involved in addressing a question. If during such discussions, someone from a completely different part of the business asks a critical question (In this case, rather than focus on capturing and reusing excess energy from the hydraulic system, why not start by focusing first on the diesel engine itself to run it at a more efficient point?) radically new ideas can gain traction.

("This hybrid stuff is cool, but is there a better speed to run the engine to help it use less fuel?")

Success can rise like a phoenix

For years, development of excavators has hinged on one key assumption: the engine needs to run at 1800 rpms to optimise the hydraulic flow,

pressure and efficiency necessary to operate the excavator. By considering the question, whether the engine could run another way, the excavator team was prompted to explore alternatives, leading them to the discovery that running the engine near 1500 rpm proved much more efficient in terms of fuel consumption and decreased the hydraulic pressure in the excavator. This opened the way for the team to use a hydraulic accumulator system that Caterpillar had developed over a decade ago and then shelved. In the end it was this old technology, brought into the project by a well-connected team member that made the engine innovation possible.

In a very short period of time, with no budget, the team worked many nights and weekends to question their key assumptions, resurrecting and combining several technologies from the edges of Caterpillar to create the hydraulic hybrid excavator, which today accounts for nearly one third of the company's large excavator sales and outperforms traditional excavators by over 50 percent.

Lunatics, experts and connectors

Although serendipity plays a role in everything, the team that produced the 336E H hydraulic hybrid excavator had a very purposeful structure that facilitated their success. Rather than *hackers, hustlers, and hipsters*, the hydraulic hybrid team was composed of *lunatics, experts, and connectors.* The experts provided the foundational understanding of the core technology and the Caterpillar customers. The lunatics questioned the key assumptions and brought new technologies and approaches to the table. And the connectors brought the two groups together, as well as connecting them to willing customers and supportive leaders. Ultimately, it was the experts and lunatics that developed the hydraulic hybrid, but the connectors and experts who commercialised it.

Lessons from Caterpullar's hydraulic experience

The Caterpillar experience matches our observations in other companies: in situations where you have established customers and knowledge, small teams composed of lunatics, experts, and connectors appear to succeed more frequently than teams composed according to the corporate divisional structure... or even the hacker, hustler, hipster metaphor. Of course, every situation differs, but there are a few core lessons from the hydraulic hybrid experience.

· Innovation teams in established companies should be structured differently than execution teams and even startup teams: lunatics, experts, and connectors work best.

· Teams need expertise in the core area, but empowering team members to challenge the core assumptions lead to the insights that create the most value.

· Diversity of thought is an essential ingredient in finding creative solutions to difficult problems.

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Nathan Furr is *an Assistant Professor of Strategy at INSEAD.*

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About the author(s)

Nathan Furr is a Professor of Strategy at INSEAD. He is a programme director of **Leading Digital Transformation and Innovation**, **Innovation in the Age of Disruption** and **Building Digital Partnerships and Ecosystems** Executive Education programmes at INSEAD.