(Guest Post) The Future of Innovation at Apple

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With the recent resignation of Steve Jobs as CEO of Apple, many wonder if the company will be able to keep pumping out game-changing innovations like the iPod, iPhone, and iPad. Of course, only time will tell. But it's still fun to make some conjectures, especially if you have a little data on which to base them. So how important is Jobs, the charismatic and visionary CEO, to innovation at Apple? Will someone else be able to take his place?

One way of approaching these questions is to look at Apple's patent portfolio. The New York Times (1) has an excellent interactive page that lets users explore the hundreds of patents Jobs was awarded during his tenure with the company. Needless to say, based on this birds-eye view of the patent portfolio, the future of a post-Jobs Apple looks less than rosy. First, the patents listing Jobs's name include most – if not all – of Apple's most iconic innovations, ranging from the iPod's distinctive click wheel (2), to the iPhone's signature touch screen (3), to the famous glass staircases (4) found at many Apple stores. Second, Jobs's continual involvement in the nitty-gritty of product design and innovation put him at odds with most executives at companies of similar size, age, and stature, and provides strong support for arguments that he epitomizes the charismatic CEO – brilliant, inspiring, but also irreplaceable. Creative scientists and engineers are great for getting companies off the ground, but they tend to be bad managers. Eventually, most either hand over the reins to a professional manager, or ditch the lab for the corner office – rarely can one individual maintain success in both worlds.

So, is Apple doomed? I don't think so. To see this, we need to take a more nuanced look at the company's patent portfolio – the conclusions we reach from the bird's eye view can be quite misleading, in part because this view too individualistic. If we want to really understand innovation at Apple, we need to situate Jobs's inventions in a broader social context. Who else at the company, besides Jobs, is coming up with new ideas? Does he do it alone, or does he get by with a little help from his friends?

The network diagram in the figure below visualizes the collaborations among all inventors who were listed on an Apple patent between 2003 and 2008 – an important period at the company that saw the introduction of the iPhone and several major upgrades to the iPod and iMac. Each node represents a unique individual inventor. If two inventors are tied, it means that they worked on at least one patent together. I colored Steve Jobs red, and Jony Ive, the British designer who many point to as Jobs's creative successor, blue.

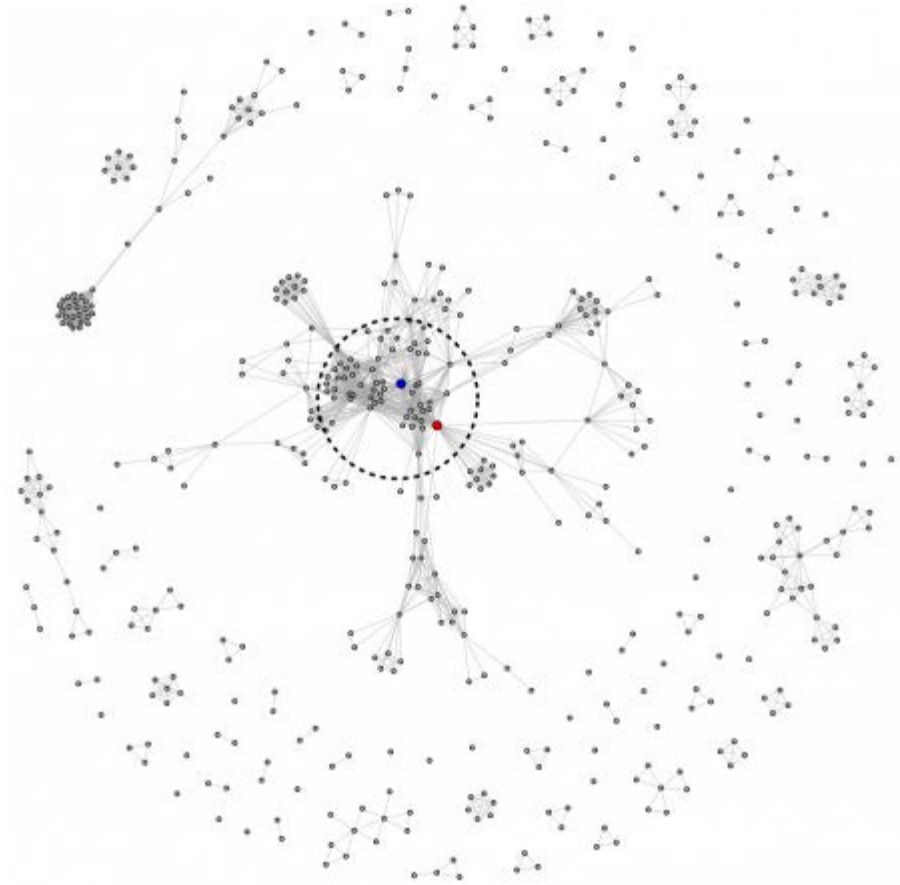

Figure 1: Network of inventors at Apple, Inc. Click for larger image and detailed caption.

What does this diagram tell us? As we would expect, Jobs occupies a particularly prominent position in the network. If his node were removed, the structure would fragment to a certain degree, making it harder for some inventors to reach one another without having Jobs as an intermediary. To the extent that this diagram represents more or less stable patterns of collaboration at Apple, Jobs's exit could be disruptive. Still, we would see the same effect if some other, non-Steve Jobs nodes were removed too. In other words, while Jobs occupies an important position, there's nothing that really distinguishes him from a dozen other important inventors at Apple. In fact, we might see greater fragmentation in the network if Jony Ive were removed.

The network diagram also reveals that while Jobs is a prolific inventor, he is also a frequent collaborator. In fact, over the course of his career at Apple, he has patented inventions with more than 50 different colleagues. Although the patent data don't tell us much about the interpersonal team dynamics, or who brought what ideas to the table, they do strongly suggest that Jobs is by no means single handedly responsible for Apple's path-breaking innovations. These observations fit well with the findings (5) of recent work by Jasjit Singh of INSEAD and Lee Fleming of Harvard Business school, who show that teams tend to produce more technological breakthroughs than lone inventors simply because they can draw on a bigger pool of knowledge and ideas.

Finally, take a look at the very center of the network, which I've circumscribed with a dark, dashed line. These are Apple's most prolific inventors. Notice the density of ties between these all-stars – they tend to work intensively with one another. This is important for thinking about innovation at the company moving forward. Major organizational change – like the exit of top management – can be very disruptive and increase employee turnover. But, we also know that when employees have dense, cohesive ties to their colleagues at work, they're less likely to leave. The pattern of ties among Apple's all-star inventors suggest that there is a good chance they'll be able to weather the transition and remain committed to their work at company. (Note, too, as I've shown in my own research, that these types of cohesive relationships among inventors are particularly important in places like Silicon Valley – home to Apple headquarters – where employees have many opportunities to pack up and join rival firms.)

What does the future hold for Apple? Of course, we can only hope that Steve Jobs's health improves and that he has a long and happy tenure guiding the company in his new role as chairman. Even without Jobs at the helm, though, we have a number of reasons to think the future is still bright for Apple. Setting aside positive financial and market outlooks, which have been discussed elsewhere (6), there are good reasons to believe Apple will continue to introduce great new products. Although Jobs has had an undeniable influence in many of Apple's most important inventions, he has not developed them single handedly. In what is perhaps another testament to his exceptional leadership, Jobs appears to have consistently reached out to colleagues for developing his ideas, and has created an atmosphere at Apple that fosters frequent collaboration among prolific inventors.

References:

(1) Steve Jobs's Patents

(2) iPod click wheel patent

(3) iPhone touch screen patent

(4) Staircase patent

(5) Singh and Fleming (2010) "Lone Inventors as Sources of Breakthroughs: Myth or Reality?

(6) Jobs's departure no reason to ditch Apple via MarketWatch