OPEN INNOVATION AT FORD MOTOR COMPANY

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To help develop "smart mobility" solutions, Ford created its own developer community, backed by a powerful open-source software and hardware platform that set a new standard in the trend toward smarter mobility.

DEFINING THE OPEN INNOVATION CHALLENGE

Detroit-based Ford Motor Company wanted to speed up its innovation engine, and identified electronics and software as a strategic area of focus. In particular, it set its sights on developing new smart mobility solutions for drivers of Ford vehicles. To be a strategic leader in the area, Ford invested in the field of interdisciplinary technology that requires deep knowledge, not only in traditional automotive technologies, but also in electronics and software.

Ford realized that innovating in the area of smart mobility may mean managing some tough challenges. For instance, smart mobility technologies must work with the unique conditions that characterize particular geographic locations, such as local mobility patterns, weather conditions, and existing physical and digital infrastructure.

What is more, the value of such solutions to consumers rests on how well they meet consumers' personal preferences, which are powerfully shaped by forces such as peers' opinions about technological products available on the market. Executives considered how best to approach such a complex innovation challenge. They realized that vehicle data, such as vehicle emission statistics, can be a powerful data source for developing smart applications that integrate with other open data, such as weather data.

CHOOSING AN OPEN INNOVATION APPROACH

Given the high degree of complexity and the extensive unknowns in the innovation challenge, Ford decided to form a unique community of smart mobility innovators (see the sidebar, "Four modes of open innovation").

An important step in the process was establishing an open source and open hardware standard that supports easy access to 19 machine-readable data sets from Ford vehicles. Establishing and releasing the open standard, called OpenXC,[1] attracted a new class of software and hardware developers that envisioned and realized innovative, smart mobility solutions using vehicle data from Ford's vehicles.

Seeding a community centered on access to Ford's vehicle data offered a number of advantages. First, it required fewer dedicated resources than were necessary to maintain partnerships with individual researchers from universities, research laboratories or start-ups. In such bilateral arrangements, Ford would typically specify unique data needs each time it interacted with every individual involved. Creating a single, open standard and nurturing its own community around it gave Ford the best chance of creating network effects. Second, this approach meant Ford could actively shape the community's formation of norms, rules and data in relation to its own open data sets. Participating in established open hardware and software developer communities would have been far more difficult, as such communities generally follow their own established rules.

OpenXC seemed ideal—but to realize sufficient, valuable solutions from it, Ford needed to tackle a few additional challenges. Specifically, Ford needed to balance access to the platform for large numbers of developers while maintaining control over sensitive data. It needed to foster extensive idea sharing among community members. And it would have to ensure that any new solutions could be adapted to local conditions.

SUPPORTING OPEN KNOWLEDGE SHARING IN A PROTECTED WAY

To develop innovative smart mobility solutions—from mobile to smart hardware applications—developers taking part in the OpenXC community required access to sensitive data generated from the use of Ford vehicles (such as speed, fuel level, and pedal positions). At the same time, Ford wanted to maintain control over contextual information. Ford established an application program interface (API) for the OpenXC platform that enabled controlled access to as many as 19 different machine-readable vehicle data streams.

Ford also had to protect its developers when openly sharing their technical solutions in the community. To support developers so that they could openly share software code, hardware, and also their knowledge of how the solution can be best used and re-used in a "legal way," Ford established a tripartite sharing scheme. The scheme included a Creative Commons license for the documentation of solutions developed in the community, along with open-source hardware and software licensing agreements.

CREATING A VIBRANT AND COLLABORATIVE COMMUNITY

To help the developers form a vibrant community with a clear, common goal, Ford set up several enabling mechanisms. For example, it established a Google Group through which developers could pose and answer technical questions as they explored ideas for smart mobility solutions. In addition to the developers, a number of Ford employees—namely, technical experts in data, APIs, software, hardware and mechanical packaging—also joined this group. These experts regularly monitored posts made by group members and responded to specific questions related to their areas of expertise. Ford also wanted to find a way for OpenXC developers to build reputation and feel rewarded for their efforts.

To this end, it created an index representing individual developers' contribution efforts. The index measured developers' contributions to the community on two fronts: number of contributions made (such as comments on the Google Group site), and reuse and adoption of such contributions (for example, downloads of an application or positive evaluations of a comment on the group site).

CRAFTING SOLUTIONS TO LOCAL PROBLEMS BY FOSTERING A DIVERSE COMMUNITY

To enhance the likelihood of creating smart mobility solutions tailored to unique local conditions, Ford realized that working with software and hardware developers was not enough. The challenge was to integrate the perspectives of three types of experts: **Technology experts** were developers in the OpenXC community who had extensive knowledge about vehicles and related technologies. **Domain experts** were individuals with deep knowledge of mobility behavior. And **end users** were individuals familiar with the unique characteristics of particular geographic locations.
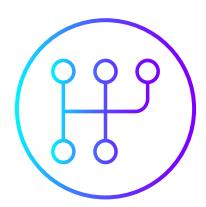
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To integrate the perspectives of these different stakeholders, Ford launched a series of smart mobility challenges in the form of competitive contests. These contests offered prizes to the developer of the best smart mobility applications, as a means to recruit additional stakeholders that would engage with the open vehicle data and utilize the OpenXC platform.

These smart mobility challenges also integrated OpenXC data with other open data sources that were useful for the developers, such as governmental data on fuel efficiency, and helped to nurture a truly diverse community.

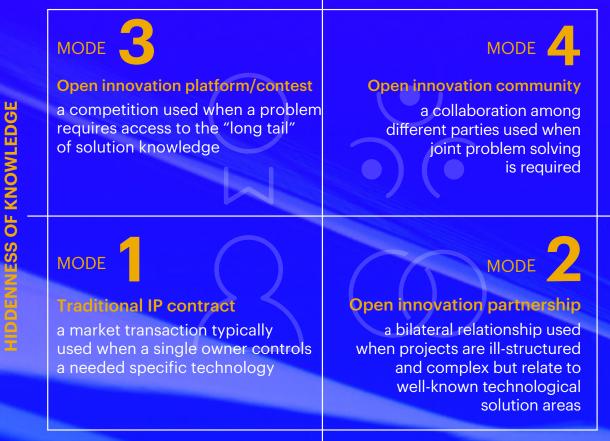**Ford launched a series of smart mobility challenges in the form of competitive contests.**

SCORING SUCCESSES

Although Ford's OpenXC platform and community are still nascent, the effort has already scored some early successes. For example, cities around the globe have begun adopting the platform as a standard in their open government data initiatives, including publishing data from the API jointly with their own government data. On the national level, the United States' Department of Energy has integrated OpenXC in its "open-data challenge." Moreover, the OpenXC community has developed a number of applications that have progressed to the piloting or incubation stage, such as a gear knob that responds to haptic, or touch, feedback from users. For some of these applications, Ford has begun working with technology accelerators that invest in start-ups that have won innovation contests launched by Ford and whose innovations have reached the commercialization stage. Clearly, for a relatively modest investment, Ford is beginning to achieve impressive results from its creative approach to open innovation.

FOUR MODES OF OPEN INNOVATION

In our research, we studied the Research & Development (R&D) operations of several large corporations with headquarters in the United States and Europe.[2] These companies each had more than 1,000 employees and total revenues of at least US$250 million. We found that, to work with external parties to augment their internal R&D, these corporations have used four basic modes of open innovation:[3]

HIGH

HIDDENNESS OF KNOWLEDGE

MODE 3
Open innovation platform/contest

a competition used when a problem requires access to the "long tail" of solution knowledge

MODE 4
Open innovation community

a collaboration among different parties used when joint problem solving is required

MODE 1
Traditional IP contract

a market transaction typically used when a single owner controls a needed specific technology

MODE 2
Open innovation partnership

a bilateral relationship used when projects are ill-structured and complex but relate to well-known technological solution areas

LOW — **HIGH**

PROBLEM COMPLEXITY

Source: Bagherzadeh, M. and S. Brunswicker (2015). Mix and match: Open Innovation Project Attributes and Optimal Governance Modes. World Open Innovation Conference 2015. Santa Clara, UC Berkeley; accessible via https://ssrn.com/abstract=2821203

[1] http://openxcplatform.com/getting-ˇstarted/index.html

[2] These four modes of open innovation were identified based on an analysis of more than 100 open innovation projects of large firms in the United States and Europe. This data collection was jointly executed by the Research Center for Open Digital Innovation and Haas School of Business, UC Berkeley. For more details on this classification scheme please see Bagherzadeh, M., S. Brunswicker et al (2015). Mix and match: Open Innovation Project Attributes and Optimal Governance Modes. World Open Innovation Conference 2015. Santa Clara, UC Berkeley

[3] For more detail on the study results read the report: Brunswicker, Sabine; Bagherzadeh, Mehdi; Lamb, Allison; Narsalay, Raghav; Jing, Yu. (2016). Managing open innovation projects with impact. Whitepaper. Research Center for Open Digital Innovation, Purdue University. West Lafayette, Indiana. www.purdue.edu/opendigital

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