OPEN INNOVATION AT EVONIK INDUSTRIES

By Raghav Narsalay, Dr. Sabine Brunswicker, Mehdi Bagherzadeh
and Dr. Bernd Elser

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German specialty-chemicals maker Evonik wanted to develop non-vacuum-based process technologies to produce electronic devices at lower cost for new application areas, such as flexible electronics. Evonik built a unique open innovation community—then let members run it themselves to arrive at the best technology solution.

DEFINING THE OPEN INNOVATION CHALLENGE

Evonik Industries, headquartered in Germany, operates in markets such as nutrition and care (producing speciality chemicals for consumer goods products or animal nutrition and healthcare), resource efficiency (such as paints and coatings), and performance materials (such as polymer materials).[1] For example, Evonik's chemical compounds are used to manufacture optic fibers and semiconductors used in the production of high-end electronic devices, such as TFT and OLED displays.[2]

As the company states on its website "innovations from Evonik help the new information and communication technologies (ICT) along."[3] With the demand for technology components to be smaller, faster, and cheaper, alongside new features such as flexibility, Evonik recognized it needed radically innovative production processes for electronic components of high-end devices such as displays.

To stay at the forefront of innovation in electronic devices, Evonik launched a project to find a way to eliminate vacuum-based processes in the production of semiconductors and other components of electronic devices. Despite their maturity, the cost of vacuum-based technologies remains high. As stated by an innovation manager at Evonik: "finding alternatives for vacuum-based materials production processes can significantly reduce the process costs and reduce the investment cost for our customers."

When Evonik launched the project, the field of non-vacuum-based production of materials for electronic devices was newly emerging and characterized by a high degree of unfamiliarity and uncertainty. Moreover, no one at Evonik could yet picture all the potential applications for non-vacuum based technologies. To solve its innovation challenge, Evonik had to consider many technology and market factors, such as how the innovation could best benefit customers. In addition, executives knew there were likely to be many potential solutions to their problem. After all, there was a wide range of alternative approaches to the traditional vacuum-based method of semiconductor production. Unfortunately, Evonik's own scientists lacked the knowledge and expertise needed to envision the full range of solution possibilities and to identify the most promising.

Evonik faced a challenge that was not only complex, but also characterized by knowledge hidden deeply among individuals and experts outside of the organization, and even outside its current network of customers and partners, since they were mainly focused on vacuum-based processes. Open innovation would prove critical to surmounting the challenge.

CHOOSING AN OPEN INNOVATION APPROACH

Given the defining characteristics of its innovation challenge, Evonik decided to create an open innovation community to gather solution ideas from many organizations—including potential customers in the industry, universities and research centers, and equipment suppliers (see "Four modes of open innovation").

Ideally, participants would exchange knowledge and build on one another's prospective solutions. Although Evonik would sponsor the community, members would make decisions jointly, such as nominating technical leads and other important leadership roles. To foster integration of the different participants' knowledge, individuals from member organizations would work in close physical proximity, at Evonik's lab as well as onsite at Evonik's external partners.

To create the strongest possible community and manage it effectively, Evonik needed to encourage participation, keep all members aligned with the project's goals, and foster knowledge sharing while protecting information sensitive to each member organization.

ENTICING DIVERSE ORGANIZATIONS TO JOIN

Given the diversity embodied in the organizations that Evonik hoped would join its open innovation community, the company had to find a way to persuade them to participate—an approach that could work for each type of organization, regardless of their vast differences. To this end, executives decided to invoke the power of intrinsic motivation. They asked each potential member organization to articulate their interests in the innovation project, including which particular needs the final incarnation of the technology could satisfy for them.

They also assured prospective members that their needs would be factored in to the technological solution that Evonik ultimately developed.

ALIGNING COMMUNITY MEMBERS BEHIND A SHARED VISION

But attracting enough of the right kinds of organizations would not be sufficient in itself. Evonik also had to ensure that they all stayed committed to the project's objectives. To do so, the company had to define a compelling vision for the effort and set a clear direction that all member organizations could follow.

With these imperatives in mind, executives worked to underscore the community's strategic relevance. They started by bringing in an external consultant from the electronics industry who described trends in process technologies for electronic devices and highlighted the need for development of the new solutions that offer low-cost production, small sizes, and also completely new applications (for example, flexible electronics). The executives then laid a foundation for the community to operate in a decentralized manner to support the realization of the vision. For instance, each participating organization would be free to dedicate a project manager, and members jointly nominated individuals who would be tasked with fostering knowledge exchange among community members on topics such as technology and market needs.

KOWLEDGE SHARING BASED ON TRUST

To help solve Evonik's innovation challenge, member organizations would have to share ideas and knowledge as well as collaborate to develop the best possible solution. Yet each organization also had to take care not to expose sensitive information to other members in the community. To strike this delicate balance, Evonik defined information-sharing rules.

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For instance, as it brought organizations in, Evonik established bilateral agreements with each that listed the information and technologies that could not be shared outside of the project unless Evonik granted permission.

The agreements also spelled out legal control rights over existing and newly developed intellectual property based on simple rules. Overall, the agreements focused on access and usage rights rather than ownership in alignment with the organization's interest and strategic objectives. While formal contracts provided the foundations for successful knowledge sharing, it was trust and formal community processes that made guided knowledge sharing possible. Clear roles, joint decision making, and transparent reporting reduced the perceived risk in the collaboration.
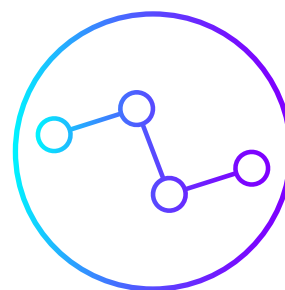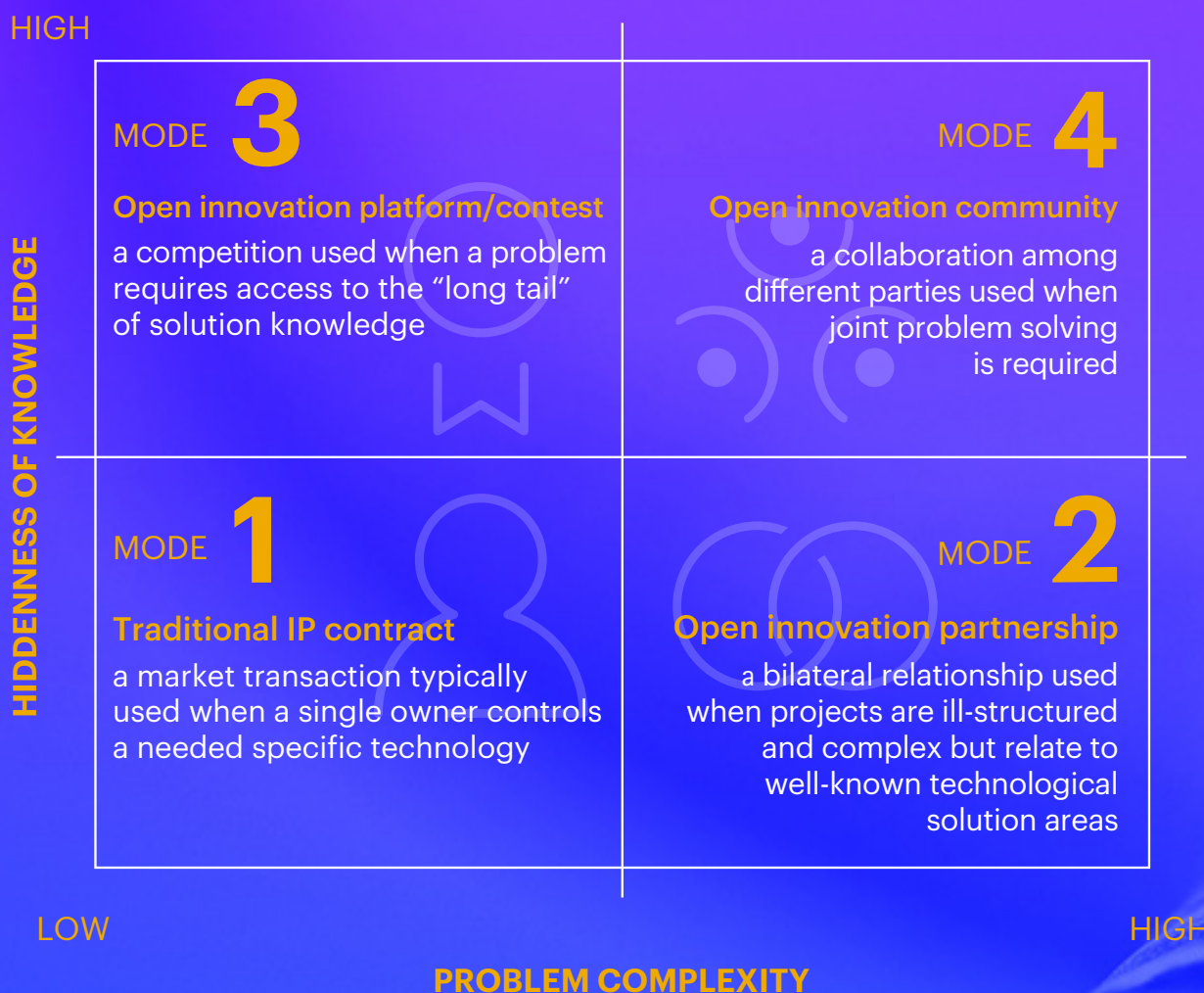
SCORING SUCCESSES

Today, Evonik offers a new chemical product that enables non-vacuum based production processes of high-end devices such as displays. For example, its iXsenic® S technology drives high-resolution LCDs and OLED displays. The new metal oxide semiconductor ink is applied in an innovative solvent-based coating process. This coating process does not require a vacuum environment and enables the production of semiconductors at temperatures below 350° Celcius, which enables the production of flexible displays.

Further, building this unique, diverse community also enhanced Evonik's open innovation capability. Today, its open innovation partners can range anywhere from leading universities and key customers to businesses outside the chemicals industry and start-ups. Evonik also reaches out to individual scientists operating externally, for example, through its Evonik Meets Science program. The corporate innovation group drives open innovation efforts within the company, and Evonik uses a variety of governance models to coordinate innovation activities, depending on each innovation project's degree of complexity and knowledge hiddenness; examples include bilateral partnerships, alliances, and corporate venture capital investments in start-ups and innovation contests.

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.[4] 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 used four basic modes of open innovation:[5]

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://corporate.evonik.com/en/company/segments/Pages/default.aspx

[2] Thin Film Transistor (TFT) and organic light-emitting diode (OLED)

[3] http://corporate.evonik.com/en/products/our-applications/pages/electronic-applications.aspx

[4] 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

[5] 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

Authors

Raghav Narsalay
raghav.narsalay@accenture.com

Dr. Sabine Brunswicker
sbrunswi@purdue.edu

Mehdi Bagherzadeh
bmedhi@purdue.edu

Dr. Bernd Elser
bernd.elser@accenture.com

Contributors

Mamta Kapur
mamta.kapur@accenture.com

Jing Yu
jing.yu@accenture.com

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