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How Companies Can Benefit from Interlinking External Crowds and Internal Employees

Based on insights from an engineering design project conducted by Airbus and Local Motors, we describe how companies can leverage hybrid working by interlinking external crowds and internal employees, to increase the agility, quality and speed of product development. We identify the benefits and risks of hybrid working and describe the different ways of interlinking external crowds and internal employees. Finally, we provide recommendations for company executives who want to explore the use of hybrid working.^{1,2}

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Organizing Work in an Increasingly Volatile, Uncertain, Complex and Ambiguous Business Environment

Today's business environment is characterized by volatility, uncertainty, complexity and ambiguity. To adjust to this environment and remain competitive, companies need to constantly adapt the ways in which they organize work. This applies particularly to traditional product development processes, which are usually lengthy and require a lot of internal resources. Companies are now exploring new ways to increase the agility,³ quality and speed of these processes. One way to achieve this goal is to open up the product development process to external talent that brings in new approaches and perspectives. Such talent is in high demand and critical to success, but not easy to recruit and retain by large established companies with their entrenched ways of working.⁴ Nevertheless, many companies in major industries are striving to adapt their product portfolios and their processes to novel demands resulting from increasing digitization.⁵



¹ Kristine Dery is the accepting senior editor for this article.

² We would like to thank Airbus and Local Motors for their help and support during our research. We would also like to thank two anonymous reviewers and, especially, senior editor Kristine Dery for excellent advice and recommendations on how to further develop and improve this article.

³ For information on the role of corporate agility, see Lu, Y. and Ramamurthy, K. "Understanding the Link Between Information Technology Capability and Organizational Agility: An Empirical Examination," *MIS Quarterly* (35:4), December 2011, pp. 931-954.

⁴ Dery, K. and Sebastian, I. M. "Managing Talent for Digital," *Proceedings of the 23rd Americas' Conference on Information Systems (AMCIS)*, Boston, August 2017.

⁵ Mocker, M. and Fonstad, N. O. "How AUDI AG is Driving Toward the Sharing Economy," *MIS Quarterly Executive* (16:4), December 2017, pp. 279-293.

This article describes the findings from an in-depth case study that we conducted between May 2017 and February 2020 of a product development project in the aviation industry that interlinked external talent (external crowds) with internal employees. In this project, Airbus, one of the world's two leading aircraft manufacturers, partnered with Local Motors, a U.S. business that operates a crowdworking platform called Launch Forth, to design a commercial cargo drone.⁶ This pilot project started in 2016 and was assigned to Airbus's Defence and Space division in Germany, which is responsible for the development of UAVs (unmanned aerial vehicles). To ensure appropriate integration of the project into its business, Airbus also involved the office of its chief technology officer. Airbus's CEO, Dr. Tom Enders, had previously met Local Motors' CEO and co-founder Jay Rogers and learned that Local Motors had experience carrying out product development projects using crowd mechanisms (Local Motors, among others, had already developed a car using this novel form of work organization). Airbus decided to partner with Local Motors to leverage its expertise in people management and its crowdworking platform to recruit and support the interlinking of external crowds and internal employees.

Our analysis of the Airbus/Local Motors project, and the resulting findings and recommendations, are based on data from interviews with senior executives from both firms, 1,612 discussion entries on Local Motors' crowdworking platform, internal company documents and publicly available data. (The research methodology is described in more detail in the Appendix.)

Airbus wanted to directly compare the results of two different forms of work organization for the development of a drone: (1) its regular approach using only internal employees, and (2) using internal employees and an external crowd, interlinking both groups in what we call a "hybrid working" (described in a later section). The project showed that bringing in external crowds with relevant expertise resulted in better outcomes in three main areas:

- *Speed*: While it took Airbus about a year to develop one cargo drone engineering design internally,⁷ with hybrid working it received 425 cargo drone designs in six weeks.
- *Quality*: Although the quality of these designs was difficult to measure and also to some degree subjective, 167 of the 425 designs were evaluated as both feasible and high quality by Airbus engineers
- *Agility*: Airbus managed to adapt several long-established processes and structures during this project—for example, the way communication was authorized and conducted—which resulted in a more adaptive and flexible way of developing products.

Airbus regarded the product development project in collaboration with Local Motors to be a success. It concluded that this form of working could be a valuable future way to organize work and could accelerate its product development process.

Nevertheless, Airbus faced several challenges during the project. First, there was an initial clash of cultures and philosophies between Airbus employees and the Local Motors crowd. Second, there was some irritation among internal Airbus employees, who questioned why the project could not be conducted internally given Airbus's vast engineering experience. Third, there were initial legal concerns from Airbus's HR department about the participation of internal employees. In overcoming these challenges, Airbus leaders gained additional insights on how to more effectively manage hybrid working arrangements and on how these new capabilities will inform further crowdworking product development endeavors in the future.

We used a work system framework⁸ perspective to structure our findings from this case. This framework includes participants, information and technologies, as well as processes and activities. One of the main benefits that Airbus realized from this project is insights

6 For more information, see "Airbus Group Teams Up with Local Motors to Co-Create Commercial Drones," Airbus Group, March 17, 2016, available at <https://additivemanufacturing.com/2016/03/17/airbus-group-teams-up-with-local-motors-to-co-create-commercial-drones/>.

7 Airbus's cargo drone was called "Quadcruiser."

8 For an overview of the work system framework, see Alter, S. "Work System Theory: Overview of Core Concepts, Extensions, and Challenges for the Future," *Journal of the Association for Information Systems* (14:2), February 2013, pp. p 78-81.

on how to adapt its processes and activities to achieve more agility.⁹

Our findings and recommendations are interesting and highly relevant for executives (for example, CEOs and CIOs) of other companies for three important reasons. First, hybrid working, which interlinks external crowds and internal employees of a company, is a novel form of work organization that has the potential to change how work will be organized in the future. Second, the lessons learned from this project show how companies can exploit the strengths and mitigate the weaknesses of using each form of work organization by itself (i.e., when using only external crowds or only internal employees). Third, research so far has focused either on employing external crowds¹⁰ or on using crowd principles inside a company with internal employees ("internal crowds").¹¹ The benefits (and risks) of a close interlinking of both groups has, to date, received little attention.

Our research also differs from extant research on crowdsourcing and online communities in terms of how we examine the outcomes of work: While existing research often focuses more on idea or innovation contests,¹² we focus on the engineering design of a specific product (a cargo drone) that is meant to be directly used to build that product.

Below, we first briefly describe Airbus and Local Motors and then provide an overview of hybrid working. Next, we describe the cargo drone project and follow that by identifying the benefits and risks that Airbus experienced from the hybrid working arrangements used during the

project. We then discuss the advantages of hybrid working and describe the four configurations that can be used to interlink external crowds and internal employees. The article concludes with five recommendations for adopting hybrid working.

Brief Profiles of Airbus and Local Motors

Airbus and Local Motors could not be more different. To use a marine analogy, Airbus is like a big tanker, where stability and reliability are of highest value, and changing direction takes time and effort, whereas Local Motors is like a speedboat, small and nimble and able to experiment with new technologies and bring digital innovation to the market quickly.

Airbus is best known as a commercial aircraft manufacturer, but also has a defense and space division, and a helicopter division. It is the largest aeronautics and space company in Europe and, together with Boeing, one of the two worldwide leaders in the industry. As of February 2020, Airbus employed 133,671 people of more than 130 nationalities and generated revenues of €70.5 billion (\$80.6 billion).¹³ Founded in 1970 as a consortium of European aviation firms, Airbus has aircraft and helicopter assembly lines in America, Asia and Europe, and has 12,000 direct suppliers globally. Its operating main office is in Toulouse (France) and there are important assembly line locations in Hamburg (Germany), Seville (Spain), Tianjin (China) and Mobile (U.S.) As of February 2020, Airbus has delivered more than 11,000 aircraft to airlines worldwide,¹⁴ was the second largest space company in the world and held 37,000 patents.¹⁵

Co-founded in 2007 by Jay Rogers (the current CEO), Local Motors is an American manufacturing company (headquartered in Tempe, Arizona) that focuses on low-volume manufacturing of

9 According to McKinsey, agility in the organizational context is "the ability of an organization to renew itself, adapt, change quickly, and succeed in a rapidly changing, ambiguous, turbulent environment." See "The Keys to Organizational Agility," McKinsey, December 1, 2015, available at www.mckinsey.com/business-functions/organization/our-insights/the-keys-to-organizational-agility.

10 See, for example: 1) El Sawy, O. A., Kraemmergaard, P., Amsinck, H. and Vinther, A. L. "How LEGO Built the Foundations and Enterprise Capabilities for Digital Leadership," *MIS Quarterly Executive* (15:2), June 2016, pp 141-166; and 2) Taylor, J. and Joshi, K. D. "How IT Leaders Can Benefit from the Digital Crowdsourcing Workforce," *MIS Quarterly Executive* (17:4), December 2018, pp. 281-295.

11 See, for example, Zuchowski, O., Posegga, O., Schlagwein, D. and Fischbach, K. "Internal Crowdsourcing: Conceptual Framework, Structured Review, and Research Agenda," *Journal of Information Technology* (31:2), June 2016, pp. 166-184.

12 See, for example, Benbya, H. and Leidner, D. "How Allianz UK Used an Idea Management Platform to Harness Employee Innovation," *MIS Quarterly Executive* (17:2), June 2018, pp. 139-155.

13 Currency conversion rate as of July 2020.

14 Interim data for 2019 indicates that Airbus might even have surpassed Boeing in terms of the number of aircraft delivered, making it the world's largest plane maker. See "Airbus Beats Goal with 863 Jet Deliveries in 2019, Ousts Boeing from Top Spot," Reuters, January 1, 2020, available at www.reuters.com/article/us-airbus-deliveries-exclusive/exclusive-airbus-beats-goal-with-863-jet-deliveries-in-2019-ousts-boeing-from-top-spot-idUSKBN1Z01Q8.

15 For more information about Airbus, see "We are Airbus: Our Portfolio and Our People," Airbus, available at www.airbus.com/company/we-are-airbus.html.

vehicle designs using microfactories and its Launch Forth crowdworking platform. Using vehicle designs provided by its online crowd community of almost 200,000 people, the company employs 3D-printing strategies in its three U.S. microfactories in Chandler, Knoxville and National Harbor.¹⁶ Local Motors' main goal is to unlock innovation and increase speed to market, which the company regards as its core competencies. Its crowdworking platform is used by some of the largest brands in the world to feed innovation and inspiration into their organizations.

Hybrid Working is a Novel Form of Work Organization

Companies can process work in several ways. The traditional approach is to use an organization's own employees, structured in business units or departments. There are still good reasons for using this approach—including lower coordination costs, ease of making long-term investments and having the necessary legal controls and requirements already in place.¹⁷ Alternatively, companies can outsource work to an external firm, subsidiary, freelancer or individual. Outsourcing certain types of work might also help a company to avoid the "innovator's dilemma,"¹⁸ including possible unexpected disruptions.

Another option is to advertise work via an open call to an external crowd. This is a novel form of work organization that has come to the fore during the last few years and can help companies deliver outstanding outcomes.¹⁹ The capabilities now accessible via external crowds go beyond simply generating ideas and include the design of new products and services fit for delivery.²⁰ However, these more advanced capabilities can also be accessed via open calls

for contributions from internal talent pools (i.e., "internal crowdsourcing"),²¹ enabling all employees to engage and form the "internal crowd." Open calls to internal talent also have the potential to enhance collaboration among employees beyond the borders of their respective company units, and improved employee connectedness can unlock value to enhance product outcomes.²²

The combination of external and crowds and internal employees constitutes a novel form of work organization that we call *hybrid working* and define as "the joint processing of work by both an external crowd and internal employees of an organization, using a crowdworking platform to manage it." The hybrid working approach will likely gain in importance because large, traditional firms increasingly need to compete with more nimble, innovative and "born digital" competitors. Hybrid working is enabled by using a platform that connects the external crowd and internal employees.²³ Hybrid workforces are typically recruited, coordinated and supported through platforms that enable both internal and external talent to work together without the limitations imposed by traditional workplace boundaries. Figure 1 depicts the hybrid working arrangement used for the Airbus/Local Motors cargo drone project.

Using Local Motors' Launch Forth crowdworking platform, an external crowd and internal Airbus employees (both recruited via open calls) were brought together to develop cargo drone engineering designs. The platform was used to enable people from inside and outside Airbus to self-select to the project based on their interests and capabilities to meet the objectives of the drone development project. It also enabled people to team-up with each other or participate alone. In addition, both Airbus and Local Motors assigned specialist internal employees to guide and support the project teams or individuals. The platform supported

16 For more information about Local Motors, see "We are Unlike Any Manufacturer You Have Ever Seen," Local Motors, available at <https://localmotors.com/company/>.

17 See, for example, McAfee, A. and Brynjolfsson, E. *Machine, Platform, Crowd: Harnessing our Digital Future*, W. W. Norton & Company, 2017, p. 313 and p. 319.

18 See, for example, Christensen, C. M. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Harvard Business Review Press, 2013, pp. 225-228.

19 See also Dery, K. and Sebastian, I. M., op. cit., August 2017.

20 Sundararajan, A. *The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism*, The MIT Press, 2016, p. 77.

21 See, for example, Zuchowski, O., Posegga, O., Schlagwein, D. and Fischbach, K., op. cit., June 2016.

22 Dery, K., Sebastian, I. M. and van der Meulen, N. "The Digital Workplace Is Key to Digital Innovation," *MIS Quarterly Executive* (16:2), June 2017, pp. 135-152.

23 See Mrass, V., Peters, C. and Leimeister, J. M. "One for All? Managing External and Internal Crowds through a Single Platform: A Case Study," *Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS)*, Waikoloa, January 2017, pp. 4324-4333.

Figure 1: Hybrid Work Organization Used for the Cargo Drone Project

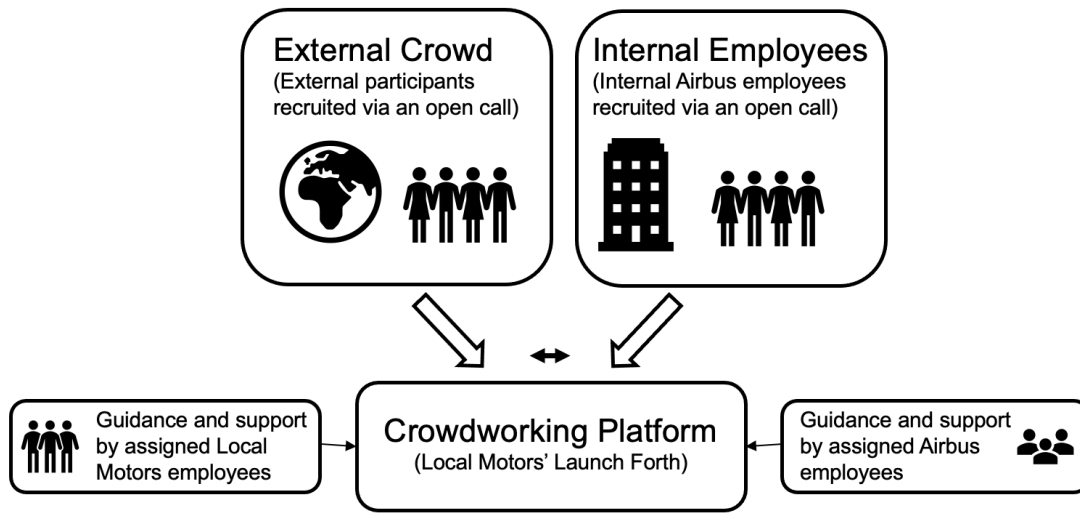


Table 1: Main Characteristics of Crowdworking Platforms²⁵

Characteristic	Description/Explanation
Open Call	On a crowdworking platform, work is offered simultaneously to a crowd of potential participants (instead of, e.g., to certain individuals) via an open call. The crowd itself can be preselected (e.g., a group of the registered participants of a platform with certain backgrounds or a group of employees from a certain organizational unit).
Platform-Based	A significant part of the work is done electronically with the platform acting as the intermediary; the platform can be managed by an external provider or by an organization itself.
Voluntary Participation	Participants decide themselves if they would like to offer their work on such a platform.
Self-Selection	After the general decision to offer their work on a platform, the participants (not the platform operator or the work provider) select which work they want to take on (or not) and when (in contrast to being assigned to it, e.g., by managerial authority).
Payment	In contrast to crowdsourcing platforms where work is not remunerated, crowds on crowdworking platforms anticipate receiving financial compensation/payment for their work (or are already paid—e.g., they are company employees who are active on such platforms).

all communications, activities and knowledge sharing, and acted as an intermediary²⁴ between Airbus and the project participants. Table 1²⁵ lists and explains the main characteristics of crowdworking platforms.

Description of the Cargo Drone Project

Airbus's Reasons for Conducting this Project with Local Motors

Despite being a major global aviation company and one of the leaders worldwide in many segments, Airbus had not developed an equally strong position in the commercial, nonmilitary drone market. Companies such as Amazon, Google, DHL, FedEx and UPS had already invested major effort into drones. Airbus wanted to be a major player in the fast-growing global drone industry and no longer "sit on the sidelines" while rivals around the world captured the market for unmanned aircraft.²⁶

Airbus, a decades-old, large, and long-established company ("a large tanker"), chose Local Motors, a relatively rather new, small and young company ("a speedboat"), to partner in the drone design project because Local Motors already had a lot of experience with crowd-based projects, albeit in other industries (especially the automobile industry). Airbus expected to

benefit from Local Motors' agility and speedy processing of work. Airbus regarded speed as essential in the development of commercial drones for this growing market and expected to learn important lessons from the co-creation process, especially how to develop products more quickly. Local Motors claims that its Launch Forth crowdworking platform provides "the agility of software development applied to hardware" and can "connect businesses with the talent, data and digital manufacturing capabilities they need to build the future, faster."

Another asset that Airbus wanted to build on was Local Motors' ability to bring in an external crowd of diverse talent, including amateurs, designers, engineers and more. To complement the external crowd recruited via Local Motors, Airbus also created its own "internal crowd" of employees. Airbus's CEO (Dr. Tom Enders) sent an email to all employees inviting them to participate in the drone design project. Although there was initially some discussion within Airbus (especially within the HR department) about who should be allowed to participate, eventually all employees were allowed to do so under two conditions. First, they had to disclose that they were Airbus employees when participating via the crowdworking platform. Second, they would not be able to win one of the prizes on offer for the best designs because they were already remunerated with their regular salaries from the company.

When the communication department announced the cargo drone project, some Airbus employees questioned why the project could not be solely conducted internally. But once other employees had expressed their strong support for doing this project using the novel form of work organization, including collaborating with external crowds, the Airbus communication department did not have to further promote the initiative internally:

"You always have the two sides of the coin: You have people who are positive and say 'hey, that's cool, we want to have externals and they bring in good ideas.' And on the other hand, you always have people saying 'why don't we do this only by ourselves?'"
Inka Beil, Senior Business Partner, Airbus Communications

24 See Gol, E. S., Stein, M.-K. and Avital, M. "Crowdwork Platform Governance Toward Organizational Value Creation," *The Journal of Strategic Information Systems* (28:2), February 2019, pp. 175-195.

25 Table adapted from, among others: 1) Afuah, A. and Tucci, C. L. "Crowdsourcing as a Solution To Distant Search," *The Academy of Management Review* (37:3), July 2012, pp. 355-375; 2) Blohm, I., Zogaj, S., Bretschneider, U. and Leimeister, J. M. "How to Manage Crowdsourcing Platforms Effectively?" *California Management Review* (60:2), October 2017, pp. 122-149; 3) Durward, D., Blohm, I. and Leimeister, J. M. "The Nature of Crowd Work and its Effects on Individuals' Work Perception," *Journal of Management Information Systems* (37:1), March 2020, pp. 66-95; 4) Mrass, V., Peters, C. and Leimeister, J. M. "Managing Complex Work Systems via Crowdworking Platforms: How Deutsche Bank Explores AI Trends and the Future of Banking with Jovoto," *Proceedings of 51st Hawaii International Conference on System Sciences (HICSS)*, Waikoloa, January 2017, pp. 3391-3400; and 5) Mrass, V., Peters, C. and Leimeister, J. M. "Managing Complex Work Systems via Crowdworking Platforms: The Case of Hamburger Hochbahn and Phantominds," *Proceedings of 51st Hawaii International Conference on System Sciences (HICSS)*, Waikoloa, January 2017, pp. 4112-4121.

26 See Pasztor, A. and Wall, R. "Airbus Seeks to Raise Its Profile in the Drone Industry," *The Street Wall Journal*, May 11, 2016, available at www.wsj.com/articles/airbus-seeks-to-raise-its-profile-in-the-drone-industry-1462996820.

Distribution of Roles and Project Focus

The cargo drone project was Local Motors' largest community-driven endeavor to date. The general distribution of the roles between the partners was as follows:

- The external and internal crowds created the cargo drone engineering designs
- The assigned Local Motors employees handled the co-creation process
- Airbus's employees (both the specifically assigned ones and the self-selected ones from the internal crowd) provided the air cargo and UAV expertise.

Prior to the commencement of the project, Airbus had used its internal employees as an "idea crowd" to determine that the commercial drone market would be especially attractive for a hybrid working pilot project. Within this market, services for the medical area appeared to be among the most promising, a view confirmed by independent experts:

"In the medical area ... chances are that an ambulance that carries blood for a

patient gets stuck in the traffic. That can have consequences for someone who needs exactly that blood transfusion. This is an application area for drones." Ralf Heidger, Issue Management UAS (Unmanned Aircraft Systems), Corporate Development (VE), DFS Deutsche Flugsicherung GmbH (German institution responsible for air traffic control)

Airbus's cargo delivery drone was therefore initially aimed at medical-use cases. However, Airbus wanted the drone design to be adaptable and reconfigurable for other purposes as well—such as agriculture monitoring, general cargo delivery, infrastructure inspection and humanitarian missions. Given that the market for drones is expected to increase dramatically,²⁷ Airbus's aim at developing a multipurpose drone

²⁷ The number of drones sold increased by 39% between 2016 and 2017. See also "Gartner Says Almost 3 Million Personal and Commercial Drones Will Be Shipped in 2017," Gartner press release, February 9, 2017, available at www.gartner.com/en/newsroom/press-releases/2017-02-09-gartner-says-almost-3-million-personal-and-commercial-drones-will-be-shipped-in-2017.

Figure 2: Important Cargo Drone Requirements

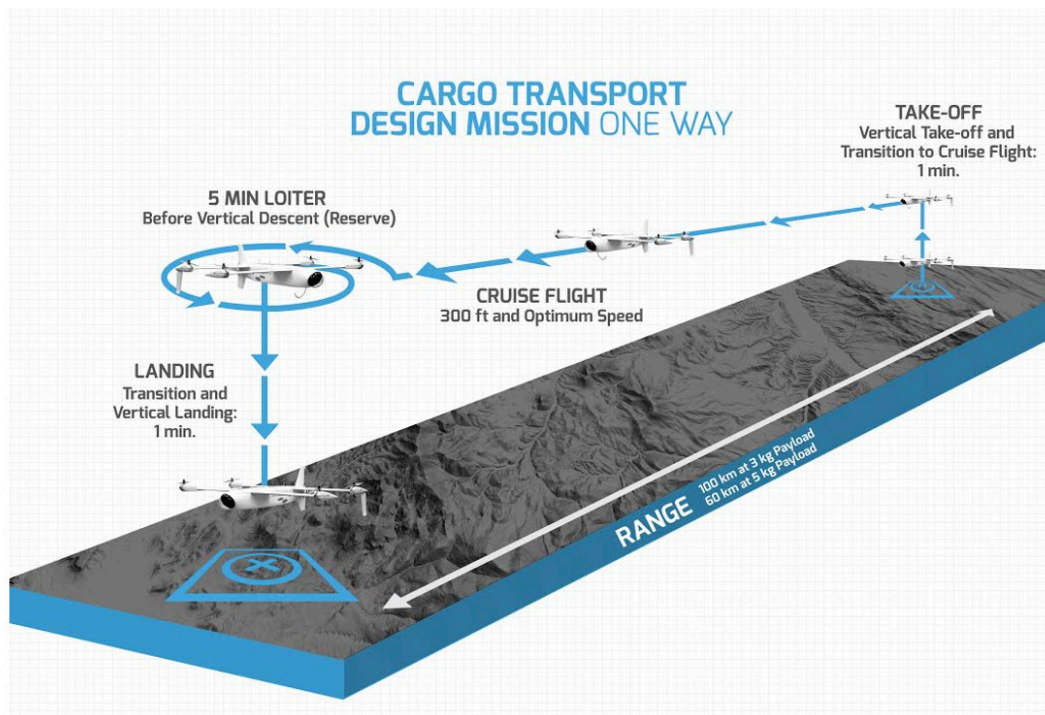
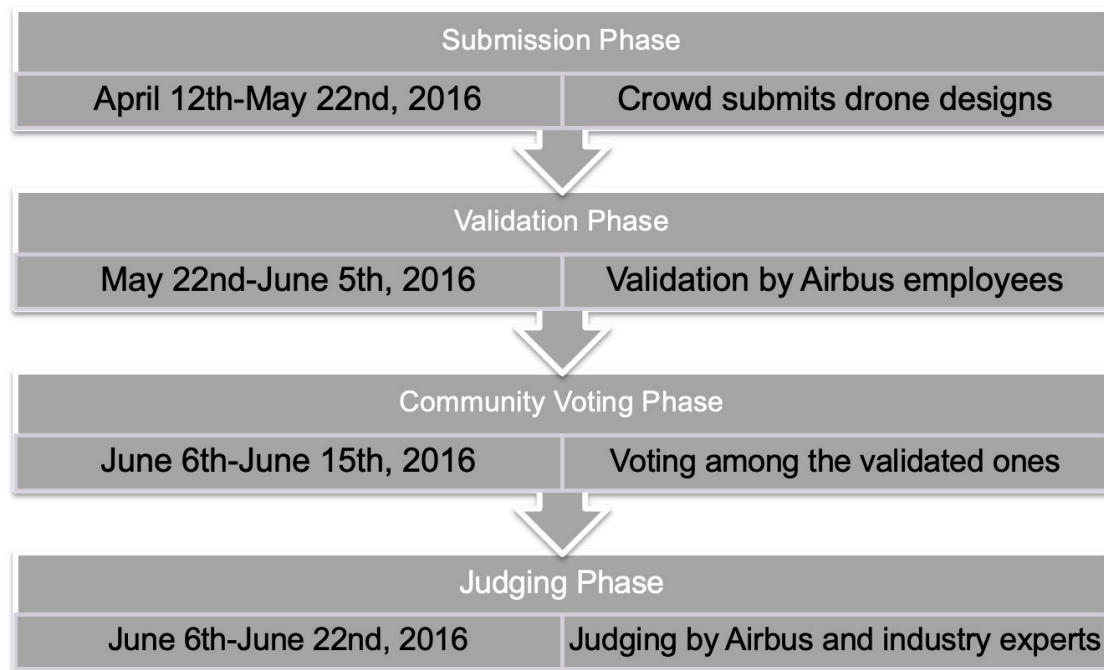


Figure 3: Timeline of the Main Phases of the Cargo Drone Project

that can also be used for other civil applications made sense.

Providing Participants with Drone Design Requirements

Via the Launch FORTH crowdworking platform, Airbus and Local Motors provided a briefing for project participants, including high-level information on the motivation of Airbus for conducting the project and specific information on the technical requirements. Figure 2 depicts some of the main technical requirements.

The platform also made plenty of downloadable information available to the participants, including design guides, equipment lists, glossary and parts lists, as well as software and links to drone literature. Local Motors also provided “inspiration examples” and a video showing that this project had the highest support inside Airbus and was initiated by Airbus’s CEO.

Project Phases and Activities

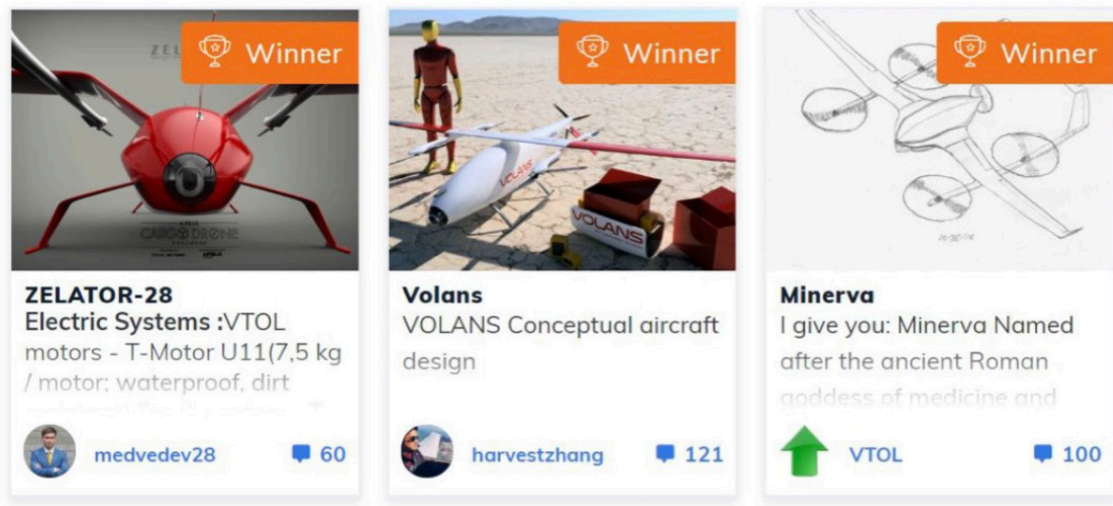
The main project phase for the development of the cargo drone engineering designs started on April 12, 2016, and participants were able to submit their engineering designs over the

following six weeks. The designs were then evaluated and validated by Airbus employees, with the main evaluation criteria being ease of maintenance, safety, ease of handling and novelty/innovation. Finally, the designs validated as feasible were voted on and judged. All these project phases were completed by June 22, 2020. Figure 3 shows the timeline of these submission, validation, voting and judging phases.

Local Motors received 425 submissions from participants in 351 cities in 53 countries. The participants generated 1,612 general discussion entries about the engineering of the cargo drone, mostly conversations and exchanges between the external crowd, Airbus’s assigned and self-selected internal employees, and Local Motors’ assigned employees. This made the drone project the largest managed by Local Motors to date, surpassing the 2012 BMW Urban Driving Experience project, which had 414 submissions and 187 discussion entries, and the 2012 Domino’s Ultimate Delivery Vehicle project, which had 385 submissions and 320 discussion entries.

From the 425 cargo drone engineering designs submitted, 167 were validated as feasible by Airbus engineers. There were three categories of

Figure 4: Winners of the Main Award as Voted by Airbus Executives



prizes for the best engineering design solutions from the crowd—the main award as voted by Airbus executives, the cargo prize as voted by cargo industry experts and the community prize as voted by the members of the external Local Motors crowd—with a first, second and third place in each category. In total, monetary prizes amounted to \$117,500. Figure 4 indicates the three winners of the main award.

The winners had to sign an agreement granting Local Motors the right to use their idea or work, including the right to register it as a trademark, patent, utility model or design right, while retaining the right to be mentioned as the author of the idea.

Figure 5 depicts the main activities during the cargo drone project and the various hybrid working groups that participated in these activities.

Project Outcome

Both Airbus and Local Motors were very satisfied with the results of the drone project.²⁸ They were particularly pleased with the speed of product development (six weeks using hybrid working compared to one year internally), the quality of the engineering design solutions

(167 cargo drone designs were evaluated as feasible), agility (enhancing, for example, Airbus's communication processes) and costs (lower than when conducting such product development only internally).

"Well I have to say I'm extremely happy and proud. ... What's amazing here is that we're tapping into the best and brightest all over the world. And the real concept is, the real breakthrough is, to do this ... in a fraction of the time. So, we're testing here something which I believe will in the future be a very important integral part of the development philosophy of Airbus at large. And I find it fascinating; it's a great premier, and I'm sure we'll see more of it in the future." Dr. Tom Enders, Airbus CEO²⁹

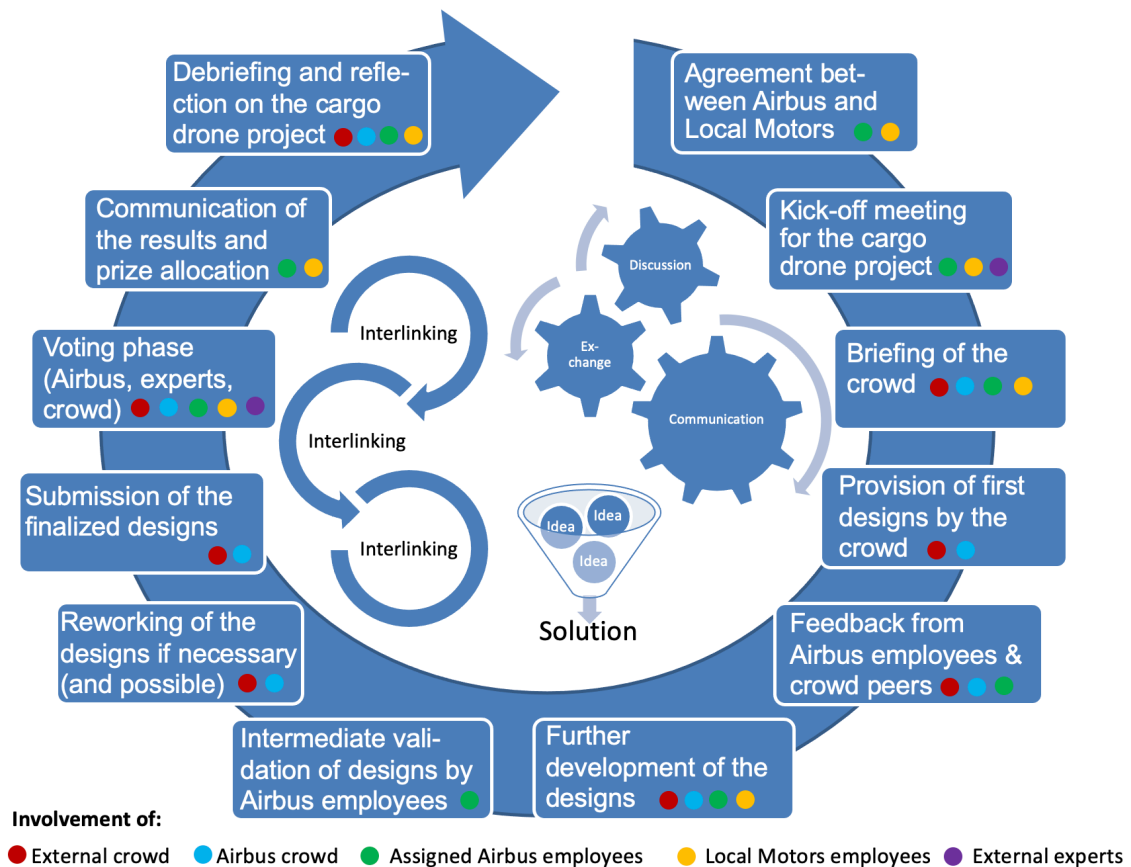
"We received a record number of submissions and the quality was astounding. As a result of this challenge, Airbus has experienced directly how to do development more quickly and at a far lower cost." Jay Rogers, Local Motors co-founder and CEO

Learning from the outcome of the drone project, Airbus has continued its journey toward increasing the agility, quality and speed

²⁸ See, "Airbus Group and Local Motors Name Winners of Next-Generation Commercial Drone Competition," Airbus press release, July 13, 2016, available at www.airbus.com/newsroom/press-releases/en/2016/07/Airbus-Group-Local-Motors-Cargo-Drone-Competition.html.

²⁹ See also "Airbus Cargo Drone," YouTube video, July 21, 2016, available at www.youtube.com/watch?v=TmE4dwkGBE, minute 4:22 to end.

Figure 5: Main Activities During the Cargo Drone Project and Participation of Hybrid Working Groups in the Respective Steps



of product development. For example, it has created start-ups inside the business and also formed separate companies where Airbus legacy processes and business rules do not impede the workforce in rapidly designing new products for the market. One of these companies founded after the cargo drone challenge is the services start-up Airbus Aerial (wholly owned by Airbus), located in Atlanta. Another is Up42 (a separate legal entity), based in Berlin.

Airbus has also continued its partnership with Local Motors.³⁰ In October 2019, Airbus announced the launch of a new joint venture with Local Motors called “Neorizon,” which focuses on

building mobility (i.e., transport) products with the aim to 3D-print drones and self-driving cars.³¹

Following the successful cargo drone project with Local Motors, Airbus has also entered partnerships with start-ups and used external crowds for the development of products. A major aim of these endeavors is to enable more agility, quality and speed of product development than would otherwise be possible in a big “tanker” company such as Airbus.

30 In our interview with Inka Beil, Senior Business Partner responsible for Airbus Communications, she emphasized that the partnership between Airbus and Local Motors was not just a “one-shot relationship.”

31 See “Airbus Signs Deal to 3D-Print Drones and Self-Driving Cars,” *Financial Times*, October 11, 2019, available at www.ft.com/content/3e07394a-ec00-11e9-a240-3b065ef5fc55.

Benefits and Risks for Airbus of Using Hybrid Working

After the cargo drone project was completed, Airbus conducted an internal workshop to collect and discuss the main lessons learned from this pilot project. Similarly, Local Motors reflected on its role in the project and how the Launch Forth platform and crowdworkers had delivered value for Airbus. Both companies also reached out to the external crowd to learn more about their experiences and to get their suggestions for improvement:

"We learned that a co-creation community is able to provide a lot of high-quality contributions for developing new products. Many of the entries had an amazingly high quality level. ... The community showed manifold ideas—not only good designs but also business ideas, technical ideas and even product brochures." Internal Airbus document detailing lessons learned from the drone project

Table 2 list the benefits and risks for Airbus of using hybrid working that were revealed by the cargo drone project.

"The increased speed of the development of the cargo drone by the external crowd ... compared to the development in-house at Airbus—and [at] a surprising high quality—has been one of the main benefits of crowdsourcing this work via Local Motors' platform." Alfred Lief, Head of UAV (Unmanned Aerial Vehicles) Portfolio and Innovation, Airbus Defence and Space (and Airbus's sponsor for the drone project)

One reason for these positive outcomes of hybrid working is that this novel form of work organization allowed Airbus to tap into the strengths of each form of work organization (e.g., new ideas from external crowds and specific knowledge from internal employees). It also allowed Airbus to mitigate the weaknesses of the two forms of work organization (i.e., just using external crowds or internal employees). External crowds often offer solutions that are creative but are neither feasible nor valid and do not match company strategy. With hybrid working,

internal employees can check the feasibility and validity of solutions and their "fit" with company strategy. However, the work processes of internal employees are often rather slow because of established procedures, hierarchies and internal restrictions. Hybrid working overcomes this constraint because the high number of external crowdworkers available simultaneously accelerates work processes. Moreover, with participants from all over the world on a crowdworking platform, there are also time zone advantages (for example, participants can hand over work in the evening to team members who are just starting their workday).

Advantages of Hybrid Working

Based on our analysis of the cargo drone project, we have identified two further advantages of hybrid working. The first is the ability to mitigate the potential weaknesses of using internal employees or external crowds only. The second is that hybrid working facilitates "coopetition" (cooperation between participants who are also competitors).

Mitigating the Weaknesses of Using External Crowds or Internal Employees Only

Table 3 identifies six examples (three each for external crowds and internal employees) of how hybrid working can mitigate the weaknesses of using each form of work organization on its own.

"The close gearing between the Local Motors crowd and internal Airbus employees has been an important point. We had Airbus employees who have been directly 'plugged in' at our platform and who served as contact persons for the crowd community when they had questions." Samuel Buschhorn, Co-creation Manager, Local Motors

Table 2: Benefits and Risks of Using Hybrid Working³²

Benefits	(Potential) Risks ³³
<p>Processes and activities:</p> <ul style="list-style-type: none"> • Speed: Shorter development time means faster time-to-market • Agility: Revealing the inadequacy of decades-old processes and governance enabled new, more agile ways of working • Quality: Better results due to feedback, faster pivoting, intense collaboration and amalgamation of different skills³⁴ • Broader basis for appropriate evaluation and validation of work because of different and heterogenous perspectives 	<p>Processes and activities:</p> <ul style="list-style-type: none"> • <i>Potential</i> legal problems if intellectual property (IP) and patent issues not have been handled appropriately (some external crowd participants were concerned that Airbus could “steal” their designs or that some designs of fellow crowd participants could violate patent rights) • <i>Potential</i> lack of innovative value of the engineering designs due to too narrowly specified requirements (both Airbus and Local Motors, as well as the external crowd, realized that these requirements should not be too tight) • Lack of capacity to give feedback for all 167 valid drone designs disappointed some participants
<p>Participants:</p> <ul style="list-style-type: none"> • More variety of ideas and sharing of knowledge and therefore high number of feasible contributions (167) • Lower costs for Airbus since it had only to fund the prizes for the winning engineering designs³⁵ • Building of a community from which Airbus could learn and which it can use for future projects (“external innovative office”)³⁶ • Airbus employees were able to look outside their department and Airbus got an overview of its employees’ capabilities compared to external talent • Fostering the intrinsic work motivation of Airbus’s employees who much appreciated the interaction with external talent • Airbus gained a recruitment pool for future employees (and the opportunity to observe externals and see how they “fit”) • Good complement of the participants’ different skills (e.g., some with a strong design background teamed up with participants with an engineering background)³⁷ 	<p>Participants:</p> <ul style="list-style-type: none"> • Irritations/reservations among Airbus employees (some asked why this had to be done using external crowds and why it could not have been done internally) • Annoyance among external crowd participants (some showed disappointment after the end of the project when they learned which designs had been selected)
<p>Information:</p> <ul style="list-style-type: none"> • Several groups (e.g., general public, start-up communities, external crowd) commented positively on Airbus’s novel approach • Good insights about the commercial drone market (e.g., how big it may be) that are more reliable than, e.g., those from a survey 	<p>Information:</p> <ul style="list-style-type: none"> • <i>Potential</i> negative (public) reactions, and therefore damage to Airbus’s image, if the project were to fail (this potential risk was part of the reason Airbus chose drone design for the pilot project because the risk could be mitigated) • <i>Potential</i> exposure of the companies’ strategies to competitors, revealing the direction of their planned further development (this risk has been anticipated in advance by Airbus and Local Motors) • Lack of information in parts of the crowd (some information that certain Airbus or Local Motors employees had given to some crowd participants upon request got lost and was not available to all)

Table 2: Benefits and Risks of Using Hybrid Working

Benefits	(Potential) Risks ³³
<p>Technologies:</p> <ul style="list-style-type: none"> • “Friendly disruption” (deliberate development and provision of new technologies by an external crowd) (“disrupt us before we are disrupted”)³⁸ • Technological advancement for the company because the project provided Airbus with an easily gained overview of the “state-of-the-art” and integration of external knowledge 	<p>Technologies:</p> <ul style="list-style-type: none"> • <u>Potential</u> creation of advantages for third parties who observed the project and could have gained important technological insights and learned from the solution, and might have brought a product to market earlier

Facilitating Coopetition

In general, crowd-based working either takes the form of a competition (or tournament) or is collaborative.³⁹ The cargo drone project had elements of both. On the one hand, participants from the external crowd were competitors because only a few of them could win the prizes.

32 This table is structured around the core elements of Alter’s work system framework (see Alter, S., op. cit., p. 78).

33 Risks that were identified from the analysis of this case study, but did not arise in practice, are shown in *italics* and have the word “Potential” underlined.

34 The statement made by Local Motors to the crowd after reflecting on the project said: “We were really impressed by the quality of your entries and the engineering relevance of most of them.”

35 In our interview with Robert von Tilborg, Airbus Vice President UAS Portfolio Management (and jury member during the Airbus cargo drone project), he stated that Airbus had lower costs during this hybrid working project compared to the costs it usually has for such endeavors internally.

36 Many participants also showed “group identification” habits and signs of pride. For example, one said: “I’m ... just proud to be within the 425 projects submitted in two months, feeling this is truly the great way to work quickly and efficiently in the future!”

37 According Samuel Buschhorn, Local Motors’ co-creation manager, the heterogeneity of participants during the drone project was an important factor when participants teamed up.

38 The internal Airbus (executive) sponsor of the drone project told us in our interview with him that, over the past 50 years, the industry had developed high entry barriers and had fixed ideas on how to develop products. Airbus firmly believed that industry outsiders could not enter and disrupt it. The building of a rocket by Elon Musk with private funds astonished Airbus. This forced Airbus to question if its way of developing products was really the only feasible one and if doing product development using a crowd could also work in its industry. See also Mesnage, L. “Bringing Digital Transformation to Airbus,” Boston Consulting Group September 5, 2018, available at www.bcg.com/publications/2018/bringing-digital-transformation-airbus-interview-marc-fontaine-digital-officer.aspx. In this interview, Marc Fontaine, Airbus’s Digital Transformation Officer, says: “We were also affected by new entrants, like SpaceX in the space business and in UAVs.”

39 See Blohm, I., Leimeister, J. M. and Krcmar, H. “Crowdsourcing: How to Benefit from (Too) Many Great Ideas,” *MIS Quarterly Executive* (12:4), December 2013. pp. 199-211.

On the other hand, many of these participants collaborated with each other. Our analysis of the 1,612 discussion entries submitted during the project revealed a variety of collaborative behaviors, even though participants were competing against each other. These behaviors included giving hints on design improvement, suggesting alternatives for technical challenges, sharing knowledge of software options and requesting assistance where skills were lacking.

However, the work of the self-selected participants from the internal Airbus crowd could be better characterized as cooperation (not least because they were not allowed to receive prizes). The same applied to the specifically assigned Airbus and Local Motors employees who guided and supported the crowd.

Overall, the working relationships during the cargo drone project can be best characterized as coopetition because they included both collaboration and competition (see Figure 6).

One of the more surprising findings from the cargo drone project is that coopetition was clearly a key to success. The most successful crowd participants were those who, despite being in competition with each other, collaborated more with others and were closely interlinked with participants from Airbus and Local Motors. The level of collaboration is reflected in the number of discussion entries (comments, exchanges, suggestions, etc.) per design (see Table 4). Indeed, the better engineering designs submitted received more discussion entries. The 167 designs that were evaluated as valid received an average of 39.47 entries, compared to only 6.71 entries on average for the 258 designs that were evaluated as not valid. Moreover, the

Table 3: How Hybrid Working Can Mitigate the Potential Weaknesses of Just Using External Crowds or Internal Employees

Work Organization	Potential Weaknesses of External Crowds or Internal Employees Alone	Mitigation Through Hybrid Working
External Crowds	Delivery of solutions that are creative, but are not feasible/valid or do not match company strategy	Check by internal employees of feasibility and validity of solutions as well as “fit” with company strategy
	Lack of knowledge about certain areas and parts of work that are company- or industry-specific	Delivery of solutions that are creative, but are not feasible/valid or do not match company strategy
	The use of external crowds can cause irritation among the existing workforce (raised anxiety and questions)	Interlinking them with internal employees can mitigate irritations and help to avoid the “not invented here” syndrome
Internal Employees	“Uniform” nature of work (e.g., need to comply with internal conventions, requirements and views)	Novel kinds of contributions, ideas and forms of work; external crowds are less restricted by internal constraints
	Lack of company employees with sufficient knowledge in specific areas new to the company	Provision of knowledge from external crowd experts who can easily be acquired on a short-term basis
	Slow work processes caused by established procedures, hierarchies and internal restrictions	Faster work processes with an external crowd due to high number of workers worldwide and time zone advantages

Figure 6: Coopetition Among Participants During the Airbus Cargo Drone Project

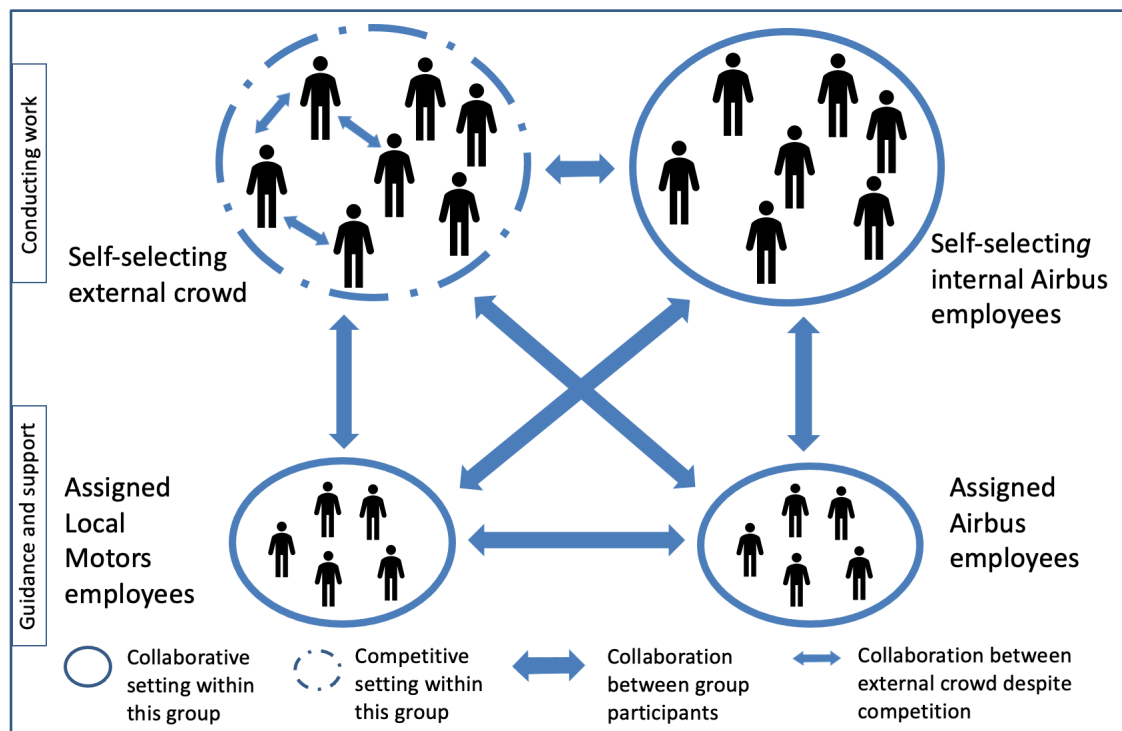


Table 4: Average Number of Discussion Entries per Cargo Drone Design

Cargo Drone Design Category	Number of Cargo Drone Designs	Total Number of Entries	Average Number of Entries per Design
Invalid Designs	258 (out of 425)	1,730	6.71
Valid Designs	167 (out of 425)	6,592	39.47
Winning Designs	5 (out of 425)	591	118.20

designs submitted by the five prize winners received an average of 118.20 entries.

"I must, and am really happy, to say the support was amazing. I learned a great deal (not yet enough) from this process and can credit the end version [of my design] to be a result of feedback from the community, Airbus and LM for which I am most grateful." External crowd member, one of the five winners

The correlation between design quality and discussion entries in the cargo drone project is consistent with the literature, where the number of such entries is considered as an implicit measure of quality.⁴⁰ The close interlinking and collaboration among participants in the drone project had a positive impact on the quality of the engineering designs. Collaboration within a competitive environment is also important because this aspect of working relationships often plays a significant role when companies conceptualize projects and work. For example, at the start of the cargo drone project, participants discussed which strategy would be the most successful. There were two options:

1. To disclose their engineering designs at an early stage on the crowdworking platform and therefore have the opportunity to receive early feedback on their improvements. However, this strategy risked other crowd participants receiving information and stimuli that might give them an edge in the competition.
2. To disclose the designs only toward the end of the project and therefore conceal their designs from other crowd participants until the closing phase. The downside of this strategy was not having

the opportunity to receive feedback to improve their engineering designs.

The first strategy (coopetition) was the one adopted and, as shown by the discussion entry data in Table 4, it turned out to be very successful.

"Upload your design as soon as possible. In past challenges, the winning designs were usually uploaded very early in the process and then refined over time with the community giving feedback. I can tell you from my personal experience ... ([before I was] employed [by] Local Motors) that this is the best way to do it. ... Be stronger together by complementing each other." Local Motors employee assigned to guide and support the crowd

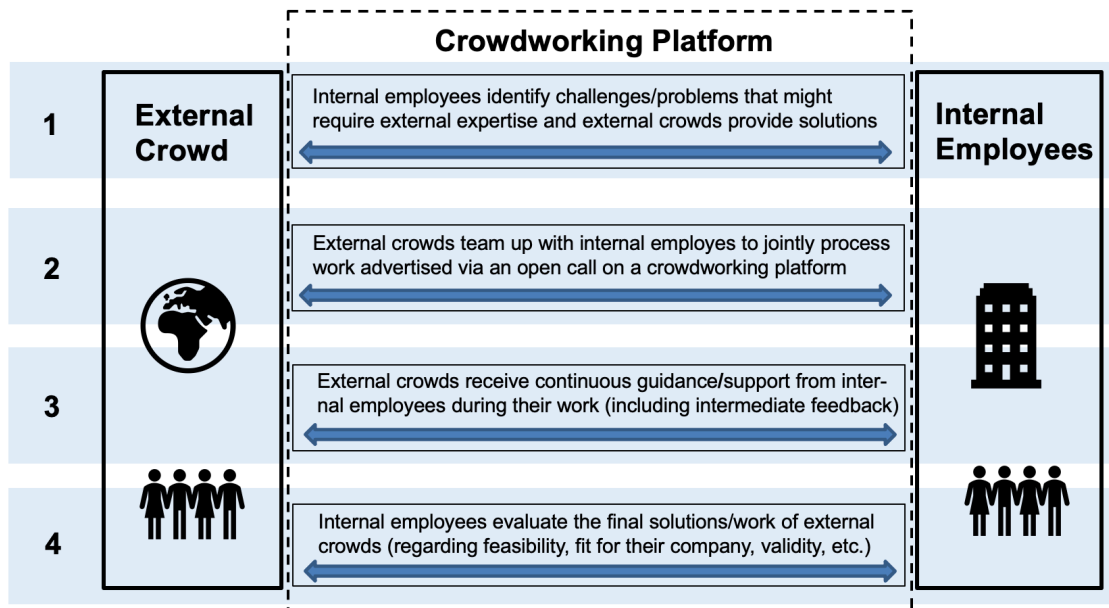
Four Configurations for Hybrid Working Involving External Crowds and Internal Employees

Based on the Airbus/Local Motors cargo drone project, we have identified four configurations for hybrid working—i.e., four ways in which external crowds and internal employees can work together on a common platform:

1. Internal employees identify challenges and external crowds provide the solutions.
2. External crowds team up with internal employees to jointly process work.
3. External crowds receive continuous guidance and support from internal employees.
4. Internal employees evaluate the final work (solutions) of external crowds.

These four configurations are depicted in Figure 7 and are explained in more detail below.

⁴⁰ Blohm, I., Leimeister, J. M. and Krcmar, H., op cit., December 2013.

Figure 7: Four Ways to Interlink External Crowds and Internal Employees

1. Internal Employees Identify Challenges, External Crowds Provide the Solutions

From an idea contest with their internal employees, Airbus had identified the commercial cargo drone market as one that would be interesting to explore. However, unlike other drone markets (e.g., military), Airbus did not have much internal experience with the commercial market and needed to seek external expertise and suggestions. This is an example of internal employees identifying important challenges and problems that could benefit from—or even require—external competence and ideas. These challenges and problems can then be communicated via an open call on a crowdworking platform to external crowds working on them (supported by internal employees) who can offer solutions.

2. External Crowds Team Up with Internal Employees to Jointly Process Work

During the cargo drone project, several participants teamed up with each other and worked together on engineering designs. Such close collaboration had the advantage that people

with different competencies complemented each other. Some self-selected employees from Airbus, for example, had substantial engineering knowledge (as did the assigned Airbus employees) but lacked design skills that could help them make the drone look attractive. Conversely, some external crowd participants lacked engineering skills, but had great design skills. The close interlinking of external crowds and internal employees had a positive impact on the success of the project, especially regarding the quality of the winning cargo drone designs.

3. External Crowds Receive Continuous Guidance from Internal Employees

At the beginning of the cargo drone project, Airbus employees (together with employees of Local Motors) provided a briefing to the external crowd on the expectations and motivations for the project and the requirements for the engineering designs. External crowd participants also received continuous feedback, guidance and support during the whole project from the assigned Airbus employees and the assigned Local Motors employees. This continuous guidance and support during the project proved to be one of the main success factors because

it helped ensure that crowd participants were continuously able to adapt their solutions to the requirements in an agile way. As demonstrated by the cargo drone project, guidance and support can range from simply answering questions from the external crowd to actively communicating feedback about intermediate work results to allow crowd participants to adjust their work early on (rather than after it has been completed). Support and guidance can even take the form of online live video chats, where employees of both the company and the crowdworking platform can provide answers and discuss questions from (and with) the external crowd.

4. Internal Employees Evaluate the Work of External Crowds

Last but not least, internal employees can evaluate the final products and solutions offered by crowd participants. In the Airbus case, commercial drones require a high degree of safety and security because (like airplanes and helicopters) they can potentially cause severe damage. One of the lessons learned by Airbus in its post-project review was that it is necessary for internal Airbus employees to evaluate and filter the work of external crowds. Airbus realized that, in many cases, the work of crowd participants needs to be adapted to meet industry safety and security requirements. Thus, the quality of crowd participants' work processed via a crowdworking platform improves when internal employees evaluate the work. Evaluations could range from ratings and rankings of the best solutions, to evaluating technical feasibility, to assessing the fit of a solution with company goals and structures.

These four configurations for hybrid working highlight the different options for interlinking external crowds with internal employees. Successfully interlinking crowd participants with internal employees is key to fostering internal employees' acceptance of hybrid working and mitigating their potential irritations about and resistance to this novel form of work organization.⁴¹ What all four configurations have in common is that they require an intermediary crowdworking platform provider that delivers both a technical solution and process support.

⁴¹ See Mrass, V., Peters, C. and Leimeister, J. M., op. cit., January 2017.

Recommendations for Adopting Hybrid Working

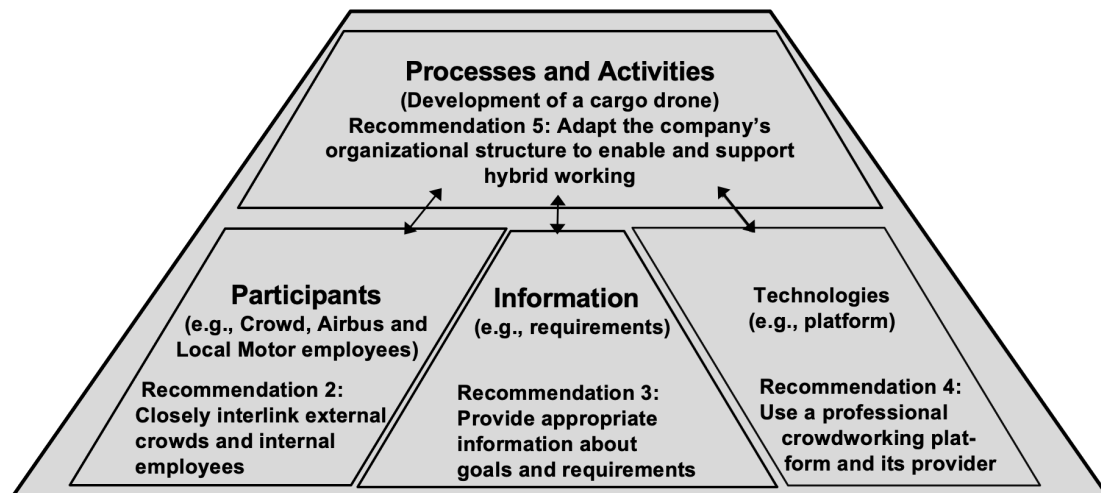
Based on our analysis of the Airbus/Local Motors cargo drone project and findings, we provide five recommendations for company executives who want to explore the benefits and advantages available from hybrid working—i.e., interlinking external crowds and internal employees via a crowdworking platform. The first recommendation is concerned with making a preliminary assessment of the type of work that may be suitable for hybrid working. The remaining four are structured according to the core elements of Alter's work system framework⁴² because this framework provides a valuable lens for looking at the different aspects of hybrid working (see Figure 8). As illustrated by the cargo drone project, following these five recommendations will increase the agility, quality and speed of a company's product development when using hybrid working.

1. First Identify Which Work is Suitable for Hybrid Working and Ensure CEO Support

Airbus first used an internal "crowd" to evaluate which area would be most appropriate for its pilot hybrid working project and found that the development of commercial cargo drones would benefit most from external ideas, knowledge and support. Airbus also recognized that (unlike military products, for example) the commercial drone market would not be too "sensitive," given the anticipated external exposure of the project. Company executives such as CEOs or CIOs should therefore first decide which projects or work types are suitable for hybrid working and which are better carried out internally (for example to avoid IP or security issues). Executives' awareness of the business challenges and strengths of a company will guide the identification of potential candidates for hybrid working and illuminate how such work can lead to competitive advantages.

Companies that plan to use hybrid working for the first time should also ensure that their top management teams provide the necessary support and communication for what is planned. Airbus employees who were assigned to guide

⁴² Alter, S., op. cit., February 2013.

Figure 8: Recommendations Structured According to Alter's Work System Framework

and support the drone development project found that CEO commitment and clear communication about the aims of the project were invaluable in gaining acceptance for the hybrid working approach within the company. Without top management support (and information dissemination throughout the whole company), it would not have been possible to appropriately utilize hybrid working.

One example of the importance of top management support was the HR department's initial resistance to allowing Airbus employees to participate as a "crowd" because of legal concerns. This resistance was overcome when the CEO sent an email to all employees saying that he supported the project and wanted employees to participate (under the premise that they disclose their status and would not be allowed to win the prizes offered). Companies should therefore not only ensure that they identify the projects for hybrid working that best "fit" their strategies, but they should also immediately communicate top management support for such projects.

2. Closely Interlink External Crowds and Internal Employees

The cargo drone project illustrates that closely interlinking external crowds and internal employees generates several benefits, particularly in the area of product development. In particular, close interlinking helps to increase the strengths

and mitigate the weaknesses of work processed by either of these groups on its own (see Table 3).

Moreover, as shown in Table 4, participants who collaborated more closely with both their fellow (external and internal) crowd participants and the assigned internal (Airbus and Local Motors) employees were on average more successful than others. Those who submitted valid cargo drone designs generated far more discussion entries than those whose designs were evaluated as invalid. Furthermore, the five winning participants generated the highest number of discussion entries. Company executives should therefore foster collaboration among external crowd participants (even though they are competing against each other) and between external crowds and internal employees.

Other than the five prize winners, none of the external participants in the cargo drone project received any financial remuneration. Some participants expressed dissatisfaction about the outcome of the project and the selected

winners, and, in response to several requests,⁴³ Airbus and Local Motors provided certificates of participation. Some participants said that they planned to put their participation in this project on their résumés because Airbus is a large, market-leading company and a well-known brand. Company executives should therefore consider providing all participants with some form of formal recognition of their work to ensure motivation of the whole crowd.

3. Provide Appropriate Information About Goals and Requirements

In the cargo drone project, Airbus provided all participants with a clear and precise briefing about both the project's goals (including the fact that it was backed by Airbus's CEO—see Recommendation 1) and the solution requirements. Providing this information in advance was key to the success of the project. Additionally, Airbus, Local Motors and the external crowd participants intensely discussed in advance how much freedom the participants should have to propose diverse solutions and how detailed the requirements should be to make sure the cargo drone designs met the expectations of Airbus. Airbus initially argued for more detailed requirements, whereas Local Motors argued for more freedom for the participants. Company executives should therefore aim to provide a good balance between imposing boundaries/specific work descriptions and requirements and fostering sufficient freedom to encourage creativity during a product development

project.^{44,45} If applicable, the company should also emphasize the strategic importance of the results of the work.

In a hybrid working environment, companies should also ensure that important information that the company or crowdworking platform provider gives to individuals upon request is also communicated to the whole crowd.⁴⁶ Finally, a company using hybrid working should make the work of the external crowd “visible”—for example, by presenting the best solutions to the public. Airbus and Local Motors did this at the Farnborough International Airshow in England, where they held an award ceremony and presented prizes to the winners of the project.⁴⁷ The two companies also provided the opportunity for all crowd participants to showcase their designs at the Drone Berlin Exposition (an international exhibition).⁴⁸

4. Use a Professional Crowdworking Platform and its Provider

Currently, many long-established companies are considering how to adopt platform thinking

43 Two examples of requests posted on Local Motors' crowdworking platform by external crowd participants were: 1) “So what if LM and Airbus gives something like a ‘Certificate of participation’? A simple but genuine-looking paper verified and signed by an Airbus executive and LM people to appreciate our handiwork;” and 2) “I just wanted to chime in and say that a certificate of participation is a great idea after 5-6 weeks of solid hard work and would have an added incentive for future challenges. Considering the amount of IP Airbus and LM have received, I don't think it is too much to ask.” These requests were supported by a lot of other external crowd participants and even by Airbus employees, one of whom posted: “I like your idea, I'm not part of the organization of this challenge, however as an Airbus employee participant (... not competing for prize but for fun) and having spent most of my nights during a month on that project, I would really appreciate this.”

44 Two of the assigned Local Motors employees posted the following conclusion on the crowdworking platform: “Defining the requirements was a challenge. They had to serve multiple purposes: making sure that the final entries would fit the asks of the different stakeholders and help you understand exactly how to meet the engineering expectations. We also had to channel your creativity to avoid waste of energy while giving you enough room to explore new ideas. Some have said that the “box” we left for creativity was too narrow and this is something we will definitely keep in mind.”

45 This recommendation is consistent with the conclusion that Airbus came to after the project. Robert von Tilborg, Airbus Vice President UAS Portfolio Management (and jury member during the Airbus cargo drone project), told us that Airbus is now well aware that it has to find the right balance between high-level requirements and overly detailed requirements. According to him, too many requirements result in too many constraints; participants would then also automatically be constrained in their designs.

46 After Local Motors reflected on the cargo drone project, it posted this important conclusion: “We could have summarized better the important answers we gave to individuals and shared it again with the community to ensure everybody's awareness. ... The guys from Airbus did a very good job and gave a lot of expert feedback, but not to all. Generally speaking, we mostly gave feedback after it was asked [for] and did not really do it spontaneously anymore after a few weeks.”

47 Local Motors stated on the crowdworking platform: “We don't want to speak for them but we believe we did a pretty good job at making Farnborough an awesome experience for the winners. We are really happy that we decided to invite all of the winners instead of only the main award [first prize] winner as ... was initially planned.”

48 One of the assigned Local Motors employee posted on the platform: “Just wanted to share with you a cool opportunity to get your designs shown to the world: All participants of the LM-Airbus Cargo Drone are invited to showcase their works at Berlin Drone Expo. ... Designs will be presented on a poster wall at the event.”

to improve performance.⁴⁹ Interlinking a high number (several hundred) of participants during an important product development project requires technological support such as a crowdworking platform in order to provide a solid basis for collaboration, communication and discussion among all participants.

The cargo drone project was supported by Local Motors' crowdworking platform, and the technical features of the platform, such as live chats, proved to be very helpful over the course of the project.⁵⁰ The self-selected external crowd, the internal Airbus crowd, as well as the assigned Airbus and Local Motors employees, were "plugged in" to the platform, which ensured the smooth operation of this hybrid working project.

In addition to using a professional crowdworking platform, companies should also draw on the platform provider's experience, as well as its existing network of external crowds and its knowledge of how to handle them. Airbus faced a culture clash when it first started to interface with an external crowd because its internal procedures differed widely from the way that such crowds worked. In addition to providing the technical solution (the crowdworking platform), Local Motors also acted as a "translator" between the two initially diverse worlds, which proved to be key to the success of this project. One of the lessons learned by Airbus is that it is very important to conduct the relationship with the provider at "eye level,"—i.e., in a partnering mode rather than by dominating the provider.

5. Adapt the Company's Organizational Structure, Processes and Activities to Enable and Support Hybrid Working

Companies should adapt their organizational structures, processes and activities to enable and support hybrid working. For example, it is important that company employees filter solutions offered by external crowd participants to make sure that they meet company and

industry demands (e.g., safety and security requirements). Companies should also allow insights gained from the interplay between external crowds and internal employees to challenge their long-established internal processes and activities and adapt them, if appropriate, to allow for more agility.⁵¹ For example, Airbus changed its longstanding communication processes because they did not support agile and fast exchanges with the external crowd.

To ensure the agility, spontaneous communication and timely feedback that are inherent characteristics of hybrid working, companies should flatten their hierarchical processes for authorizing projects and communicating with external crowds or internal employees. They should also establish units within the company, set up subsidiaries or form joint start-ups with partners that have a "start-up" atmosphere that better matches the culture of external crowds. For example, following the cargo drone project, Airbus set up Airbus Aerial, Up42 and Neorizon. Finally, companies should ensure that their organizational structure and processes reflect the partnering mindset that is necessary for cooperating with external crowds and crowdworking platform providers. Airbus regarded this as a key driver of the success of its hybrid working pilot project:

"Large corporations can learn from this project that in a product development process, it can be very helpful to look outside your own corporation. And that it is ok to look for help outside and to go into a partnering mode. But it has to be done on an eye-level, equal partnering mode." Robert van Tilborg, Airbus Vice President UAS Portfolio Management and jury member during the cargo drone project

49 See Constantinides, P., Henfridsson, O. and Parker, G. G. "Introduction: Platforms and Infrastructures in the Digital Age," *Information Systems Research* (29:2), June 2018, pp. 381-400.

50 Local Motors posted the following after it had reflected on the cargo drone project: "We think the format of the live chat we implemented is very good (in-platform, with chat). We just need to think a bit more about when exactly to run them (day of the week and hour) to impact the most people globally and communicate a bit better their scheduling."

51 See "Airbus Cargo Drone Challenge by Local Motors," YouTube video, April 12, 2016, available at: www.youtube.com/watch?v=4iznBFghD4o. In this video, Alejandro Gonzalez, Airbus's project leader says: "We are at the same time discovering new markets in which agility is a mandated requirement, so to say. So we have to adapt ourselves, change our mindset to be more agile, to be more lean," minute 1:28 to 1:45.

Concluding Comments

Today's business environment is increasingly characterized by volatility, uncertainty, complexity and ambiguity. To respond to the challenges of this environment and remain competitive, established companies need to transform how they process work.⁵² Hybrid working is a novel approach to organizing work that allows companies to increase the agility, quality and speed of product development. The Airbus/Local Motors case described in this article shows that managing projects using hybrid working arrangements that interlink external crowds and internal employees offers many opportunities for higher performance. However, adopting hybrid working requires careful thought and planning. Company leaders must make purposeful choices in the areas of project selection, integration of the different workforces, platform selection, provision of information and coaching. This article provides guidance and recommendations for making these choices. Following these recommendations will ensure that companies use hybrid working to leverage the competencies of talent from within and outside of the organization, reap the benefits of coopetition offered by hybrid working and create value beyond simply exchanging ideas.

Appendix: Research Methodology

Between May 2017 and February 2020, we studied the successful Airbus/Local Motors cargo drone project, which used hybrid working to interlink external crowds and internal employees. The research question that we set out to answer based on the insights gained from our analysis of this project was: "How can companies benefit from interlinking external crowds and internal employees?" None of the authors of this article are employees of Airbus or Local Motors or have a commercial relationship with these companies, so the analysis of this case took place from an external, neutral perspective.

The study used an explorative, inductive approach, following the case study research

method.⁵³ To analyze the cargo drone project and to structure our findings, we used the lens of Alter's work system framework, including its core elements—processes and activities, participants, information and technologies.⁵⁴ To ensure triangulation and strong evidence for our findings, we used the following multiple sources of data:

1. To gain insights from Airbus and Local Motors, we conducted in-depth interviews with key representatives from both companies and had additional contacts and exchanges with further employees of both. We also examined an internal Airbus document prepared after a follow-up workshop and that summarized the main conclusions and detailed the lessons learned.
2. For insights from the perspective of the external crowd, we analyzed the 1,612 general discussion entries posted on Local Motors' crowdworking platform. These entries encapsulated the interlinking (collaboration, communication, exchange, etc.) between the external crowd, the internal self-selected Airbus employees, and the specifically assigned Airbus and Local Motors employees who guided and supported the participants. To ensure the completeness of our findings, we also analyzed the 591 discussion entries relating to the five winning designs.
3. For insights from a neutral, outside perspective from sources not directly involved in the project, between June 2017 and February 2020 we accessed more than 350 documents about Airbus, Local Motors and the cargo drone project. The documents examined included Airbus annual reports, archival data such as terms and conditions, magazine and newspaper articles, press releases, slides, technical reports and reports on a range of social media channels (e.g., blogs, podcasts, YouTube videos). We also interviewed an expert from DFS/Deutsche Flugsicherung, the German institution for air traffic control, which has published

⁵² Dery, K., Sebastian, I. M. and van der Meulen, N., op. cit., June 2017.

⁵³ See Yin, R. K. *Case Study Research: Design and Methods*, SAGE Publications, 2014.

⁵⁴ Alter, S., op. cit., February 2013.

rules and regulations for flying drones.⁵⁵ We also discussed our findings and insights in three meetings with experts on crowdworking and digitization of work. (These experts included representatives from companies, crowdworking platform providers, two scientific organizations, two unions and others). The corroboration we received from these experts indicates that our findings are valuable for a wide range of institutions.

Our interviews followed a semistructured approach (including follow-up questions). We recorded and transcribed the interviews, and then analyzed and coded both the interviews and the 1,612 general and 591 specific discussion entries from Local Motors' crowdworking platform, enabling us to assess how companies can benefit from interlinking external crowds and internal employees in hybrid working arrangements.

The coding followed the well-established qualitative content analysis approach of Mayring,⁵⁶ using the related QCAmap software.⁵⁷ We specified the coding unit (phrase or clause/word sequences), the context unit (all information about this case) and the evaluation/recording unit (all interviews and the 1,612 general and 591 specific discussion entries). The actual coding followed an inductive category formation approach, which captures categories emerging from the material itself (while checking and confirming the category system and coding unit after having coded about 15% of the material). Our underlying principle was that a good qualitative content analysis should be theory-guided,⁵⁸ which is why we chose Alter's work system theory and its work system theory framework for analyzing and structuring the findings.

⁵⁵ These rules and regulations are available at www.dfs.de/dfs_homepage/en/Drone%20flight/Rules%20and%20regulations/.

⁵⁶ Mayring, P. *Qualitative Content Analysis: Theoretical Foundation, Basic Procedures and Software Solution*, University of Klagenfurt, 2014.

⁵⁷ For information about QCAmap, see www.qcamap.org.

⁵⁸ See Mayring, P. *Qualitative Inhaltsanalyse: Grundlagen und Techniken*, Beltz, 2015.

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