



engineering  
resources



# Building today's innovation project teams

Engineering managers are faced  
with challenges and solutions

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Joseph W. Lampinen, M.S.

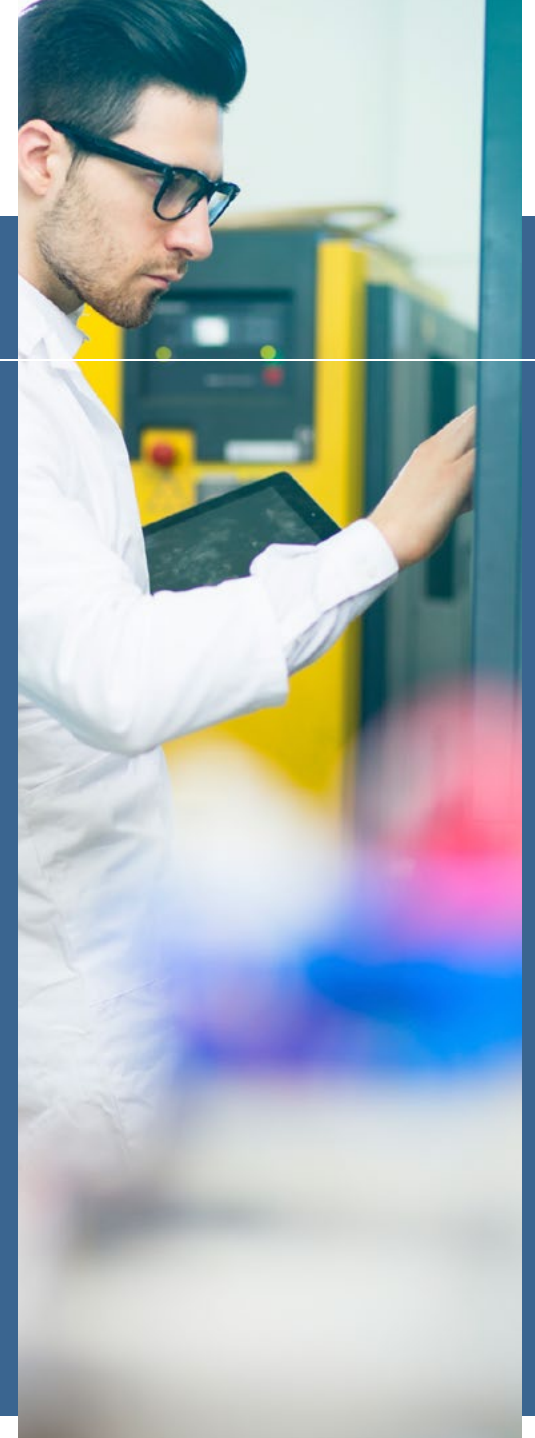
[lampijw@kellyengineering.com](mailto:lampijw@kellyengineering.com)

Project managers, engineers, scientists, and technologists in industry—engaged in new product development and other innovation projects—often face problems of workforce size restrictions, timeline acceleration, reduced budgets, and frequent, unpredictable changes in project priorities.

These challenges can make it very difficult for engineering managers to build their innovation teams to the optimum size and mix of skills by using only regular employees. As a result, many industrial innovation projects are staffed by a combination of regular employees and contingent workers (i.e., temporary employees, contractors, freelancers, consultants, etc.) in order to provide the needed capacity, flexibility, and to comply with organizational guidelines.

Today, most businesses make use of contingent workers to some extent in lieu of and in addition to regular staff.<sup>1</sup> The use of contingent workers allows companies to manage the size and composition of their workforce with great agility in meeting the ebb and flow of work demand resulting from projects and cyclical activities.<sup>2</sup>

Additionally, contingent technical workers (e.g., engineers, scientists, technologists) allow client companies to access critical expertise and special skills that can contribute to the knowledge base of their regular employees.<sup>3</sup> There may be a beneficial “cross pollination” effect that can occur when a new engineer or scientist joins a company after working for another employer. By sharing new approaches, ideas, and concepts based on what they have learned in their prior work in other industries and organizations, the new technical employee can contribute in a substantive, creative way to innovation projects. Adding contingent workers with appropriate qualifications and experience to a project team offers this same effect.



<sup>1</sup>Djibo, Desiderio & Price, 2010

<sup>2</sup>Bergstrom, 2001

<sup>3</sup>Nesheim, 2003

Some businesses consider research and development to be their core competencies and the source of their chief competitive advantage. These businesses may believe that the use of external, supplemental engineers and scientists—especially in lieu of regular employees—may degrade their performance in technological innovation and affect their organizational know-how.

This paper will review the literature to consider two potential means in which the use of contingent workers may contribute to innovation projects:

- 1 Improved workforce agility and cost structure, enabling funding of additional projects or deeper investment in fewer projects, as well as rapid scale-up of workers to achieve faster progress on innovation projects, and
- 2 Access to special technical skills and expertise, while gaining external perspective and knowledge sharing.

*“Creativity and innovation at work are the process, outcomes and products of attempts to develop and introduce new and improved ways of doing things. The creativity stage of this process refers to idea generation, and innovation refers to the subsequent stage of implementing ideas toward better procedures, practices or products. Creativity and innovation can occur at the level of the individual, work team, organization, or at more than one of these levels combined, but will invariably result in identifiable benefits at one or more of these levels.”<sup>4</sup>*

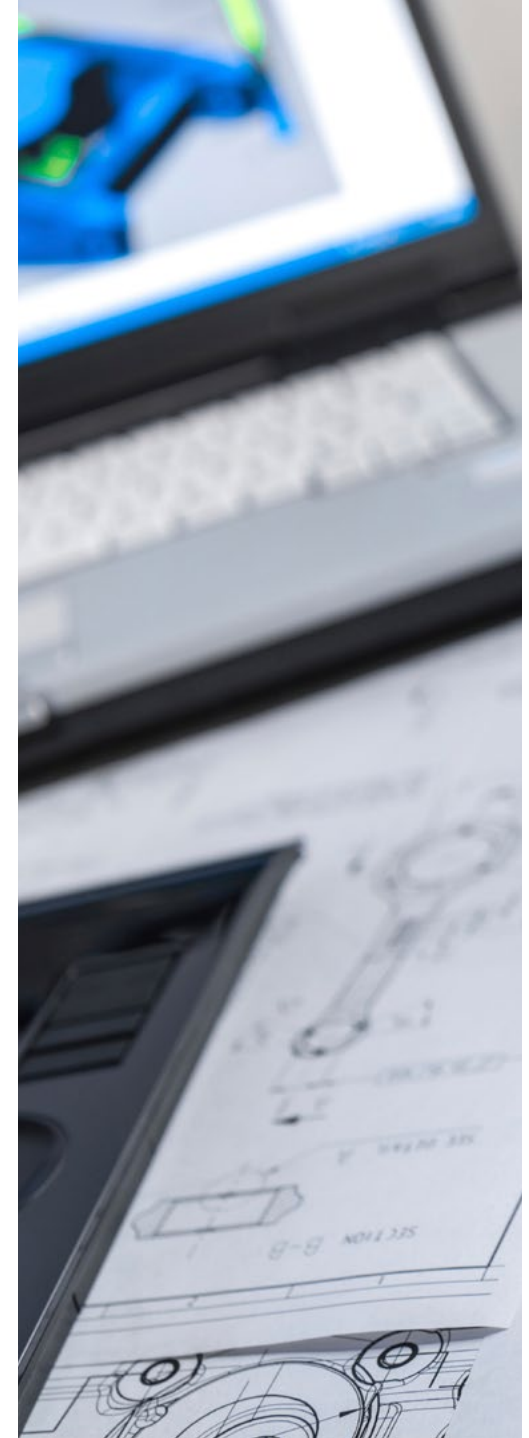
<sup>4</sup>Anderson, Potocnik, & Zhou, 2014, p. 1298

# OPEN INNOVATION

**is a model in which collaboration with contributors outside the company and an external exchange of ideas and knowledge is encouraged and valued. This differs from traditional concepts of innovation management, in which companies conduct research and development activities entirely on their own, internally.**

The involvement of contingent workers in research and development projects literally constitutes open innovation in the sense that contingent workers are external to the organization conducting the research and development project—and bring with them their knowledge and experience from past work. When their involvement includes creative work (i.e., beyond performing rote work as directed by the client), contingent technical workers have real opportunity to share and contribute to the collective knowledge.

A recent report<sup>5</sup> by the Industrial Research Institute describes the “Hollywood” model of open innovation in which industrial firms serve a role analogous to the role served by film studios in the production of motion pictures. In this model, an industrial firm manages their research and development portfolio, funding and producing selected projects, but bringing in outside, contingent workers to perform the technical work. In this way, the industrial firm limits their financial risk and only “green lights” projects that are making promising progress and offer good prospects for success.



# WORKFORCE AGILITY

**refers to an organizational ability to quickly modify the size, structure, and assignments of personnel—including regular employees, as well as contingent workers.**

This flexibility and responsiveness is critically important in reshaping or rightsizing a workforce to meet the evolving needs of the organization, as well as in meeting changing workloads resulting from innovation projects as they progress through various phases. Lack of workforce agility results in a static structure that is relatively poor in responding to changing demands and lacks scalability.

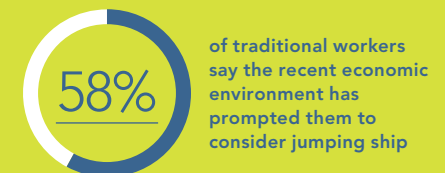
Classic objectives for companies using contingent workers includes improved fixed cost management and the ability to rapidly tailor the size and composition of their workforce to the demands of their project load.

**Talent Supply Chain Management** is a proactive approach to securing and optimizing talent supply and services through all input channels to meet the human capital needs of companies, enabling them to better produce, distribute, and deliver goods and services to meet their strategic objectives.

## New confidence in their prospects

Coming out of the recession, many workers have redefined the very notion of job security. In 2015, 60 percent of free agents said they valued their ability to remain independent rather than be employed directly by traditional organizations, while 42 percent said free agency helped bolster their sense of job security, as they were not tied to an organization's highs and lows.

Equally, many free agents are cherishing their independence as a way to get ahead, and not merely stay afloat. A total of 41 percent agree the improving economic environment has strengthened the demand for work in their areas of expertise, and 79 percent believe free agency to be a viable employment option into the future.



Source: 2015 Kelly® Free Agent Research



## Lower fixed cost structure amid greater demands

The use of contingent workers allows clients to closely manage their fixed overhead and apply a variable cost structure to research and development projects. While contingent engineers, scientists, and technologists are sometimes more costly on a per hour basis, the client purchases only the precise number of hours needed for the assigned project. As the changing phases of a project demand greater or fewer hours worked, the variable cost rises or falls accordingly. In other words, contingent workers tend not to be underutilized.<sup>6</sup>

Increased international competition, as well as the globalization of industry generally, has placed greater demands on modern firms. Companies need to lower their cost structures, particularly their fixed costs, while retaining and improving their responsiveness to market conditions. As Matusik & Hill noted in their landmark 1998 paper, "The increasing use of contingent work represents one way in which firms have responded to these twin demands."<sup>7</sup>

The use of contingent workers allows clients to lower their training costs and their recruitment costs. In addition, "it is efficient to use contingent work for periods of high demand, employing only enough permanent staff to cover periods of low demand."<sup>8</sup> Desouza & Awazu<sup>9</sup> agreed, "The advantage is cost savings ... it is far more economical and expedient to hire someone on a temporary basis."



**31% of U.S. workers are operating as free agents, according to 2015 Kelly Free Agent Research**

<sup>6</sup>Watlington & Radloff, 1997

<sup>7</sup>p. 681

<sup>8</sup>Matusik & Hill, p. 682

<sup>9</sup>2006, p. 18



## Ready access to critical expertise

The use of contingent workers is well matched to projectized research and development organizations. Benefits include "...reduced monthly cash drain and increased flexibility."<sup>10</sup> In addition, the use of contingent workers can allow clients to access specialty expertise that would be too costly to hire as regular, full-time employees—another net cost savings.

Workforce agility enables organizations to make the most efficient use of personnel by readily adding (or removing) workers to meet changes in workload and required skills. This workforce flexibility and responsiveness is one of the keys to lean innovation.

**Lean innovation** espouses the principle of initiating "fewer projects at the same time, but with a larger team on each project" to improve the intensity and tempo of the selected projects. "Reducing development time and increasing staffing is generally a good idea."<sup>11</sup>

**Free agents use technology to access the work they want, from anywhere in the world**



Video conferencing innovations and team communication tools like Slack and 10,000ft, and performance trackers like iDone, facilitates ongoing relationships with employers commissioning the work.



Cloud-computing applications such as Dropbox™ and Microsoft® Office 365™ allow projects to be stored and picked up remotely. The bottom line is that physical location and permanent ties to employers are becoming less important.

Source: 2015 Kelly Free Agent Research

<sup>10</sup>Marion & Friar, 2012, p. 49

<sup>11</sup>Sehested & Sonnenberg, 2011, p. 113-115

## Contingent workers as technical experts

Workforce agility is enabled by contingent workers and is ideally suited to supporting rapidly changing workloads and required mix of skill sets. This, again, helps explain why contingent workers are key to lean innovation practices.

Matusik & Hill noted that many firms use “contingent workers as ‘technical experts’ for important projects” in core development work.<sup>12</sup> Besides serving as supplemental technical workers to carry out the tests, experiments, and other work designed by regular employees, contingent workers are often called upon to contribute as technical consultants and thought leaders to project teams combining regular employees and contingent workers. Contingent “...experts can be added to teams when and where needed” without the burdens of hiring regular employees.<sup>13</sup>

Research and development projects are ideally suited to benefit from the use of contingent workers. Engineering, science, and technology are becoming increasingly specialized and this is a “prime driver for contingent hiring.”<sup>14</sup> A highly trained individual can be brought in to meet a specific technical need and then be released, when no longer needed.

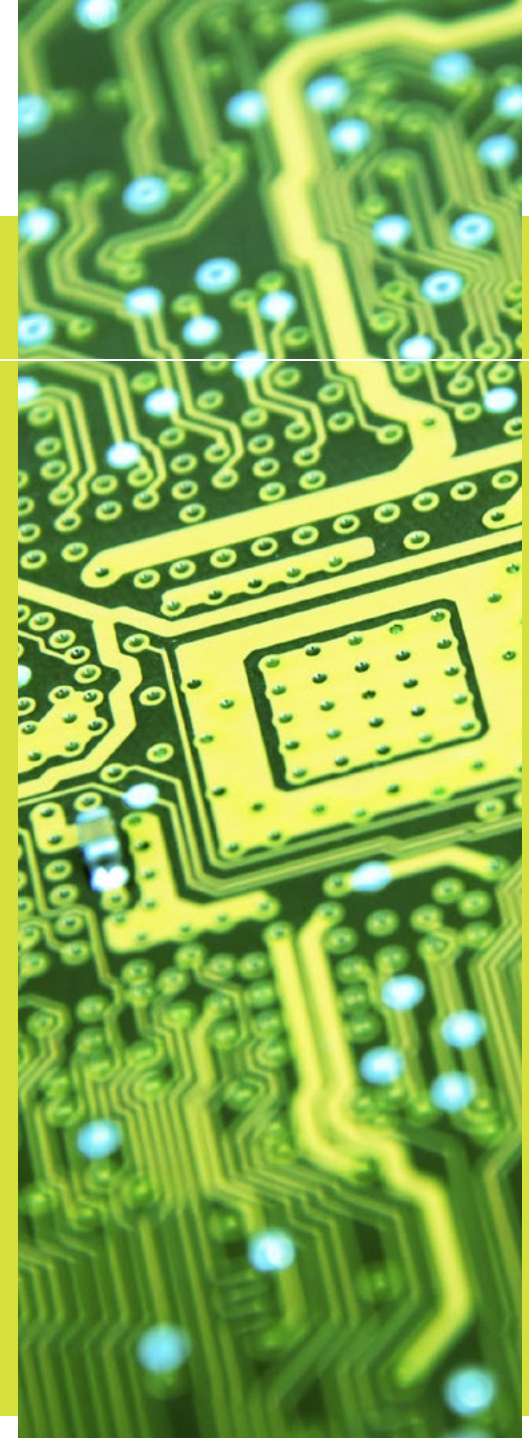
Of course, in order to contribute effectively to innovation projects, contingent workers need to be technically competent on a par with (or beyond) regular employees. Jarmon, Paulson & Rebne found that to be the case in their paper: “Respondent managers generally believed that contractors performed overall at least as well as comparable employees. This high level of perceived overall performance suggests that contractors might be used more often in the future than is presently the case.”<sup>15</sup>

<sup>12</sup>1998, p. 680

<sup>13</sup>Marion & Friar, p. 49

<sup>14</sup>Watlington & Radloff, p. 12

<sup>15</sup>p. 16



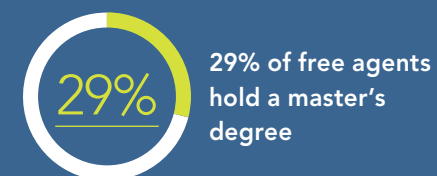
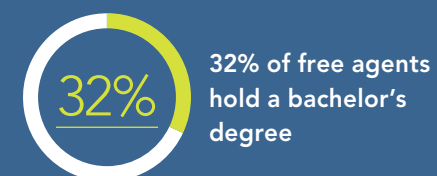


Schultz<sup>16</sup> commented that many companies “realize that technical contingent workers are often among the most talented in their fields.” This supports the potential for these workers to contribute materially to technical research projects and is an indicator of the potential quality and value of their work.

One study noted, “most firms perceive innovation to be the responsibility of a select few employees.” This has evolved to become an obsolete viewpoint in innovation management strategy, as the researchers observed, “effective management of external alliances and human resources are important if organizations are to maximize their innovative performance.”<sup>17</sup>



### Free agents are professional, technical, and highly educated



Around 69 percent of free agents specialize in a professional or technical skill set. Finance, engineering, IT, education, healthcare, sales, law, and marketing are some of the fields in which free agency is most common.

Source: 2015 Kelly Free Agent Research

<sup>16</sup>2000, p. 103

<sup>17</sup>Storey, et al, p. 15

## Faster results on innovation projects

A key challenge for companies using external resources (i.e., contingent workers) in research and development is to develop an “absorptive capacity” to internalize and assimilate external knowledge contributed to their projects. So integrating contingent workers into the project team and providing technological means of documenting and recording knowledge (e.g., product life cycle management (PLM) applications or other product development tools) becomes essential.

In the same study, Storey wrote that contingent workers were primarily used by companies to achieve cost reduction and workforce agility, but were also valuable as a “means to access scarce knowledge and as a way to utilize specialist, innovation-enabling contributions.”<sup>18</sup>

Bergstrom<sup>19</sup> concluded that use of contingent workers provide companies “...a way to access highly specialized skills that are needed for only a short period of time, such as engineering skills that are needed only for a single project.” Engaging skilled contingent workers enables client companies to achieve faster results in innovation projects, especially in areas where companies lack internal expertise—by importing the talents they do not possess.<sup>20</sup>

Desouza and Awazu<sup>21</sup> added that by using contingent workers, a company “...receives knowledge that has been applied in multiple environments and by subject matter experts...” while the company “...does not have to invest in resources needed to create the knowledge; they only pay a fee to access and use such knowledge.”



<sup>18</sup>p. 15

<sup>19</sup>2001, p. 375

<sup>20</sup>Farris & Cordero, 2002

<sup>21</sup>2006, p. 18

## Potential risks to innovation

The need for organizations to consider, pursue, and accept knowledge and information from outside the company was validated and reemphasized by Francois, Favre, & Negassi, who noted the amount of “information needed is constantly increasing because of constant technological progress.” This makes it “indispensable” to acquire knowledge from outside the organization, in order to access technical abilities that serve to improve the technological capabilities of the firm.<sup>22</sup>

Nesheim found, in his study, that companies which utilize contingent workers in “core value-creation areas” (i.e., research and development) deliberately do so “to access knowledge, bring in new ideas and create an innovation-stimulation competence mix with the firm’s employees.”<sup>23</sup> This finding contradicted conventional wisdom at the time, which held that the use of contingent workers benefited the organization primarily by offering a supplemental, flexible, auxiliary technical workforce, which could accommodate increases in research and development workflow, expanding capacity.

However, Nesheim’s findings are thoroughly supported by a 2010 paper, which documents the extent to which organizations seek to benefit from the prior inventions and technological knowledge of new workers hired in research and development roles.<sup>24</sup>

Nesheim also identified potential risks and adverse effects of employing only internal, regular employees in research and development projects: “possible reduction in sources of innovation, higher organizational inertia and risks of obsolescence in the organization’s competence.”<sup>25</sup>

<sup>22</sup>p. 249

<sup>23</sup>p. 528

<sup>24</sup>Singh & Agrawal

<sup>25</sup>2003, p. 531



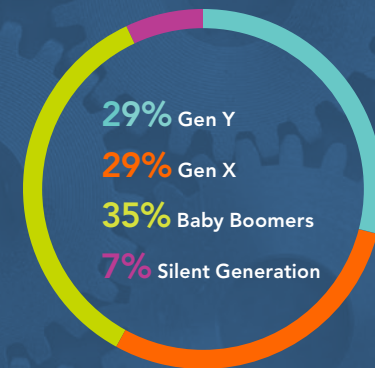
## A variety of perspectives

Collaboration with other researchers (i.e., from outside the organization) improves creativity and serves to minimize uncertainty in the innovation process. However, the “not invented here” syndrome, in which research and development staff who are direct employees of the organization discount or ignore superior external technology or knowledge is a potential threat to effective collaboration.<sup>26</sup>

Adding new workers to projects increases knowledge levels within the company “...not (only) because of the expertise of these new workers, but rather because of the increased variety of perspectives they introduce to the organization.”<sup>27</sup> Mobile inventors (i.e., those who move frequently from company to company, such as contingent workers) tend to generate fewer patents, though they can be more productive by other measures. For example, they are instrumental in collaborating to share technical knowledge and proposing alternative solutions to technical problems.<sup>28</sup>

**Not invented here (NIH)** is a stance adopted by social, corporate, or institutional cultures that avoid using or buying already existing products, research, standards, or knowledge because of their external origins and costs.

### Free agents, across generations



Employers may be surprised to learn that free agency is split relatively evenly between most generations in the workforce. A free agent today could be a Gen X parent juggling work and family, or a mature worker seeking to ease out of corporate life on their own terms. As sources of talent, these groups are as important as the young freelancer working on a laptop in a café.

Source: 2015 Kelly Free Agent Research

<sup>26</sup>Fleming, 2007

<sup>27</sup>Ton and Huckman, 2008, p. 57

<sup>28</sup>Fallah, Choudhury & Daim, 2012



## Practical collaboration

*"Few have questioned the soundness" of collaboration. More researchers "concentrated on generating new ideas or on solving problems would seem to offer a greater likelihood of success."*<sup>29</sup>

While traditional innovation management models have been the convention for decades; modern research and development leaders recognize "it is more cost effective and practical to collaborate rather than to rely entirely on in-house research and development."<sup>30</sup>

Assignment of potential patent rights or other intellectual property by a contingent worker to the client organization is considered an advisable standard practice when engaging a worker for innovation projects.<sup>31</sup> However, some writers suggest that rigid assignment requirements might drive away the most talented researchers and that client organizations may be better advised to negotiate somewhat more liberally in order to attract highly desirable workers to participate in research and development efforts.<sup>32</sup>



86% of manufacturers surveyed report some level of collaborative culture within their organizations<sup>29</sup>



35% report a culture that is highly collaborative<sup>29</sup>

<sup>29</sup>Brousell, 2014, p. 1

<sup>30</sup>CREATE, 2014, p. 1

<sup>31</sup>Rockman, 2004

<sup>32</sup>Lobel, 2014

## Contingent workers contribute to industrial innovation by two primary means:

**1**

By lowering fixed cost structures and providing a flexible, responsive, scalable source of technically competent workers, contingent

workers enable more resources to be deployed against fewer projects (which supports lean innovation) or, alternatively, permits further investment in a greater number of research and development projects.

**2**

By providing a means to access highly skilled technical specialists who may contribute expertise necessary for a particular project or a

phase of a project, as well as by sharing technical knowledge and perspective from outside the client organization, contingent workers directly contribute to the collective knowledge of the innovation team.

Multiple references confirm that contingent technical workers can be very highly skilled and talented professionals who are able to contribute significantly to client projects and work teams.

The fastest growing segment of contingent technical workers are in engineering, science, and technology fields, indicating that their engagement is increasingly popular with industrial client organizations who recognize the benefits described in this paper.



The “Hollywood” model of innovation, described by the Industrial Research Institute as a future state, suggests that the use of contingent workers will become increasingly prevalent as research and development management professionals continue to adopt open innovation practices and seek expertise and talent beyond the walls of the organization.

<sup>28</sup>Brousell, 2014, p. 1

<sup>29</sup>CREATE, 2014, p. 1

<sup>31</sup>Rockman, 2004

<sup>32</sup>Lobel, 2014

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Employers need to include free agents in their workforce strategy, or risk missing out on a key source of talent. Below are some tips to get started:

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### Take stock of the existing workforce

- Identify the amount of money your organization already spends on free agents. Consider the departments that are best placed to offer project work, and which could be restructured to benefit from this talent channel.
- Introduce an agile employment model that blends traditional and free agent talent. This offers the advantage of organizational scalability. Staff numbers can be ramped up with free agent talent when business demand is high, and reduced to an in-house core of permanent employees during periods of relative downtime.

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### Embrace virtual teams

- The ability to mobilize virtual clusters of talent from around the globe is more important than having established hierarchies working side-by-side.
- Take advantage of online talent communities for specific projects (see the examples listed earlier). These are predicted to become a \$50 billion global industry by 2020, and are already the go-to destination for many younger free agents. Virtual workspaces offer the additional benefit of cost efficiencies and a greater diversity of perspectives, provided that management challenges can be addressed.

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### Define workforce priorities

- In optimizing the mix of traditional and free agent talent, rank the variables that are important to workforce strategy. These could include having a versatile mix of skills within the organization, respecting corporate knowledge, and embracing new ideas.
- The merits of hiring free agents versus traditional workers should then be assessed against each measure listed. It bears remembering when balking at hiring free agents because of perceived risk—sometimes the greatest risk to an organization is the talent being missed out on.

- Anderson, N., Potocnik, K., & Zhou, J. (2014). Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework [Electronic version]. *Journal of Management*, 40(5), 1297-1333. doi: 10.1177/0149206314527128
- Bergstrom, O. (2001). Externalization of employees thinking about going somewhere else [Electronic version]. *International Journal of Human Resource Management*, 12, 373-388. doi:10.1080/09585190010026194
- Brousell, D. (2014, September 9). *Collaboration: Many firms are playing catch-up*. Retrieved on November 5, 2014 from <http://www.gilcommunity.com/blog/collaboration-many-firms-are-playing-catch/>
- Center for Responsible Enterprise and Trade (2014). *Trend Alert: Open Innovation – and Protecting IP – for Effective Collaboration*. Retrieved on November 5, 2014 from <https://create.org/resource/open-innovation-protecting-ip-effective-collaboration/>
- DeSouza, K., & Awazu, Y. (2006, August-September). Managing contingent knowledge workers [Electronic version]. *Engineering Management*, 18-19.
- Djibo, I., Desiderio, K., & Price, N. (2010). Examining the role of perceived leader behavior on temporary employees' organizational commitment and citizenship behavior [Electronic version]. *Human Resource Development Quarterly*, 21(4), 321-341. doi: 10.1002/hrdq.20049
- Fallah, M. H., Choudhury, P., & Daim, T. U. (2012). Does movement of inventors between companies affect their productivity? [Electronic version]. *Technology in Society*, 34, 196-206. doi: 10.1016/j.techsoc.2012.04.003
- Farris, G. F., & Cordero, R. (2002, November-December). Leading your scientists and engineers 2002 [Electronic version]. *Research-Technology Management*, 13-25.
- Fleming, L. (2007, Fall). Breakthroughs and the "long tail" of innovation [Electronic version]. *MIT Sloan Management Review*. Retrieved on November 6, 2014 from <http://sloanreview.mit.edu/article/breakthroughs-and-the-long-tail-of-innovation/>
- Francois, J. P., Favre, F., & Negassi, S. (2002). Competence and organization: Two drivers of innovation [Electronic version]. *Economics of Innovation and New Technology*, 11(3), 249-270. doi: 10.1080/10438590290018578
- Industrial Research Institute (2013). *IRI2038 phase 3 scenario report*. Retrieved November 23, 2014 from [http://www.iriweb.org/iridocs/IRI2038\\_Scenario\\_Report\\_Final.pdf](http://www.iriweb.org/iridocs/IRI2038_Scenario_Report_Final.pdf)
- Jarmon, R., Paulson, A. S., & Rebne, D. (1998). Contractor performance: How good are contingent workers at the professional level? [Electronic version]. *IEEE Transactions on Engineering Management*, 45(1), 11-19.
- Lobel, O. (2014, January 22). Why noncompetes may give you the least desirable employees [Electronic version]. *Wall Street Journal*. Retrieved October 22, 2014 from <http://blogs.wsj.com/accelerators/2014/01/22/orly-lobel-why-non-competes-may-give-you-the-least-desirable-employees/>
- Marion, T. J. & Friar, J. H. (2012). Managing global outsourcing to enhance lean innovation [Electronic version]. *Research-Technology Management*, 55(5), 44-50. doi:10.5437/08956308X5505053
- Matusik, S. F., & Hill, C. W. (1998). The utilization of contingent work knowledge creation, and competitive advantage [Electronic version]. *Academy of Management Review*, 23(4), 680-697.
- Nesheim, T. (2003). Using external work arrangements in core value creation areas [Electronic version]. *European Management Journal*, 21(4), 528-537.
- Rockman, H. B. (2004). *Intellectual property law for engineers and scientists*. Hoboken, NJ: Wiley.
- Sehested, C. & Sonnenberg, H. (2011). *Lean innovation: A fast path from knowledge to value*. Heidelberg: Springer.
- Schultz, A. E. (2000). Managing independent contractors [Electronic version]. *Chemical Engineering*, 107(1), 103-104.
- Singh, J. & Agrawal, A. (2010, April). *Recruiting for Ideas: How Firms Exploit the Prior Inventions of New Hires* [Electronic version]. Cambridge, MA: National Bureau of Economic Research.
- Storey, J., Quintas, P., Taylor, P., & Fowle, W. (2002). Flexible employment contracts and their implications for product and process innovation [Electronic version]. *International Journal of Human Resource Management*, 13(1), 1-18. doi:10.1080/09585190110092758
- Ton, Z., & Huckman, R. S. (2008). Managing the impact of employee turnover on performance: The role of process conformance [Electronic version]. *Organization Science*, 19, 56-68. doi:10.1287/orsc.1070.0294
- Watlington, A. G., & Radeloff, R. L. (1997). *Contract Engineering*. New York: McGraw-Hill.



**JOSEPH W. LAMPINEN****Senior Director, Engineering, Global BPO Center of Excellence**

Joe is a leading engineering workforce strategist and solutionist, engaged with industrial clients to solve problems in engineering outsourcing and recruitment, shaping strategic guidance to improve organizational abilities to meet current and anticipated engineering workforce demands. He holds a Master of Science degree in technology from Purdue University, as well as a graduate certificate in engineering law and management from the University of Illinois at Chicago, and an interdisciplinary bachelor's degree in technology and operations from Western Illinois University. Joe is credentialed as a Certified Manufacturing Engineer, Project Management Professional and is a Leadership in Energy and Environmental Design Accredited Professional. He joined Kelly in 1998 and has worked in the engineering practice throughout his career in operational and strategic leadership roles. Joe frequently speaks and presents at industry and professional conferences and is an active member of a number of engineering professional societies and associations.

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