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Value of Open Microcredentials to Earners and Issuers: A Case Study of National Instruments Open Badges

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Abstract

While microcredentials and open digital badges have become increasingly popular in education, more research is needed to better understand their implementation and benefits to both issuers and users. In this paper, we use a case study approach to report and discuss the outcomes from the implementation of an open badges program at National Instruments, highlighting the effects this program has had on both National Instruments and its users. As the program evolves to better meet the needs of its stakeholders, we find that both participants (badge earners) and the issuer (National Instruments) see potential value in the National Instruments Badging Program. The value for both seems to stem from the way in which the program enables the sharing of badges, which helps the earner establish their skills/reputation while also increasing awareness of the program for National Instruments. This study adds to our understanding of why an organization may find value in offering open microcredentials as an alternative to traditional professional development and certificates for their customers and employees.

Keywords: open badges, microcredentials, credentials, professional development, microlearning

Introduction

With the ever-changing professional landscape and the gap between skills of college graduates and skills required by employers (Jaschik, 2015), opportunities for extended and enhanced learning are needed. Many colleges and universities offer exceptional programs and other learning opportunities specifically designed to meet the needs of the modern workforce; however, they are not available to all learners (Osam, Bergman, & Cumberland, 2017). Implementation of open badges and open microcredentials has been proposed as a solution to both the skills gap of recent graduates and the need for continued lifelong learning opportunities (Casilli & Hickey, 2016). Though early in its development, use of this technology is increasing; thus more research is needed to explore its use and value, along with detailed examples of organizations using it effectively.

Some forms of formal education, including many traditional colleges and universities, by their nature limit who has access to the education they provide. Osam, Bergman, and Cumberland (2017) identify three categories of barriers to formal education: situational, such as “finances, family life, health, work conflict, and transportation;” institutional, which includes “the availability of faculty, lack of night, weekend, and online courses . . . as well as difficulty in dealing with admissions and advising staff;” and dispositional, which includes “fear of failure [and] attitude toward intellectual activity, as well as perceptions about ability to succeed” (p. 55). Many university admissions procedures, by choice or by necessity, filter applicants through a process that excludes many from entering as students, especially the disadvantaged (Bastedo, Bowman, Glasener, & Kelly, 2018). Even those who are admitted must still deal with cost, time commitment (including class schedule), transportation, and their own fears, all factors which can prove challenging to many.

Open Digital Badges

Modern technologies and the distributive power of the Internet may provide solutions to some of the aforementioned higher education challenges. One example is the potential of open microcredentials, such as open badges. In 2012 Mozilla introduced the concept of open badges as a way to recognize and communicate various types of learning experiences (Mozilla Foundation, Peer 2 Peer University, & MacArthur Foundation, 2012). While the initial focus was to provide a way to credential informal learning, the concept has been adapted for use in primary, secondary, and higher education as well as in corporate training programs by small and large companies such as Microsoft (n.d.) and IBM (n.d.).

Open badges go beyond simple certification by embedding metadata about what the badge holder knows or can do. When they comply with the Open Badges Specification maintained by IMS Global Learning Consortium (IMS Global Learning Consortium, n.d.), they are portable and shareable across the Web. Utilizing this open standard, these badges can represent skills and knowledge gained from open platforms and informal learning experiences, providing details about potential employees such as which specific verified skills the individual has mastered, when and how the skills were attained, and who issued the badge—information that may interest hiring committees, employers, peers, or other entities (Lockley, Derryberry, & West, 2016).

Open badges are valuable because of the included metadata, which typically include the badge name, description, criteria, issuer, evidence, date issued, standards, and tags (Bowen, n.d.). This metadata connects evidence and criteria to the credential, better communicating what the learner accomplished. The recent Open Badge Infrastructure 2.0 specification additionally allows for endorsements of the badge from outside entities (Clements, West, & Hunsaker, in press). Those who share badges they have earned, provide access for others to see each of these pieces, providing a wealth of information beyond what current educational credentials communicate.

While open badges are a relatively new concept, they have received confirming attention over the past five years—a simple search in Google Scholar for “open badges” has returned over 1,700 results since 2014. In reviewing the literature, we found that much of the initial discussion has focused on how to set up a badge program, with details about the issuing platform and program design, along with guiding principles for designing the specific badges (Devedžić & Jovanović, 2015; Rodgers & Puterbaugh, 2017).

Other research has focused on the use of badges in secondary or postsecondary education environments. These papers have explored the impact of badges on motivating learners (Abramovich, Schunn, & Higashi, 2013; Cheng, Watson, & Newby, 2018), credentialing skills (Randall, Harrison, & West, 2013), and serving as pedagogical tools (Cheng et al., 2018). Fewer studies have focused on how badge earners or potential employers perceive badges (Dyjur & Lindstrom, 2017; Erickson, 2015). Casilli and Hickey (2016) noted that “the preexisting trust networks that operate between and among educational institutions, employers, and education consumers are not typically, nor even frequently, tested, investigated, or held accountable” (p. 118).

The research is even more scarce regarding open badges, which have the potential to extend and revise these traditional trust networks. Liyanagunawardena, Scalzavara, and Williams (2017), in their extensive synthesis on the literature about open badges, identified only three articles about employer perspectives. Recently, in a study examining the opinions of education employers, it was discovered that upon learning about education badges, education employers felt that such badges could be valuable pieces in an application (Randall & West, in press). Another study (Raish & Rimland, 2016), found in a nationwide survey of employers in the United States, that only 5% would not be interested in open badges. However, the concept is still largely unknown with employers, as Raish and Rimland (2016) also found that 62% of the respondents wanted to learn more about open badges.

Open badges are also being used outside of formal education environments, including by corporations such as IBM and Microsoft. More than 1,700 badges are listed on the IBM Skills Gateway site (IBM, n.d.). However, in the academic and non-academic literature, the benefit to the badge issuer is not always directly discussed. In one post David Leaser (2015), the senior manager for IBM’s Global Skills Initiative, explained that issuing badges helps the issuer “attract, nurture, and progress a pool of talent and it helps establish the brand as a leader in the field” (para. 9). This seems to agree with a statement by Finkelstein, Knight, and Manning in The American Institutes for Research 2013 report:

The issuer of a traditional form of achievement benefits from the act of bestowing an honor on those who meet the criteria or thresholds the issuer has set. Recipients of degrees or certificates are reflections of the institutions that nurtured and endorsed their abilities. When given in recognition

of skills, behaviors, or contributions that an organization values, credentials are also a way of scaling the issuer's impact on the world. As such, any credential has a marketing component, as well as the potential to take the issuer's mission to scale through individuals it has essentially deputized. (p. 6)

While open badges would be assumed to carry similar benefits of marketing for the issuer, including greater "scale" of impact, there has been little research or discussion exploring the value of badges for both the earners and the issuers. Less than 10% of the total articles in Google Scholar on "open badges" are also related to the search string "workplace learning." Of these, most appear to be about teacher professional development (Gamrat, Zimmerman, Dudek, & Peck, 2014; Randall, West, & Farmer, in press), or theoretical articles about the potential of open badges to impact workplace learning (Aberdour, 2016). More investigation is needed specifically on the benefits that open badges can provide for employers as well as the employees engaged in professional learning. In addition, because open badges are still relatively new, examples of badging programs need to be shared so that effective practices can be disseminated. Thus, this paper seeks to provide a case study of National Instruments, an engineering technology provider, that implemented a large-scale open badges initiative. In discussing this case, we also seek to answer the following questions:

- What benefits might open badges provide to badge earners?
- What benefits might open badges provide issuers?

Method

A case study approach was used to consider the value of badges for National Instruments stakeholders. Founded in 1976, National Instruments (NI) is now a worldwide company with more than 7,000 employees. Their purpose is to help scientists and engineers overcome complex problems through technology solutions aimed at accelerating productivity and innovation. National Instruments produces engineering hardware and software such as automated test equipment and virtual instrumentation software. The company provides training for users of their products. They began issuing badges through the Acclaim platform (referred to in this article by its new name, Credly).

Context and Badging Program

To understand the NI badging program data requires an understanding of the evolution of this program over two phases: A pilot program in 2017 and subsequent expansion in May 2018.





Initial 2017 badging pilot. National Instruments' pilot program in 2017 included seven badges, covering fundamental engineering knowledge and skills related to the use of their products. Users participating in the program could view training videos tied to badges or use a number of other learning resources to prepare for the required assessment. They also had the option of taking the assessment without viewing those videos. Users who passed an assessment with 85% or higher (down from the original 100% requirement) were invited to create an account with Credly in order to claim their badge. Users who failed

an assessment could retake it as many times as needed. These assessments were offered to current National Instruments customers at no cost, as were the badges for passing scores.

Table 1 includes the seven badges provided by National Instruments, along with their digital image and the description provided on the National Instruments website and Credly page.

Table 1

Seven Badges Included in National Instruments Badge Pilot Program

Title	Image	Description
LabView Discovery		LabVIEW Discovery badge holders demonstrate a basic understanding of the LabVIEW environment. This badge holder can develop applications that acquire, analyze, and visualize data, execute repeatedly, and correctly handle errors. This badge is no longer issued by National Instruments and has been archived.
Programming NI-DAQmx		This badge indicates that an individual understands the functions used to program data acquisition devices and the benefits of different options. Holders of this badge can use the NI-DAQmx driver to measure, generate, and synchronize data acquisition tasks. They can program finite or continuous acquisitions and implement best practices for hardware or software timing, triggering, and logging. This badge is earned by passing the related assessment.
Sensors and Signals		Sensors and Signals badge holders understand the different types of signals and the sensors used to measure them. This badge holder can select the appropriate sensor for signals such as strain, vibration, and position, as well as having a foundational knowledge of sensor configuration and connectivity to data acquisition hardware. This badge is earned by passing the related assessment.
Measurement Fundamentals		Measurement Fundamentals badge holders understand the basic concepts of measurement including measurement accuracy, acquisition rates, and signal conditioning. This badge holder can make basic analog and digital measurements, select the right DAQ hardware based on resolution, range, and sensitivity, and correctly wire the system with proper grounding techniques. This badge is earned by passing the related assessment.

Channel Wire
Communication



The badge holder is able to use channels in LabVIEW to communicate between parallel sections of code without forcing an execution order. This badge is earned by passing the related assessment.

Academic
Instrumentation
Fundamentals



The badge holder can engage in hands-on experiments to better understand filter behavior and transfer functions for active and passive analog filters by simulating and then experimenting with Multisim Live and Analog Discovery 2. The individual develops a working knowledge of fundamental engineering concepts, like filter slope, passband, stopband, and cut-off frequency, through interactive simulation analysis and hands-on measurement verification.

Academic Embedded
System
Fundamentals



The holder of this badge has demonstrated basic understanding for using myRIO with LabVIEW to create an interactive project incorporating myRIO's onboard accelerometer and LEDs. This individual has (a) discovered the power, speed, and determinism of the reconfigurable I/O (RIO) architecture by building an electronic level with myRIO and LabVIEW, (b) formed a basic understanding of how a real-time processor integrated with an FPGA along with some sensors and actuators become an embedded system, and (c) developed a LabVIEW program that converts an accelerometer measurement into a visual representation of the rotation angle using LEDs.

Note. From "Browse Badges," by National Instruments, 2019a (<https://learn.ni.com/badges/resources>), and "National Instruments," by Acclaim, 2019 (<https://www.youracclaim.com/org/national-instruments>). Adapted with permission.

2018 expanding badging program. After initial positive feedback on the pilot program (discussed below), in May, 2018 during their largest user conference titled "NIWeek," National Instruments launched an expansion of their badges project. This expansion included a new badging website (see Figure 1) with an overview of the professional badging system as well as recommended badges for learners. In addition, they now offer 32 Level 1 badges and 11 Level 2 badges, significantly increasing the badge initiative.

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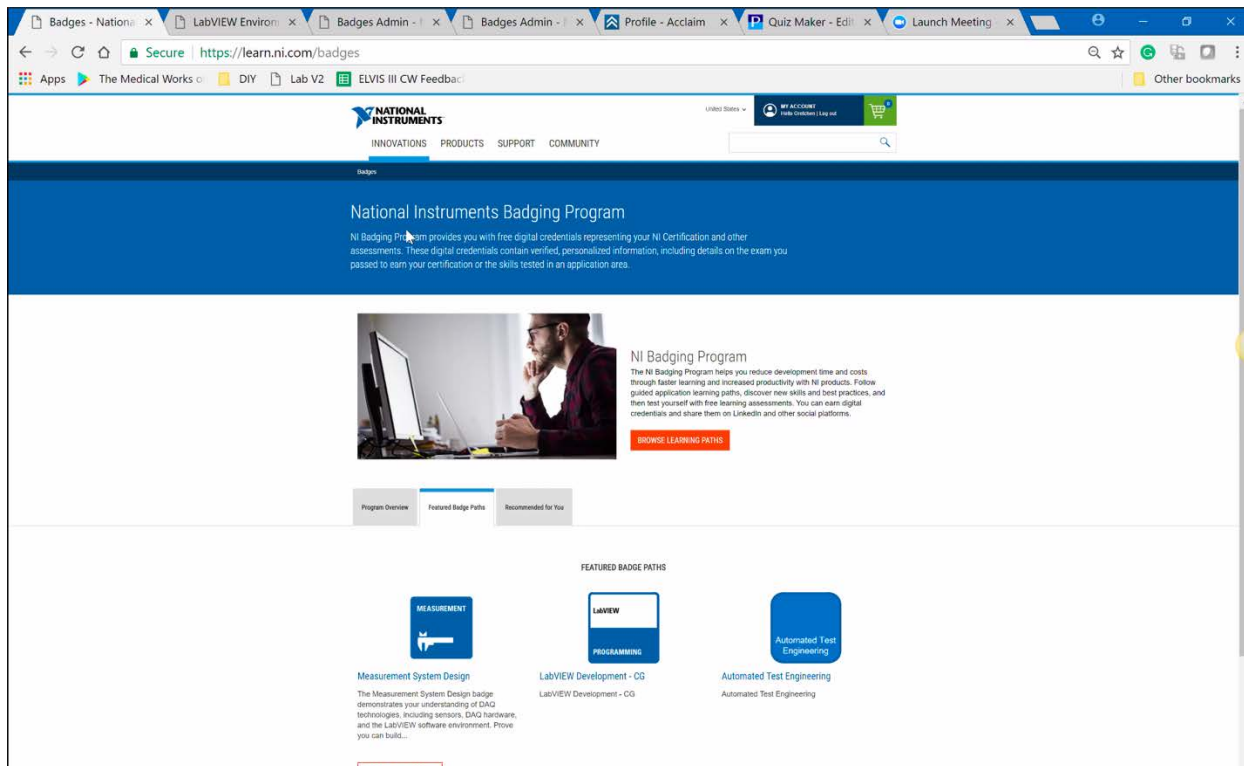


Figure 1. Revised launch of National Instruments badges. From “National Instruments Badge Program,” by National Instruments, 2019b (<https://learn.ni.com/badges>). In the public domain.

A key feature of National Instruments’ expanded badging project is learning paths. Touted on the main page (see Figure 2), these pathways help guide learners towards collecting badges that aggregate to automatically issue larger credentials. Earners’ progress on these pathways is represented by the colored bar to the side of the badge (see Figure 2).

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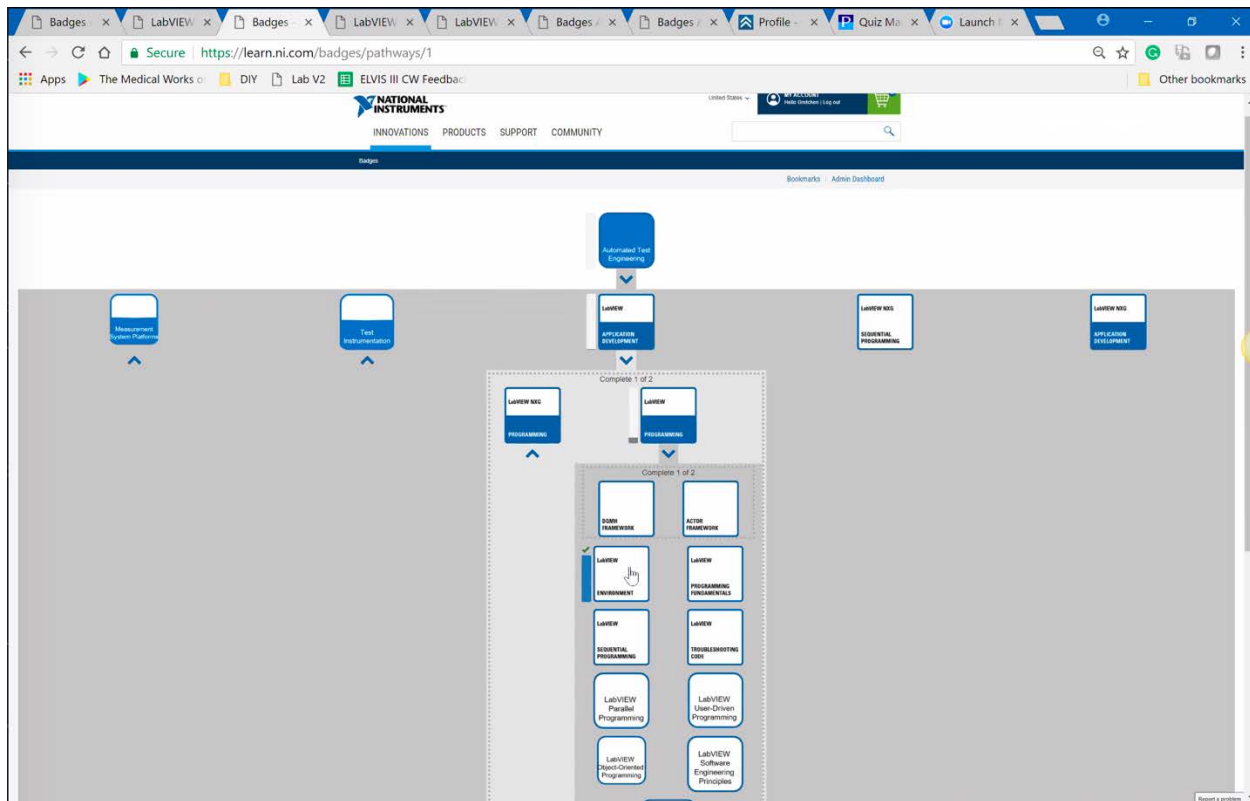


Figure 2. Learning pathways progress in National Instruments badges. From “National Instruments Badge Program,” by National Instruments, 2019b (<https://learn.ni.com/badges>). In the public domain.

Options are provided to search or browse badges (see Figure 3), and assessments are accessed by clicking on a badge. An earner who completes an assessment without training is awarded the credential; for those who are not initially successful, training opportunities can be provided by National Instruments or its partners (see <https://learn.ni.com/badges/resources/857>). Allowing partners to also provide the training enables easy scalability of the National Instruments program into other languages.

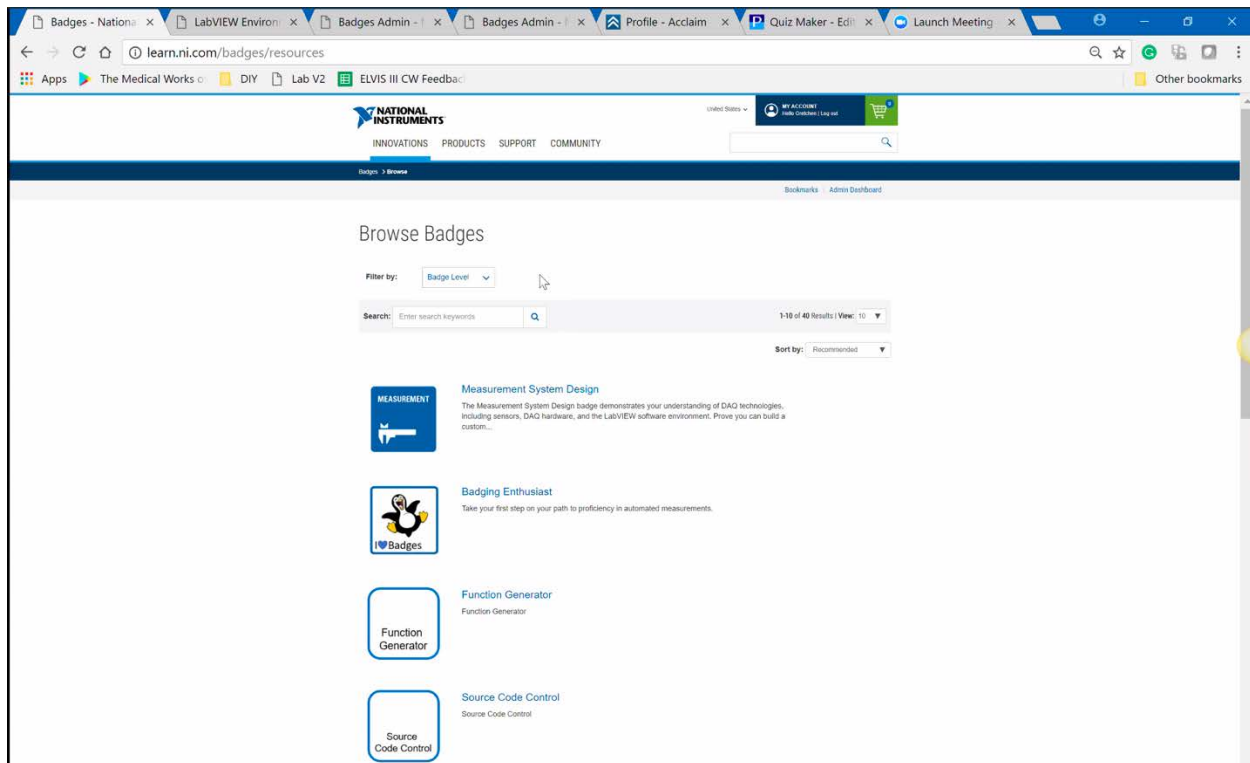


Figure 3. Browse feature for National Instruments badges. From “Browse Badges,” by National Instruments, 2019 (<https://learn.ni.com/badges/resources>). In the public domain.

Survey Instrument

A survey was created to collect evaluation data on this professional learning initiative, in order to provide feedback data to National Instruments. Some of the survey questions asked were not directly related to badge credentials, but instead focused on the training content and participants' perception of the program:

- How well did the learning module material prepare you for the assessment?
- Is it clear where to go to learn the concepts tested in the assessments?
- Thinking about the assessments you attempted or completed, overall how challenging were they?

Still, the findings from these questions helped to provide context for our case study of National Instruments. In addition, several questions were included that were more directly related to the value of badges:

- Did you share your digital credential/badge in any of the following ways?
- How likely are you to recommend the NI Badging Pilot Program to a colleague?
- How likely are you to participate in NI's Badging Program in the future if the topics are relevant to your needs?

- Please select the response that best describes your level of agreement with the following statements about the NI Badging Pilot Program: (a) It helps to advance my engineering skills/knowledge, (b) It helps to advance my proficiency with NI products, (c) It enables me to successfully complete current or future projects.

These were the questions that we analyzed directly to answer our research questions. While the survey was administered to all participating in the National Instruments courses and assessments, the questions about credentials and badges were only sent to those who had actually earned a credential.

Survey Participants

Of those who participated in the new program, 426 were invited to be respondents to a survey in October of 2017, and 796 were invited to respond in October of 2018. Participants were those who participated in the NI assessments/courses and received a credential. Responses were received from 51 participants in 2017 and 122 participants in 2018. This article provides a descriptive analysis of the gathered responses.

Limitations of Survey

Since many of the survey questions focused on the training content, the data were limited. In addition, some of the respondents who were answering questions about the badging program might have focused their answers more so on their experience of the training provided than on their experience of the credentialing method. Thus, a follow-up study would benefit by improving the questions and adding in-person interviews to clarify survey responses and gather additional qualitative data. Additionally, this survey was limited by a 12% response rate, as well as by the reality that the context of professional training for a specific company's engineering products can be fairly specialized and may not generalize to the many other possible uses and contexts for open badges.

While these limitations may limit the generalizability of the results, we believe the case study of the information obtained can still provide valuable insight on the value of badges within a professional learning context.

Findings and Discussion

The insights gained from the 2017 survey are reported before those from the 2018 survey, as they report on different implementations and stages of the program. We focus on results regarding the potential benefits for earners, then consider the potential value for National Instruments. We embed discussion of the findings within each section.

2017 Survey Results

Benefits for earners. The survey results indicated that most of the participants found the NI Badging Pilot Program to be valuable. When the survey responses were grouped according to respondent' likelihood of repeating the program if more content became available, on a scale of 1 (*not at all likely*) to 10 (*extremely likely*), 13 responded with 8; 13 responded with 9; and 14 represented themselves with 10. A total of 40/51 respondents (78%) indicated that they would be likely to participate in NI's badging program

in the future for relevant topics. Of the 33 respondents who had shared an earned badge at least once, several had shared it multiple times, for a total of 61 shares, an average of 1.84 shares per person. This data on badge sharing is one more method for determining how much the user values a badge, as a willingness to publicly share a badge may suggest that the earner assigns value to it.

Additional data on the value of the badges for the participants can be determined by the acceptance rate. In open badging systems, badges are issued to earners, but earners must still accept those badges. This extra step can provide some indication into whether the earners value the badge. With the National Instruments case, data pulled from the Credly system showed that the acceptance rate overall (not just for those surveyed) was 89% and the share rate (the number of badges that earners shared to social media and the Internet) was 51%.

While these findings show that earners did value the badges, these responses do not indicate specifics on which aspects participants value. We further filtered the respondents by asking which of several statements "best describes your primary reason for participating in the NI Badging Pilot Program." We found that 18 of the respondents indicated that their reason for participation was that they "planned to use the badge for professional recognition (e.g., to help with a promotion or job interview, add to my resume/CV)." These 18 respondents accounted for 35 of the 61 total shares for the group. Table 2 shows how these individuals shared their earned badge and compares the number of shares from the total group to the 18 seeking recognition. These findings suggest that one of the primary values of badges is that the credential can be shared easily, enabling the earners to seek additional professional recognition from stakeholders who might otherwise be unaware of the training and skills they have earned.

Table 2

How Participants Shared Their Earned Credential

Method of sharing	Number of shares (all 51 respondents)	Number of shares (18 respondents seeking professional recognition)
Added to social media site (e.g., LinkedIn)	26	14
Added to job site (e.g., Indeed)	1	0
Added to my resume/CV	14	10
Added to my business card	1	1
Informed my employer	10	6
Informed my peers	6	3
Informed my customers	3	1
Did not claim badge/did not share	18	1

In general, the National Instruments badge pilot produced substantial media activity and multiple shares per person. The sharing of badges on online/ professional profiles indicates that the earners valued badges as a way to market their skills to supervisors, peers, and clients.

Benefits for the issuer. As stated previously, much of the presumed value to badge issuers consists of attracting talented people who will eventually help build brand recognition (Leaser, 2015). In addition, sharing of credentials on social media enhances marketing of the brand, which may ultimately lead to further recognition of the company. A follow-up study regarding the effects of badges on brand awareness would be useful.

We can identify a few data points from the survey that seem immediately relevant to answering the question of “in what way is the use of badges valuable to National Instruments?” First, 27 of the 51 participants indicated a high likelihood of recommending the program (as indicated with a response of 8 or above, see Figure 4), supporting a supposition that the program will help National Instruments attract people who may not have heard of their program otherwise. Figure 4 breaks down responses to the question of how likely participants were to recommend the program on a scale of 1-10.

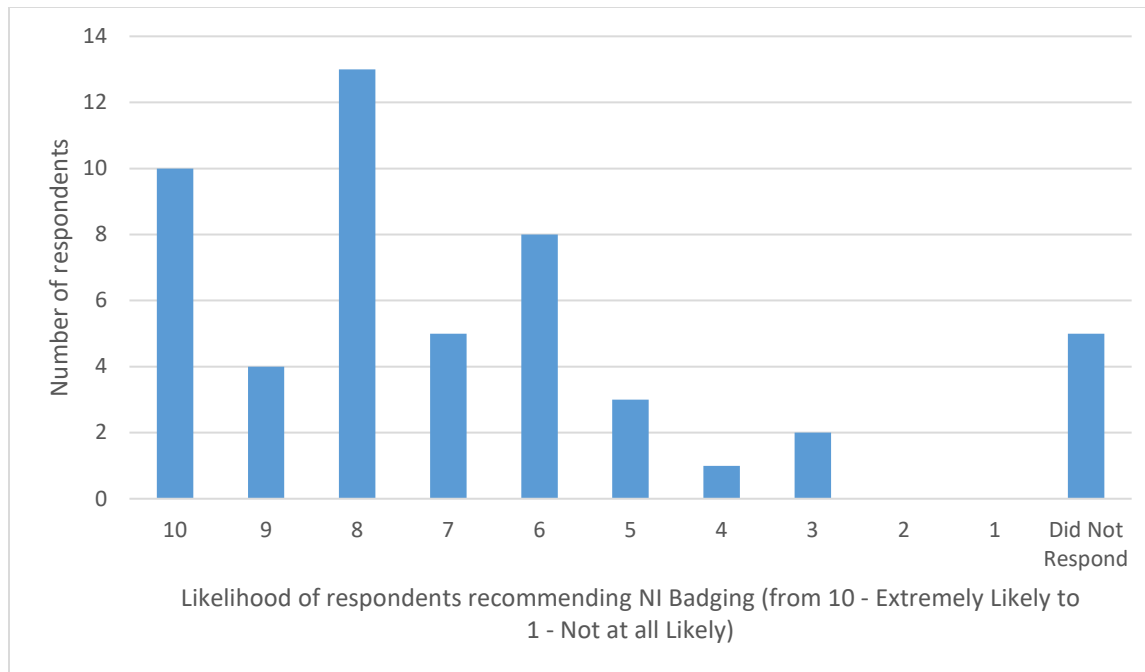


Figure 4. Likelihood of respondents recommending the NI badging pilot program to a colleague.

Second, participants responded to several questions on a 7-point Likert scale. Three of these questions directly related to the idea that the badge program may have the potential to strengthen the skills of talented people. First, participants were asked if the program helps advance their engineering knowledge, and responded with an average of 5.34 (on a 1-7 scale). Second, they were asked if the program advanced their proficiency with NI products, and they responded with an average rating of 5.6. Finally, they were asked if the program enables them to successfully complete current or future projects, and they responded with an average rating of 4.74.

Of these three questions, participants agreed most strongly with the statements that the NI Badge Pilot Program “helps to advance [their] engineering skills/knowledge” and “helps to advance [their] proficiency with NI products.” Though most still agreed, responses were more spread out regarding the statement that they were enabled “to successfully complete current or future projects.” While it might be assumed that the first two—advancing skills and knowledge, and developing proficiency with the company’s products—would contribute to completing projects, it seems that participants were more concerned with their own personal interests in the training. This contributes to the assertion that the program helps strengthen the skills of talented participants rather than providing basic training for unexperienced individuals.

These initial data points provide some support for the assertion that badges do provide value to National Instruments and could also be valuable to other badge issuers. However, as we continued analyzing the data, we noted that 17 participants found the training on the NI website while specifically searching for training materials. This suggests that some participants may have already been interested in improving their skills, and would therefore have participated in the program regardless of whether badges were offered. However, 34 participants did find the training through other means.

We found that 23 respondents participated out of curiosity, perhaps because of the badges themselves since the program was marketed as the NI Badging Pilot Program (<http://www.ni.com/white-paper/53685/en/>). We grouped these 23 along with two participants who indicated that they participated specifically to earn badges and one who indicated doing it for fun. These 26 participants engaged in the training for intrinsic reasons, not directly related to their job. Of these 26 participants, 18 responded with a rating of 8 or higher to the question of whether they would participate again if the topic was of interest to them. This finding suggests that these experiences should be personally meaningful and that perhaps including badge credentials with training could help to capture people's interest, draw them into professional training, and promote their participation in future training as well.

2018 Survey Results

After the initial positive feedback from the 2017 survey, National Instruments expanded the badging program for a relaunch in May 2018. The data below were collected in October 2018, and provide information regarding this second stage of the program.

Benefits for the earners. A high majority of the 122 respondents to the 2018 survey were enthusiastic about the badging program. On a 7-point Likert scale, 83% agreed (scored a 5 or higher on a 7-point scale) that the badging program advanced engineering skills. The respondents in 2018 continued to value sharing their earned badges, finding it easy to accept a badge after completing assessments (82% agreeing that this process was easy). Although in 2017 40% indicated they added their badges to their resumes, in 2018 only 17% said they did this. However, 67% added their badges to a social media site like LinkedIn or Facebook, 26% informed their peers, and 25% informed their employer. Also 47% reported they planned to use the badge for professional recognition of some kind.

Finally, data pulled from the Credly system showed that the acceptance rate (i.e., the percentage of badge earners who accepted the badge issued to them—an indication that they valued it) for the 2018 implementation for all badge earners between May and October was 93% (up from 89% in 2017), and the share rate was 33% (down from 51% in 2017). Two reasons are suggested for the decline in share rate for 2018. First, after the initial success of the badging program in 2017, National Instruments back issued nearly 19,000 professional certification badges to those who had completed the assessments before the badges were available. Possibly these badge earners felt less invested in the badges since they were receiving them so long after completing the assessments. In addition, as NI expanded the badging program to include more badges representing particular learning goals rather than overall certification, earners might be less likely to share badges that did not represent certification. This merits further study, as it may elucidate the kinds of badges earners find most useful.

In conclusion, it seems that participants find the badges valuable and nearly always accept these credentials when earned; they frequently share them, but they are sharing them in newer, more current ways rather than on traditional resumes.

Benefits for the issuer. Besides providing value for the earners, the NI badges seem to be providing benefits to National Instruments; 59% of respondents expressed a strong desire to participate in the badging program in the future (scoring 9 or 10 on a 1-10 scale). Also, 56% agreed (rating 5 or higher on

a 7-point scale) that the program helped them complete projects, and 81% agreed that it advanced their proficiency with NI products. One of the goals of the NI badging program has been to make sure customers are satisfied with NI products by becoming skilled at using them, and this result indicates that the badging program is meeting this goal.

In addition to being more skilled at using NI products, the participants indicated being very likely to promote the NI badging program to others: 40% indicated a likelihood of 9 or 10 on a 10-point scale. Once participating in the badging program, they often engaged in the NI-provided online training: 48% indicated they took or started the NI-provided online training after beginning the badge program.

Conclusion

This paper describes the pilot badging program implemented by National Instruments, demonstrating an innovative approach to supplementing the training they provide to their employees and customers through digital open credentials that can be stacked into learning paths, automated through assessments, and shared widely on social media. A survey of 51 badge recipients of the pilot project demonstrated overall high levels of satisfaction with the badges, indicating respondents valued them enough to share the badges on their social media accounts and to anticipate engaging in future National Instruments training.

These responses supported the expectation that the badges would provide benefits for both the badge earners and National Instruments as an organization. Earners appreciated being able to quickly share the credential, which provides professional recognition useful in seeking new jobs, requesting a raise/promotion, or impressing potential clients. For National Instruments, issuing badges showed potential to increase brand awareness, as earners were inclined to share their credentials and advise others to participate.

However, this was a pilot project, with a small sample, and some of the survey questions would require more detailed follow-up through interviews with respondents in order to verify some of the assumptions mentioned. National Instruments is expanding their project to include grouping badges into customized and automated learning paths, and they will collect more information on this expansion of the pilot to further test the value to the organization and to their employees/customers.

While the information in this study has been useful in guiding the development of the NI badging program, and we believe it has some generalizable usefulness as well, further research could be done. In particular, further study might focus on why some earners share their received badges and whether their propensity to do so is influenced by their positions at their companies, their own personal needs and goals, and the types of credentials they have been awarded. For example, we suspect that earners may be more likely to share overall credentials than smaller, more focused learning badges that are part of their professional development pathway. It might also be useful to study how the success of the badging program affects earners using additional NI products and services and how it affects brand awareness of the company on social media. For the earners, it would be important to better understand qualitative aspects of the value they get from earning the badges, including effects on their sense of professional identity and self-efficacy.

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