FirstBuild
Providing an Environment for Working Learners of All Ages

MODEL SUMMARY
FirstBuild engages working learners of all ages in the development, technology, production and sale of next-generation appliances. The FirstBuild micro-factory in Kentucky provides University of Louisville students an opportunity to connect classroom learning and production skills. The facility also provides a community space for innovators of all ages where they can access the expertise and support needed for their custom projects.

BACKGROUND
FirstBuild was developed by GE Appliances and Local Motors as an online, micro-manufacturing community designed to inspire innovators of all ages to solve some of the toughest design and engineering challenges facing the appliance industry. To participate, community members must first submit their ideas to the FirstBuild website. Participants then identify market needs and vote to determine which of the submitted ideas should be pursued as projects and, ultimately, which products should move on to the micro-production stage. Products selected for production are designed and built within FirstBuild's micro-factory in Louisville, KY. This facility, officially opened in July 2014, enables innovators of all ages to participate and watch the appliance production process unfold. FirstBuild also holds open community hours that provide makers of all ages in the Louisville community access to the tools and resources needed to support their next big design.

PARTNERSHIP
FirstBuild's key partners are GE Appliances, Local Motors, the University of Louisville Department of Engineering, local secondary schools and residents in the Louisville community.

NUTS AND BOLTS
FirstBuild includes:

- An open community for makers of all ages;
- Collaboration space with University of Louisville engineering student clubs;
- Online innovator collaboration space;
- Engineering capstone projects for University of Louisville engineering seniors;
- Internship opportunities for college students; and
- Activities for young students related to science, technology, engineering and math (STEM).

The innovators can access the Louisville facility on weekdays from 9 a.m. to 9 p.m. During these times, innovators have access to tools and project support from FirstBuild engineers and student workers to help them bring their product to market. The facility provides the advanced technology tools necessary to move from design
FirstBuild also helps innovators sell and market their appliance products through the FirstBuild website and by facilitating opportunities to bring products to store shelves. FirstBuild also creates a direct link between manufacturing operations and the University of Louisville’s Department of Engineering curriculum. FirstBuild is conveniently located across the street from the university’s campus, making it easy for students to both attend class and apply their learning in a real manufacturing operation environment. Incoming students to the engineering program are immediately exposed to FirstBuild as part of their freshman project. Through this experience, students learn to design and build a product with the support of the FirstBuild engineers. Located adjacent to the FirstBuild facility is the University of Louisville engineering garage, which is used by the engineering clubs to design products for competitions and class assignments. Students also have access to the FirstBuild open community space, including advanced tools and support from senior engineers.

In alignment with the program’s vision to provide opportunities for hands-on learning, the FirstBuild team decided to initiate a college internship program with the University of Louisville. Students from the university completed their senior capstone projects at FirstBuild’s facility in 2015 and participated in the initial FirstBuild internship class, which required the participants to build an easy-load double oven with a sliding drawer. The oven concept, originally submitted by a FirstBuild community member, received the votes necessary to move into the design phase and by spring 2015 was ready for production. The FirstBuild team interviewed engineering students at the facility and selected five students based on their manufacturing skills and competencies. During the summer of 2015, the selected students were tasked with building 200 ovens for market distribution.

Key elements of the internship include:

- **Management of Production Line and Processes:** Working as a team, interns applied skills learned in the classroom to produce the ovens, including tool and die, Toyota’s “5S system,” line audit and quality processes, how to control fit and finish, batch build and batch assembly, plant performance tracking, and manufacturing ramp-up curves. From Monday through Wednesday, interns produced the oven parts and on Thursday and Friday assembled and packaged them. Each week, the interns reviewed the plant’s performance with the production supervisor and brainstormed ways to make production more efficient.

- **Interpersonal and Intrapersonal Skills:** Interns learned important teamwork, problem-solving and communication skills that are necessary to run a production facility. If an intern needed assistance with the finish of a part, other interns routinely pitched in to help solve the problem.

- **Mentorship:** Interns worked closely with their production supervisor and senior engineers at the facility, who served as mentors by assisting students in problem-solving and process improvement.

### PROGRAM BENEFITS, RESULTS AND OUTCOMES

The FirstBuild community benefits innovators of all ages within the Louisville area, as well as those community members who engage through the FirstBuild website. FirstBuild student benefits and outcomes include:

- **In-Demand Technical Skills:** While working, students learn how to operate machinery, manage a production line and troubleshoot in-line problems.

For example, an intern from the 2015 summer class gained the skills necessary to bend parts on a large press break machine on her own.

- **Paid Internships and Jobs:** Interns and student workers are paid from $12 to $17 per hour and develop the skills to handle the responsibilities associated with a full-time job.
Access to Mentors: Students develop relationships with FirstBuild supervisors and engineers, who teach them critical skills and provide professional development.

Career Awareness and Exploration: Students learn how to design, develop, produce and market a product. Through FirstBuild, students are exposed to career paths in areas of manufacturing they might not have otherwise considered.

Intern Performance Reviews: Managers provide interns a formal performance review at the conclusion of the internship, which gives feedback similar to that of a job review.

Strong Participation: 100 percent on-time attendance was reported for the initiating 2015 summer internship class.

Maker/innovator community benefits and outcomes include:

Support in Bringing Ideas to Market: FirstBuild helps makers bring new ideas to market while also providing them royalties.

Free Access to Tools: The FirstBuild facility provides access to the tools necessary for the design and development of new products and innovations.

SUSTAINABILITY AND OVERCOMING IMPLEMENTATION CHALLENGES

The FirstBuild team continues to expand its relationship with local educational institutions. The summer 2015 internship was a success, and the FirstBuild team plans on running future internships. Currently, the FirstBuild micro-factory team is considering shifting factory hours to 12 p.m. to 7 p.m. so University of Louisville students are able to further support the production process. By shifting the hours, FirstBuild will be able to further its ultimate goal of teaching students the skills and knowledge necessary to succeed in their professional careers while inspiring them to be lifelong innovators.

WORDS OF WISDOM

The FirstBuild team urges people who want to set up similar programs to engage with local educational institutions and provide students hands-on learning opportunities that connect education with the workplace. This is especially critical in industries like manufacturing, which has a shortage of workers with the skills necessary to operate the advanced machinery in today’s plants.

“You cannot hammer a nail over the internet. Learning ‘with your hands’ builds a strong foundation for future learning to stack upon.”

— Randy Reeves, Operations Manager, FirstBuild

Community of Makers: Through the FirstBuild community, innovators have the chance to share ideas and network.

GE Appliances and Local Motors benefits and outcomes include:

Ability To Bring Product to Market Faster.

Support for the Community Through a Maker Space: At the FirstBuild community space, Louisville makers receive the support and resources needed to bring their ideas to market.

Cost-Effective Way To Blend Working and Learning Environments: The costs associated with the student internship programs are low and provide students valuable hands-on experience in manufacturing appliances that will be sold in the market.

Opportunity To Engage the Consumer: By creating a platform for community engagement, FirstBuild incorporates consumers into the future design and development of GE appliances.

INFORMATION, TOOLS AND RESOURCES

• FirstBuild https://firstbuild.com

CONTACT

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Descriptions of Common Work-and-Learn Models
A Glossary of Key Terms

Following are descriptions of the most common and effective work-and-learn models that are a part of business and industry programs nationwide.

**Apprenticeship**
An apprenticeship is a unique, flexible training system that combines job-related technical instruction with structured on-the-job learning experiences. It provides a unique combination of structured learning with on-the-job training from an assigned mentor. Related instruction, technical training or other certified training is provided by apprenticeship training centers, technical schools, community colleges, and/or institutions employing distance and computer-based learning approaches. The goal is to provide workers with advanced skill sets that meet the specific needs of employers. In many cases, these programs provide apprentices the opportunity to simultaneously obtain secondary and postsecondary degrees, as well as credentials issued by third-party industry organizations. (Source: U.S. Department of Labor)

**Career Fair, Career Expo, Job Fair**
A career fair, also called a career expo or job fair, is an event held for employers and recruiters to meet with potential job candidates. Industry representatives set up exhibition booths — usually at a secondary or postsecondary institution — where students and job seekers can find information about different career fields, training opportunities and jobs currently available. Career fairs give employers an opportunity to interact with future job candidates and make direct contact with students who are making decisions about what education, training and career to pursue. Quality career fairs offer hands-on activities to participants, allowing them to see firsthand what a job in the industry entails.

**Clinical Training/Practicum**
Clinical training combines classroom learning with supervised hands-on immersion experiences in specific fields, mostly in industries that involve human services. In health fields, clinical training is founded on actual observation and lab instruction and/or treatment of patients, as distinguished from theoretical or experimental training. The training is usually highly specialized and includes coursework specific to performing functions and tasks in an actual workplace. (Sources: Siemens Clinical Training & Continuing Education; Clinical Training Institute)

**Cooperative Education/Co-Op**
Cooperative education is the integration of classroom theory with practical work experience, through which students alternate attendance at school with periods of professional employment. At the high school level, the periods of classroom and work-based experience are usually half-days. In higher education, the alternation is most often on a longer time scale. Cooperative education programs enable students to apply technical skills already acquired through the education institution in a real-world workplace setting. Traditionally, cooperative education has been used to aid a student's transition from school to work, while providing participating employers an opportunity to attract, evaluate, train and ultimately employ a ready source of educated and skilled employees. (Sources: Center for Manufacturing Excellence, University of Mississippi; University of Cincinnati)
Externship
An externship is typically a training program offered by educational institutions and private businesses that gives students brief practical experiences in their field of study and insight and knowledge in a particular career field. Often shorter term than internships, externships are intensive career learning experiences that typically range from two days to two weeks. Although more immersive and structured than job shadowing, these experiences provide the opportunity for students to see firsthand the work activities and responsibilities in various professions and industries. The experience should provide the learner a greater sense of the knowledge, skills and attributes of people who thrive within that given career pathway and industry sector and a complete experience of day-to-day work life.

Hands-On Training
Hands-on training provides student learners an opportunity to use their hands to perform tasks. This training aims to simulate conditions that are as close as possible to real work conditions while avoiding the risks commonly associated with a new employee. In hands-on training, participants typically have the opportunity for repeated practice.

Industry Tour
Companies offer guided tours of their facilities to let students, parents and the general public witness firsthand the day-to-day operations of the business. Typically lasting up to two hours, tours are led by knowledgeable staff members who show and describe the companies’ processes, products and protocols, as well as point out the skills and training needed for different jobs. Quality industry tours typically result in greater awareness of the company and the industry and increased engagement with the local community, schools and future employees.

Internship
An internship is a formal program that provides practical experience for learners in an occupation or profession, during which the learner is immersed in a work situation for a limited period of time. Internships can be paid or unpaid and usually accompany or relate to academic coursework or training. A quality internship provides the learner an increasingly thorough grasp of the career field, extensive experience in specific job functions, application of education and training to specific duties, and a feel for what it is like to work on a daily basis in the industry. While not always intended to result in employment at the sponsoring company, internships help employers expose potential workers to their workplace and industry and recruit, screen and test-fit future job candidates before they are hired full time.

Job Shadowing
Job shadowing is a work experience option through which students learn about a job by walking through the working day as a shadow to a competent worker. The job shadowing work experience is a temporary, unpaid exposure to the workplace in an occupational area of interest to the student. Students witness firsthand the work environment, employability and occupational skills in practice, the value of professional training, and potential career options. Job shadowing is designed to increase career awareness, help model student behavior through examples, and reinforce for the student the link between classroom learning and work requirements. Almost any workplace is a potential job-shadowing site. (Source: Paris, K., and Mason, S. (1995). Planning and Implementing Youth Apprenticeship and Work-Based Learning. Madison, WI: University of Wisconsin, Center on Education and Work)

Mentorship
Mentorship is the coupling of a novice with an older, more experienced professional wherein the expert shares knowledge and experience with the novice over the course of time. Mentorship can be either formal or informal and can happen face to face; online; or in conjunction with other work-and-learn opportunities, such as internships and job shadowing. Mentorships help mentored youth improve their overall academic achievement and develop the necessary skills to enter or continue on a career path. They also provide guidance for decision making. Quality mentorships usually involve mentee training and alignment to the company’s culture and goals.
On-the-Job Training (OJT)
OJT is training by an employer that is provided to a paid participant (either an incoming or incumbent employee) while engaged in productive work in a job that provides knowledge or skills essential to the adequate performance of the job. OJT is usually limited in duration, as appropriate to the occupation for which the participant is being trained, taking into account the content of the training, the prior work experience of the participant and the service strategy of the participant, as appropriate.
(Source: Workforce Investment Act)

Pre-Apprenticeship
Pre-apprenticeship is defined by the Employment and Training Administration as “a program or set of strategies [that is] designed to prepare individuals to enter and succeed in a Registered Apprenticeship program and has a documented partnership with at least one, if not more, Registered Apprenticeship program(s).” Since the pre-apprenticeship model is meant to prepare learners to enter a registered apprenticeship, a quality model provides sufficient applied academic training, as well as industry-based technical skills training and practice, to ensure that students transition successfully into an apprenticeship.

Registered Apprenticeship
A registered apprenticeship encompasses the details and benefits listed in the “Apprenticeship” definition. Additionally, it meets national apprenticeship standards outlined by the registration process with the U.S. Department of Labor (DOL) Office of Apprenticeship or through a state apprenticeship agency. Upon completion of a registered apprenticeship program, participants receive a portable credential (provided by DOL or the state apprenticeship agency) that certifies occupational proficiency as a journey worker for the selected occupation. For more information on the DOL registered apprenticeship program, please visit: www.dol.gov/apprenticeship. (Source: U.S. Department of Labor)

Returnship
A returnship is an internship specifically designed for older professionals who have been out of the workforce for an extended period of time to re-enter a career. In many cases, they are designed to help these individuals refresh their skill sets and learn new technologies before returning as full-time employees. Often lasting around 10 weeks, a returnship provides individuals with an opportunity to sharpen their skills in a given career path or pursue new areas of expertise in a work environment that may have changed significantly since their last experience as an employee. Returnships also give employers the opportunity to screen returning experienced applicants before hiring them full time. (Sources: Goldman Sachs; CareerBuilder)

RESOURCES
• 21st Century Competency-Based Apprenticeship Resources http://bit.ly/1RcO4Uh
• National Network of Business and Industry Associations: Grads of Life ROI Calculator http://bit.ly/1X6yKMP
• U.S. Department of Labor Office of Apprenticeship www.dol.gov/apprenticeship
Contributors
The National Network acknowledges the contributions of the following companies, associations and educational institutions whose time, ideas and feedback made this guidebook possible.