The EPICS Playbook

Best practices to start your first Engineering Projects in Community Service program

BUILD-IT Playbook Series

Resources for a sustainable world class model in STEM Higher Education

Since 2015 the BUILD-IT Alliance, through strategic collaborative dialogue with industry and the Vietnamese Government (MOET), has focused on creating a world class model for innovative technology and engineering higher education. The BUILD-IT public-private ecosystem is designed to produce graduates who can solve problems and engineer solutions and value for Vietnam's social and economic development. BUILD-IT leverages the vast capabilities of the implementing partner, Arizona State University, America's largest and #1-ranked university for innovation, along with diverse government, industry, and academic partners linking T&E higher education to the needs and capabilities of industry partners, building strategic leadership skills to advance university autonomy, program and instructional quality, and formal lasting partnerships. BUILD-IT supports female empowerment and has provided leadership forums, academic initiatives, and scholarships, and has laid groundwork strengthening the universities' capacity for building technical English and 21st century professional skills.

The BUILD-IT Playbook series has been developed with collaboration and input from BUILD-IT partners and is designed to provide a quick start guide and compilation of best practices that have been effectively implemented in Vietnam by our partner institutions. By leveraging these lessons learned and resources for implementation of tested and effective models, you will have resources that will help you develop a sustainable world class model in STEM Higher Education.

Playbooks in our series include:

The Maker Innovation Space Playbook

Multifunctional spaces with workshops and tools to prototype innovations, Makerspaces provide critical learning spaces to the generation of problem solvers.

EPICS

EPICS is an internationally recognized engineering-based service learning and social innovation applied project program. Helping students build both hard and soft skills for success.

Women in Project-Based Learning

This playbook presents detailed instructions for creating gender-responsive programs that encourage and support women in engineering.

Certified Facilitator and Master Teacher Training

This playbook provides step-by-step strategies for creating a high yield of trained faculty in a short duration of time who can better drive students towards university success.

A Playbook for University Leaders Seeking AUN-IQA

This playbook presents recommended processes, best practices and key points of emphasis to facilitate the successful completion of AUN-IQA certification.

Digital Pedagogy in Higher Eduction

Through the digital pedagogy playbook, BUILD-IT university partners have access to proven best practices, methodologies, and approached for teaching and learning in a digital environment.

The Accreditation Playbook

This playbook serves as a quick start guide for leaders and officials of universities who are considering or have begun a journey to external international accreditation for programs.

The Industry Advisory Board Playbook

This quick start guide provides a foundation for setting up your IAB. Learn the basics of forming your board, finding participants, and setting expectations.

Get ready for your first **EPICS** program

EPICS – Engineering Projects in Community Service – is an internationally recognized engineering-based service learning and social innovation applied project program that inspires students to use engineering and human-centered design to build solutions for social challenges. EPICS asks student teams to partner with local community organizations to address community-based human and environmental challenges. Community organizations are encouraged to take advantage of students' technical skills to improve, coordinate, and build pragmatic innovations for their communities.

EPICS students get field experience designing, building, and rebuilding working prototypes. Students gain confidence, 21st Century skills, and real-world engineering experience, all before graduation. In 2017, BUILD-IT began modeling the EPICS program with six Vietnamese universities to expand their capacity to organize and operate innovative multi-disciplinary project-based learning programs.

This playbook summarizes the key concepts and mindsets that an EPICS program lead should consider as they start their first program cohort.

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Understand the EPICS Process

The why, what, how, and who of EPICS

Why start an EPICS program?

As Vietnam's economy advances, graduates need stronger work-relevant skills,such as interpersonal communication, critical thinking, problem-solving, and technical English. The disconnect between academia and industry needs means that students struggle to be globally competitive. Engineering Projects in Community Service is a human-centered design applied project program that helps students grow their confidence and technical capacity. It prepares students to apply their learning to real-world projects.

What makes the EPICS methods innovative?

Multi-disciplinary Teams break academic silos by gathering students and their skills from different majors.

Human-centered Design centers design on empathy & incorporates iterative design reviews with stakeholders.

Service Learning empowers students to use their know-how to engineer for good.

Social Entrepreneurship leverages business elements to tackle social challenges.

21st Century Skills develop students' conflict resolution, teaming, communication, and critical thinking skills.

How is the EPICS design innovation cycle set up?

The EPICS Design Innovation Cycle pushes students to follow an iterative design process dependent on continuous feedback and improvement. Student teams are encouraged by their EPICS lead to progress through the phases as their design develops. Each team's progress dictates the pace of their project's journey through the Design Innovation Cycle.

Who does EPICS?

EPICS Leads are faculty members who manage the program and facilitate EPICS classes.

Support Leads are EPICS Leads in-training who are supporting their university's effort to run EPICS.
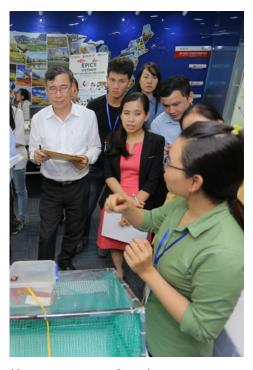
Community Partners/Mentors are local organizations that offer insights on social challenges that frame EPICS projects.

Sponsors are industry or community partners that support the program through in-kind or cash contributions.

EPICS teams are self-coordinated student teams that complete the EPICS design cycle at their own pace.

Presentations build both confidence and English skills

Mentors, sponsors, & students meet at a final showcase

Plan your first EPICS program
The why, what, how, and who of EPICS

Set your milestones

EPICS Leads begin by setting program and teaching milestones to track your progress in initiating your first EPICS program. Common milestones include:

1. Writing milestones, syllabi, and budgets

2. Identifying community mentors, sponsors, and support leads

3. Recruiting male and female students

4. Training support leads in the EPICS methods

5. Writing lesson plans and teach courses

6. Hosting design reviews

7. Hosting showcases

8. Reflecting and improveing your program

Identify community mentors

Community mentors volunteer to give students insight on social challenges and feedback on prototype designs. Mentors are often community organizations, schools, social entrepreneurs, or family businesses. EPICS Leads should develop and distribute a community mentor recruitment flyer or website. Ideally, EPICS Leads pre-arrange community mentors and develop early project concepts before the program starts. A good community mentor commits to providing design feedback once per design phase. They understand students are not interns or employees.

Develop projects concepts

Once a community mentor agrees to support an EPICS team, the Leads and the students co-create a project concept. As you develop a project concept, keep in mind that the project's impact on beneficiaries' lives should be significant. The level of expertise required should fit the students' skillset, costs incurred by students should be low, and the mentor's time commitment should be substantial. Projects should not be business-critical or expensive.

Write your syllabus

While your milestones guide your program management plan, your syllabus serves as your teaching plan. EPICS pilots are typically six modules over one semester. Although leads assign deliverables and share best practices, EPICS classes are student-driven. Students complete the deliverables through teamwork, meetings with stakeholders, and active experimentation. Schedule your class time, location, duration, topics, homework, and design review sessions so you can fit them into your timeline. A detailed EPICS curriculum guide and sample syllabi are linked in the references.

Gather mentors & sponsors
EPICS is a team effort

Identify sponsors

A sponsor is an individual or organization that wants to financially and/or technically support your EPICS teams. Sponsors are often enterprises that wish to hire EPICS graduates who demonstrated work-relevant skills such as team-based engineering and technical English. Supporting EPICS helps sponsors develop potential hires' 21st Century skills. Sponsoring EPICS can lower onboarding costs by giving sponsors access to skilled engineers before their competitors. Active sponsors can boost their staff's morale through EPICS engagement activities. Sponsorship helps broadcast a company's investment in innovation and improves its employer branding.

Brainstorm your budget

Once you have a program vision, you must estimate the cost of doing it right. Consider these points while drafting your budget:

- Will your EPICS leads be volunteers?

- Will you collect fees from students?

- What costs will students need to pay for themselves?

- Do you need to rent space, tools, or materials?

- Do your events require catering or transportation?

- Do you need to collect tax invoices?

- Is your program a competition? If yes, what are your awards?

- What are your administrative costs?

- How will you promote the program?

- Do you need media, social media, or a photographer?

Clarify the benefits in your sponsorship flyers

To communicate the benefits of sponsoring EPICS, insert precise sponsor levels into your website and printed flyers. As a result sponsors know what they "get" for each level of contribution. The clear levels establish a minimum contribution. Offer sponsors tangible benefits like media coverage, access to students, and opportunities for career fairs. Make certain that your school and sponsors agree to program branding guidelines upfront.

Mentoring sessions with professionals are critical

Community mentors & sponsors meet students on campus for co-working sessions

Recruit EPICS Leads & students
Excite faculty and students to join

Learn to be an EPICS Lead

BUILD-IT trained numerous EPICS faculty at our partner universities who have the know-how and experience to teach their peers the EPICS curriculum. If you are interested in setting up an initial EPICS training for your leads, reach out to each university to connect to the resources and expertise you'll need to get started.

Train EPICS Support Leads

Once you've mastered the EPICS methods, begin training Support Leads to help you manage your pilot and lead future cohorts. EPICS faculty training asks new faculty to complete a mini-design project to understand the EPICS Design Innovation Cycle. The more leads you train, the more likely your program will sustain. You may choose to run this training after you've completed your first cohort.

Recruit students

EPICS leads should develop and distribute student recruitment websites or printed flyers that show students that EPICS is a fun way to apply their skills to tackle real-world problems. EPICS simulates the challenges of professional engineering, complex problem-solving, team deadlines, project management, and high-stakes presentations. Students will improve professional skills through feedback sessions, presentations, graphic design, managing project budgets, and competing for awards. Through EPICS, students experience a competitive fast-paced work environment, make friends, and grow into confident engineers with a real project on their resume.

Encourage women throughout EPICS

Aspects of EPICS, such as team dynamics, lack of relevant role models, and unfamiliarity with tools, impact men and women differently. Without active countermeasures, young women may be hesitant to join EPICS. Both recruitment and program planning should mitigate gender barriers and promote equitable learning outcomes. Ensure that women can see that they are welcome in EPICS -- include women in promotions, as mentors, as leads, and as judges. Women are often drawn to the social responsibility aspect of EPICS. Make sure to put women and their interests front and center in your promotions. See references for a complete playbook on encouraging Women in Applied Project.

Flyers & social media get students' attention, but word-of-mouth gets them to join

Diversity is critical to user-centered design, recruiting women to EPICS is critical to program success.

Inspire student innovation
Guide self-directed learning

Write lesson plans

The EPICS program modeled in Vietnam is a six module 12-week program that allows self-directed teams to complete the entire innovation cycle. Lessons guide the teams through the needs assessment, design, prototype building, and performance testing their unique solutions. The EPICS curriculum is student driven. Teams are then assigned deliverables and expected to complete their deliverables through teamwork, meetings with stakeholders, and active experimenting. Lesson plans are unique to each EPICS Lead.

Deliver & manage classes

Do your best to limit lecture time and focus on activities and group work. Classes should strive to be interactive and follow the central tenants of active student-centered project-based learning. Beyond managing classes, leads should help the teams navigate team dynamics and time management stresses.

Support teamwork skills

Build teaming skills workshops on conflict resolution, teamwork roles, and time management into your program. Each team will lead its journey from a challenge to a working prototype. Personalities, priorities, and skills may clash as each teammate strives to push the project forward. We recommend asking your students to write a team charter as one of their first assignments. Please encourage students to view their team roles as fluid, with each person contributing to each project phase.

Run design reviews

A design review is a critical activity within the design cycle. The design review is a time for students to present their ideas and prototype iterations to their peers, mentors, and industry guests at the end of each phase. Students gain feedback on their prototype's build, test results, and next steps during the review session. Without a design review, teams may suffer from groupthink. A design review is an excellent opportunity to invite your mentors and sponsors into your classroom and get them involved in the EPICS design cycle. See the references for phase-by-phase design review questions.

Classes regularly review designs & deliverables

Mentors offer advice during design reviews

Showcase your projects
Celebrate and promote your new program

What is an Innovation Showcase?

The Innovation Showcase is the program finale. It is a project fair where teams demonstrate how they solved real-world problems with imaginative solutions. A showcase often begins with guests visiting student's project displays and moves on to a time for students to demo and pitch their innovation to an audience of students, mentors, and sponsors. When EPICS is a credit-bearing course, the Innovation Showcase may be a celebration. When EPICS is an extracurricular competition, the showcase may be a chance for judges to review projects and give awards.

Judge presentations, prototypes & awards

Assign your mentors and sponsors to give awards for empathic design, innovation, teamwork, and presentation skills. Judges should review prototypes to examine the team's engineering and presentations to understand their community engagement level. EPICS is too complex to give first, second, and third-place awards. Give awards for working prototypes, clear presentations, and effective teamwork.

Share your impact

The showcase is an opportunity for social and local media channels to broadcast your impact. EPICS is an internationally recognized curriculum that aligns your university brand with global project-based learning practices. Leverage the showcase to excite prospective students, especially women, to join and enroll in your university. Media exposure benefits sponsors, so place sponsors' brands at the center of EPICS promotions. This incentivizes them to continue contributing to EPICS every year. See references for TV segments, articles, and social posts promoting the EPICS showcases.

The showcase is an opportunity to make women highly visible

Media attention spreads your message

Sustain EPICS

To turn your pilot into a sustainable program

Funding your EPICS program
As your EPICS program grows, so will the cost of running it. Since each team has associated materials and tool costs, programs must find funds that match your students' growing interest in EPICS. Ideally, EPICS becomes a course with faculty paid for their teaching and with students or universities paying a program fee to cover costs. To maintain EPICS, look for various means to support the program, including grants from social organizations, fees levied on students, mentors, or sponsors. Come up with creative ideas to generate revenue - like charging ticket fees for showcase guests. BUILD-IT partners sustained their EPICS through a combination of grants, course fees, and industry sponsorships.

EPICS & accreditation
ABET focuses on learning "real-world" skills that students need to embark on successful engineering careers. ABET emphasizes that students develop a broad understanding of "engineering in context" and the soft skills necessary for professional teamwork. EPICS projects provide opportunities for students to demonstrate that they have achieved these learning outcomes. The EPICS methods align with ABET accreditation criteria for students to develop teamwork and other essential career skills.

EPICS brings learning outcomes required by international accreditation bodies

EPICS as a course
Offering EPICS as a course helps ensures that your program is sustainable. Ideally, EPICS is a credit bearing class serving diverse academic majors. The Da Nang University - University of Science and Technology and Can Tho University offer EPICS as an introductory engineering course to excite students for STEM. Course integration requires careful planning to collect material costs, student course fees and regularly attract students and sponsors.

EPICS as a competition or capstone
Transforming EPICS into annual competitions or graduation capstones are steps towards integration. Including EPICS methods in competitions will develop design innovation skills in more students. Offering EPICS as a methodology for a graduation capstone makes it a graded requirement. Expanding EPICS from a graded capstone for a few students into a program for a large cohort is just a matter of gathering enough resources to support more teams.

Students ready to join one Vietnam's first EPICS courses

References

EPICS Online Playbook (Sample Milestones, Syllabi, Lesson Plans, Flyers, poster & presentation templates,) (2021) *https://sites.google.com/asu.edu/epicstrainerresources*

EPICS Resources, *https://www.dropbox.com/sh/gyzq24jhg0agfpn/AAAW7q5mQx_DwSo2ja-6B4Al_a?dl=0*

Women in Applied Projects Playbook (2021), *https://builditvietnam.org/sites/default/files/2021-12/BUILD-IT%20Playbooks_women-applied-projects.pdf*

Let us know...

Thank you for your interest in the BUILD-IT playbooks, these useful guidelines will help you develop a sustainable world class model in STEM Higher Education. Make sure to share your input on implementing our playbooks and how you used them.

Additionally, we would like for you to share them with your colleagues, not only in your university but also in your network.

Reach out to builditvietnam@asu.edu to let us know about your successes and any lessons or suggestions you would like to send as feedback.