SEED

Strengthening Ecosystems for Empowerment and Development

A Comprehensive Overview of Unity Foundation's Open Source Ecosystem Methodology

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1. Executive Summary

SEED — Strengthening Ecosystems for Empowerment and Development — is Unity Foundation's methodology for building a sustainable, community-governed Open Source Ecosystem (OSE) that gives Community-Based Organizations (CBOs) durable, affordable access to enabling technology. Rather than treating open-source software as a one-time download, SEED reframes it as a living economy: a network of mission-aligned organizations, academic partners, and developers who co-invest in shared technology, share the resulting knowledge, and govern the ecosystem together.

This document consolidates Unity Foundation's SEED research, architecture, and early field results into a single reference for board members, funders, and prospective partners. It explains what SEED is, the problem it solves, how it is structured, the open-source technology foundations it builds on, and the real-world initiatives already validating the model.

SEED at a Glance

- Full name: Strengthening Ecosystems for Empowerment and Development (SEED)
- Model type: Sustainable Open Source Ecosystem (OSE) with participatory governance
- Core technologies: Micronaut, Grails, and OpenDDS frameworks — collectively "The Frameworks"
- Academic collaborators: Washington University in St. Louis, SIUE, UMSL, and Saint Louis University
- Live field initiatives: We Move / Libre311 (with Local Motion) and a data-collaboration tool with UMSL's Community Innovation and Action Center (CIAC)
- Governance inspiration: modeled on the Apache Software Foundation and Linux Foundation, adapted for CBOs

2. What Is SEED?

SEED stands for Strengthening Ecosystems for Empowerment and Development. It is the name Unity Foundation gives to its central research question and its answer to that question: how can open-source technologies be reframed as an accessible Open Source Ecosystem (OSE), empowering Community-Based Organizations to scale their services?

The work behind SEED was developed by Unity Foundation researchers and contributors — including Dr. Ebrahim Moshiri, Kevin Stanley, and Jeff Brown — through direct collaboration with local nonprofits, CBOs, and academic institutions. That collaboration evaluated technical capacity, resource availability, and the potential for sustained information sharing across the St. Louis region's social-sector organizations.

Unity Foundation itself is a 501(c)(3) nonprofit established in 2020 by Ebrahim Moshiri and the Ebrahim Moshiri Family. Guided by a board of directors and advisors with expertise spanning healthcare, education, and technology, the Foundation promotes equity through the strategic application of open-source technology — with

a focus on solutions that generate measurable societal and economic impact through data sharing, transparent governance, and effective deployment of enabling technology within CBOs.

In short: SEED is not a single piece of software. It is the methodology, governance model, and shared technical foundation that let many non-profits, CBOs and educational learning communities, resource-constrained organizations act collectively, like one well-resourced technology organization.

3. The Problem SEED Solves

Unity Foundation's research identified a consistent pattern among nonprofits and CBOs: they struggle to keep pace with rapid technological change. Financial and other structural barriers routinely preclude meaningful investment in enabling technology — including the specialized talent and infrastructure required to sustain it.

Two paths typically fail these organizations. Off-the-shelf software frequently does not align with their specific values, requirements, or operational workflows. Custom software development, meanwhile, is often unsustainable, because it competes with mission-critical resource demands that always take priority.

SEED's core insight is that strategic collaboration among mission-aligned organizations can bridge this gap. By pooling technology investment across a shared, open ecosystem instead of duplicating it organization-by-organization, CBOs gain resilience and effectiveness they could not otherwise afford individually.

4. The SEED Model: A Participatory Open Source Economy

Open-Source Ecosystems (OSEs) present a viable path for CBOs to amplify social impact through distributed, collaborative technology development. Unity Foundation's SEED model applies this idea directly to the social sector, encompassing a full product lifecycle — ecosystem discovery, collaborative development, continuous integration, and partner engagement — all anchored by robust knowledge transfer.

SEED introduces a participatory economy: CBOs are not merely consumers of Unity Foundation's technology, they are co-creators of it, guided by empirical data, community feedback, and transparent, consensus-based governance. This directly adapts successful models from established technology ecosystems — the Apache Software Foundation and the Linux Foundation — to the specific requirements and constraints CBOs face.

Two principles anchor the model:

- Open technological innovation — maximizing interoperability through open standards so tools and data can move freely between partner organizations.
- Transparent governance — ensuring coordinated growth, clearly defined roles, and sustained community involvement as the ecosystem scales.

Unity Foundation is more than a technology platform in this model; it functions as an innovation hub — a unified space where developers and CBOs craft transformative technology solutions, share knowledge, and tackle societal challenges together.

5. SEED Architecture

The SEED architecture flows from Unity Foundation's overarching governance down to the products CBOs use every day. Standards, governance, ecosystem engagement, and knowledge transfer sit at the top as Unity Foundation's core functions. Beneath them, three mature open-source foundations steward the technical frameworks that make the ecosystem possible. Collaborative development, communications, training, and community projects turn those frameworks into finished, deployable CommUNITY Products — which in turn power community partnerships, outreach, internships, and the workforce of the future.

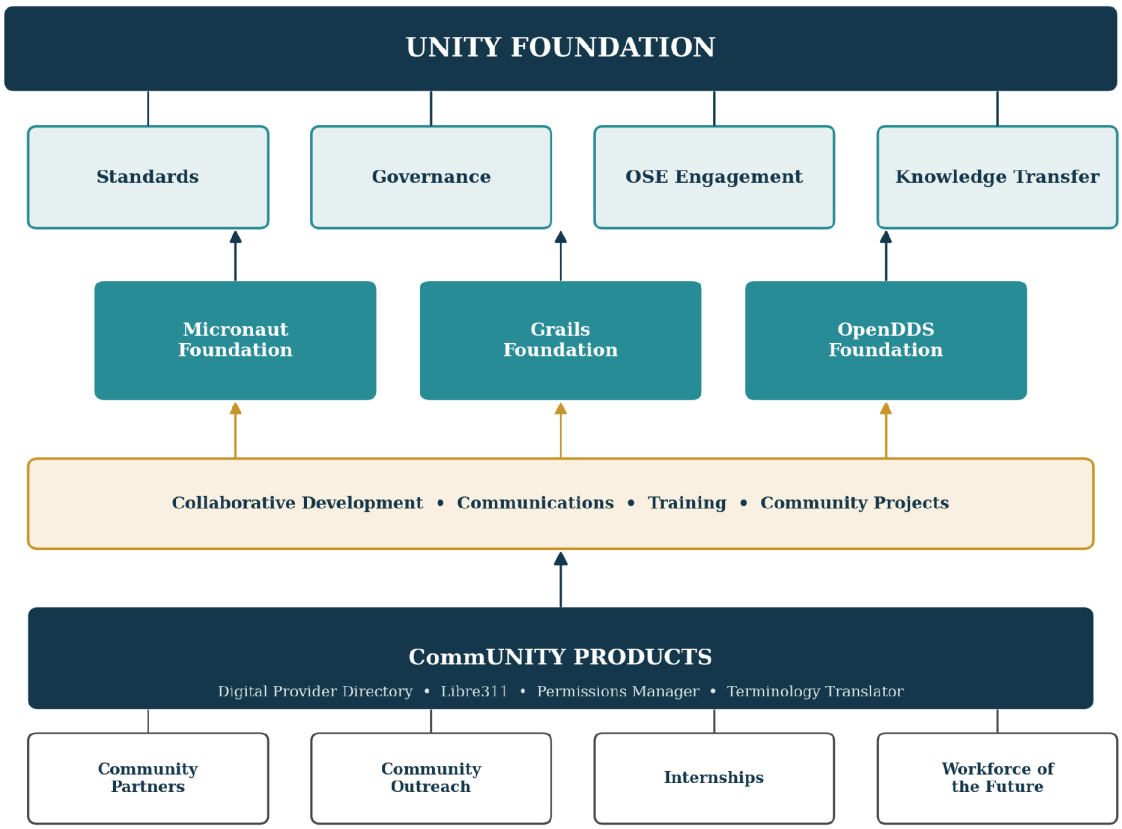

Figure 1. SEED / Unity Open Source Ecosystem (OSE) architecture, from governance through deployed community products.

This layered structure is deliberate: it allows Unity Foundation to coordinate the transition of existing products — such as Micronaut, Grails, and OpenDDS — into a unified structure, while leaving room to consistently transform new open-source technologies into the same sustainable ecosystem going forward.

6. The Open Source Frameworks Underpinning SEED

SEED's technical foundation rests on three mature, independently governed open-source frameworks — collectively referred to as "The Frameworks." Each is built on decades of research in application development and open architecture principles, and each is maintained by its own established open-source foundation. All three were previously stewarded by Object Computing, Inc. (OCI) and now sustain specialized Open Source Ecosystems in their own right.

Framework	First Released	Foundation	Core Purpose
Micronaut	2018	Micronaut Foundation™	JVM-based, full-stack framework for modular microservices and serverless applications; optimized for rapid startup and low resource use in containerized and cloud-native environments.
Groovy/Grails	2008	Grails Foundation™	Groovy-based framework for modern, robust web applications with straightforward object-relational database connectivity and a mature plugin ecosystem.
OpenDDS	2007	OpenDDS Foundation™	Implements OMG® Data Distribution Service (DDS®) standards for secure, real-time data distribution across large-scale, low-latency distributed systems.

Table 1. The three open-source frameworks that anchor Unity Foundation's SEED technical stack.

These products have been adopted by Fortune 500 companies and used in collaboration with prominent academic institutions, including Washington University in St. Louis (WUSTL), Southern Illinois University Edwardsville (SIUE), the University of Missouri–St. Louis (UMSL), and Saint Louis University (SLU). That combination of enterprise-grade maturity and academic partnership gives CBOs technology that is both credible and actively supported — without the cost of building it from scratch.

7. SEED Strategy Overview

Unity Foundation's SEED strategy rests on four interlocking pillars. Together they turn a collection of individually under-resourced organizations into a single, mutually reinforcing technology ecosystem.

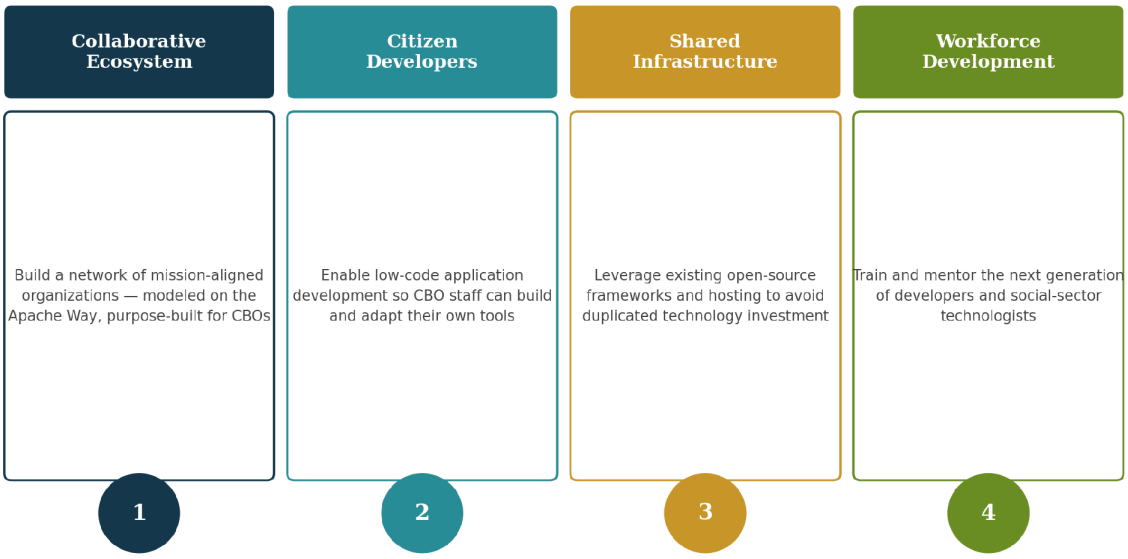

Figure 2. The four strategic pillars of the SEED methodology.

7.1 The SPROUT Framework

SPROUT—Student Pathways in Robotics, Open-source, and Urban Technology—is the applied pedagogical and curricular layer of the SEED methodology. While SEED establishes the governance and architectural foundations of the Open Source Ecosystem, SPROUT acts as the primary vehicle for delivery, transforming the SEED strategy into a tangible, cradle-to-career educational pipeline.

- **Student Pathways** operationalizes the Workforce Development pillar by mapping learning progress from K-12 foundational concepts through dual-credit collegiate pathways.
- **Robotics** serves as the primary technical application, utilizing micro-controllers and sensors to bridge the gap between abstract coding and physical problem-solving.
- **Open-source** remains the governing philosophy, ensuring that all curriculum artifacts, codebases, and datasets are accessible, transparent, and built upon the shared OSE framework.
- **Urban Technology** aligns with our Community-Based mission, focusing student efforts on solving high-stakes, local challenges—such as food insecurity and soil health—using the very technology that underpins the SEED ecosystem.

7.2 RIVET: The Counterpart to SPROUT

RIVET is the natural counterpart to SPROUT. It's an unmistakable Rosie the Riveter reference without appropriating the name, and it's mechanically honest about what the program does — a rivet is the fastener that permanently joins two separate pieces into one load-bearing structure. That is precisely the function: fastening emerging talent to institutions that need it.

SPROUT grows the talent. RIVET fastens it to the mission. SPROUT is the seedling stage: students in a greenhouse learning Python, open source, and the habits of collaborative work. RIVET is the load-bearing stage: young professionals, interns, and career-changers placed against real institutional capability gaps. One program produces contributors; the other converts them into national capability. A student who finishes SPROUT has somewhere to go, and RIVET has a pipeline it didn't have to recruit from cold.

This completes the mapping onto the Roots/Trunk/Branches/Canopy model:

- Roots: Open Technology / SEED (Shared infrastructure)
- Trunk: SPROUT (K–12, grades 9–12 entry)
- Branches / Canopy: RIVET (Interns, young professionals, career-changers)

Depending on whether transitioning service members are formally in scope, RIVET has two expansions:

- RIVET — Readiness through Innovation, Vocation, Engineering and Technology (sector-neutral, safest for cross-industry framing)
- RIVET — Readiness Initiative for Veterans, Engineers and Technologists (leans into the NDTA / Scott AFB origin; use if veterans are a named audience)

Collaborative Ecosystem

- Create a collaborative ecosystem of organizations, similar in spirit to the Apache Way, but focused specifically on the good of Community-Based Organizations.
- Provide technology support directly to community organizations and advocacy groups.

Citizen Developers

- Enable citizen developers with low-code application development tools so CBO staff — not just professional engineers — can build and adapt what they need.
    - Resource Directory
    - Collaboration and Coordination tools
    - Case Management tools

Shared Infrastructure

- Leverage existing open-source frameworks rather than building redundant technology from scratch.
- Build tools that simplify the creation of further tools and applications, compounding the ecosystem's output over time.
- Develop sustainable, shareable open-source solutions, with hosting support available to partner organizations — a paid tier for organizations that can invest, and a free tier to ensure no CBO is priced out.

Workforce Development

- Support the development of a workforce of the future who can build and sustain these solutions long after initial deployment.
- Collaborate with organizations that train, mentor, and support community organizations directly.

8. Six Aspects of a Sustainable Open Source Ecosystem

Unity Foundation evaluates the health of its Open Source Ecosystem across six interdependent aspects. No single aspect can carry the ecosystem alone — sustainability emerges from balancing all six together.

Figure 3. The six aspects Unity Foundation monitors to keep the SEED ecosystem sustainable.

Economic Sustainability	Diversified funding and shared cost structures that keep the ecosystem solvent without depending on any single funder.

Community Engagement & Culture	Active participation from CBOs, developers, and partner organizations, sustained through open communication and shared ownership.
Operations	The day-to-day discovery, development, integration, and support processes that keep products moving from concept to deployment.
Engineering	Technical quality, architecture, and maintainability of the frameworks and products built on top of them.
Knowledge Sharing	Documentation, training, and mentorship that let knowledge move freely between organizations instead of staying siloed.
Legal & Licensing	Clear open-source licensing and governance agreements that protect contributors and adopters alike.

9. SEED in Action: Experimental Use Cases

SEED is not only a framework on paper — it is already producing deployed, real-world applications through partnerships that exemplify the collaborative model.

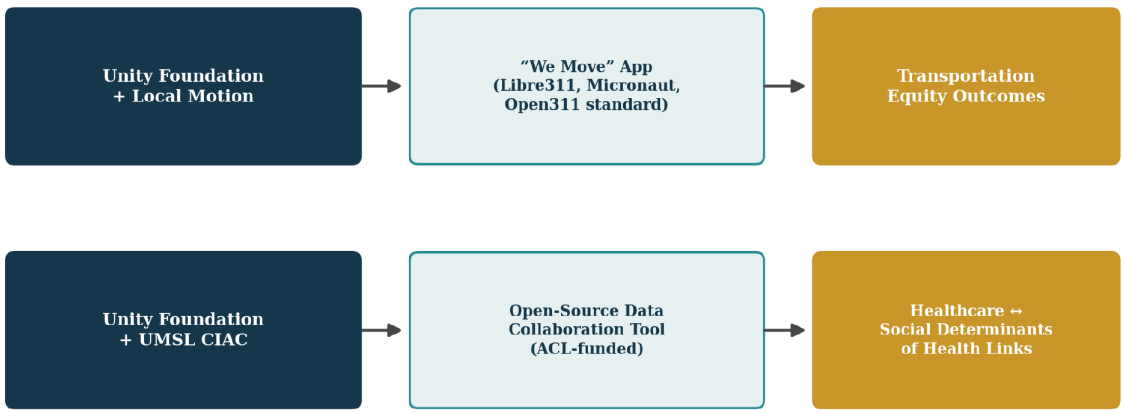

Figure 4. Two early SEED partnerships translating shared open-source infrastructure into direct community outcomes.

Unity Foundation + Local Motion: We Move / Libre311

The partnership between Unity Foundation and Local Motion exemplifies the collaborative nature of the SEED ecosystem. Together, the two organizations developed the "We Move" application to address transportation equity. Built on the Open311 standard with a Micronaut-based backend, the project provides a scalable, open-source solution for diverse communities, released under the Apache 2.0 license as Libre311. Local Motion

continues to foster community engagement through transportation-focused initiatives built on this shared foundation.

Unity Foundation + UMSL Community Innovation and Action Center (CIAC)

The collaboration between Unity Foundation and UMSL's Community Innovation and Action Center addresses complex societal challenges at the intersection of healthcare and community well-being. Funded by Unity Foundation and an Association for Community Living (ACL) grant, this project developed an open-source tool for data collaboration aimed at connecting healthcare services with the social determinants of health. It illustrates the OSE's role as a platform where diverse stakeholders unite expertise to foster interdisciplinary innovation that improves societal well-being.

10. Desired Outcomes

SEED's ultimate measure of success is not adoption of technology for its own sake, but the community-level outcomes that technology enables. Unity Foundation frames these as seven interconnected desired outcomes:

- Safe Infrastructure
- Affordable community - Transportation, workforce development Healthcare
- Employed People
- Accountable Government
- Connected People
- Continuous Learning
- Leadership Pipeline

Each SEED initiative — from the Digital Provider Directory to Libre311 to workforce-development data sharing — is ultimately judged against its contribution to one or more of these outcomes.

11. Personas Served by SEED

The SEED ecosystem is designed around the needs of seven distinct personas, ensuring that governance, tooling, and communication serve the full range of people who depend on it:

- CBO Leader / Executive Director
- Open Source Developer
- Partner Organization
- End User

- Project Collaborator
- Societal Beneficiary
- Workforce Development Director

12. Roadmap: Readiness by Complexity and Timeline

Unity Foundation sequences SEED initiatives by plotting them against two dimensions: how complex each initiative is to build and govern, and how far out its timeline sits. Earlier, lower-complexity initiatives establish the technical and trust foundation that later, higher-complexity initiatives depend on.

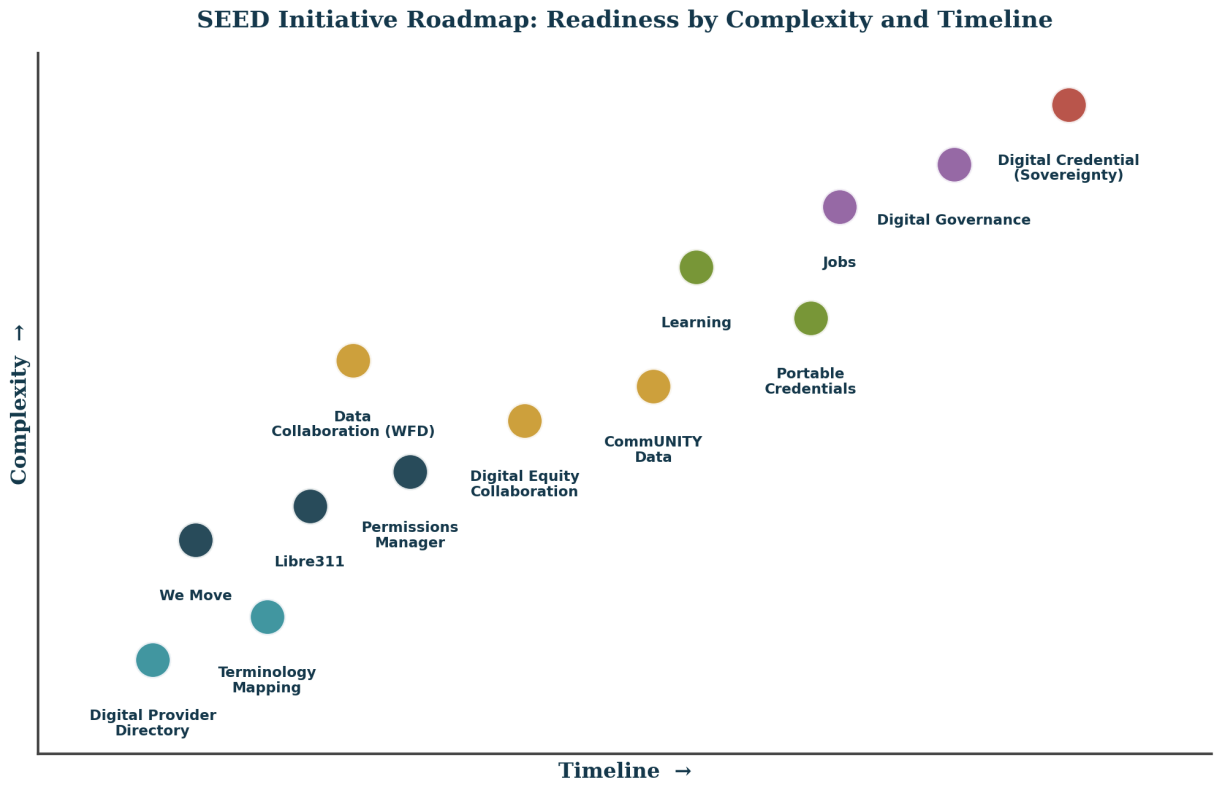

Figure 5. SEED initiatives mapped by complexity and timeline, from the Digital Provider Directory through long-term digital-sovereignty credentialing.

Near-term, lower-complexity initiatives — the Digital Provider Directory, Terminology Mapping, We Move, and Libre311 — establish shared data standards and a working technical base. Mid-complexity initiatives, including Permissions Manager, Digital Equity Collaboration, and CommUNITY Data, build coordinated data-sharing across organizations. The most complex, longer-horizon initiatives — Learning, Portable Credentials, Jobs, Digital Governance, and ultimately Digital Credential (Sovereignty) — depend on the trust and infrastructure the earlier stages establish.

13. Intellectual Merit

SEED introduces an innovative model by establishing a participatory economy that directly involves CBOs in the creation and sustainability of open-source products, guided by empirical data, community feedback, and transparent governance. By fostering collaboration on shared solutions, the initiative modernizes the social service sector and accelerates community participation and mobility.

The Unity OSE adapts successful models from established ecosystems — the Apache Software Foundation and the Linux Foundation — to meet the specific requirements and constraints of CBOs. This approach underscores open, collaborative innovation using a specialized toolset to promote inter-organizational cooperation. By prioritizing community-driven development, open governance, and mentorship, Unity Foundation provides a platform for CBOs to engage with and contribute to a broader technological ecosystem.

14. Broader Impacts

SEED is designed to yield significant communal and societal impact by expanding opportunities for CBOs to drive innovative development. For example, the OSE enabled the creation of a mobile solution for city maintenance intended for open-source release and broader adoption. The Unity OSE also facilitates permission-based, transparent data-sharing applications for use by CBOs, academic institutions, and government agencies.

By lowering barriers to entry, the ecosystem stimulates entrepreneurial growth, enhances economic efficiency, and promotes project consistency. It also serves as a community learning hub for professional development, providing mentorship and hands-on training to a new generation of software professionals and social scientists.

Ultimately, the ecosystem's adherence to open principles is intended to ensure long-term sustainability and a broader reach — consolidating established open-source foundations into a unified OSE that creates a synergistic, collaborative environment for accelerating innovation and knowledge sharing across the CBO sector.

15. Conclusion

SEED reframes open-source technology as shared community infrastructure rather than a cost every organization must bear alone. By combining mature, enterprise-proven frameworks with participatory governance, low-code tools for citizen developers, and a deliberate workforce-development pipeline, Unity Foundation is building an ecosystem where under-resourced organizations can access the same caliber of technology as the institutions with the deepest pockets.

The early results — We Move / Libre311 with Local Motion, and the UMSL CIAC data-collaboration tool — demonstrate that the model works in practice, not just in theory. As SEED matures along its complexity-and-timeline roadmap, from shared directories today toward portable credentials and digital

governance tomorrow, it positions Unity Foundation and its partners to close the gap between what CBOs need and what they can currently afford, one shared solution at a time.