



Best Practices for the Governance of Digital Public Goods

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David Eaves, Leonie Bolte, Omayra Chuquihuara,
and Surabhi Hodigere

APRIL 2022



HARVARD Kennedy School

ASH CENTER
for Democratic Governance
and Innovation

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Abbreviations

AI	=	Artificial Intelligence
CalSAWS	=	California Statewide Automated Welfare System
COSS	=	Consortium-based open source software
DPG	=	Digital Public Good
DPGA	=	Digital Public Goods Alliance
IMF	=	International Monetary Fund
MOSIP	=	Modular Open Source Identity Platform
NIIS	=	Nordic Institute for Interoperability Solutions
OMF	=	Open Mobility Foundation
OS	=	Open Source
UN	=	United Nations
SaaS	=	Software as a Service
SDG	=	Sustainable Development Goals
WGI	=	Worldwide Governance Indicators

Executive Summary

“Digital government” is becoming simply “government.” As a result, an ever-increasing number of systems and processes critical to the operation of government—the core infrastructure of a state—are being digitized.

This necessity creates enormous opportunities—to enhance, scale, and even standardize government services—and challenges—including a risk that building out this new infrastructure will impose costs that will reinforce global inequities.

In this light, it is no surprise that Digital Public Goods (DPGs)—an institutionalized sharing of “open-source software, open data, open AI models, open standards, and open content” between government and other actors—are an increasingly discussed model.¹ This presents an opportunity to share the burden of modernizing the **core infrastructure of a state**.

Inspired by the open-source movement, not only are DPGs non-rivalrous, but sharing them across jurisdictions could lower costs, speed adoption, and create standards to facilitate cooperation and trade. However, the joint management of any resource by sovereign entities—particularly of key infrastructure for the maintenance of public goods and services offered by the state—carries with it significant questions of governance.

Generously funded by the Rockefeller Foundation, our team of researchers based at the Ash Center within the Harvard Kennedy School has sought to understand governance best practices for public-sector DPGs. For this purpose, we conducted more than 20 interviews with leading experts in the field and conducted an extensive literature review.

As a result of this process, the report at hand proposes five governance best practices for DPGs: **Codifying a Vision, Mission, and Values Statement; Creating a Code of Conduct; Designing Governance Bodies; Ensuring Stakeholder Voice and Representation; and Engaging External Contributors.**

These five recommendations seek to nurture institutions that will create public value, possess legitimacy, and maintain the necessary support and operational capacity.²

1. INTRODUCTION AND FRAMING OF THE ISSUE

Increasingly, “digital government” is becoming simply “government.” Over the past few decades, governments have been transitioning the rules and processes that determine how public goods and services are distributed and accessed from being codified on paper and managed by humans to being codified in software and managed—in large part—by computers. There are thousands, if not millions, of services that are being or have been digitized, or will be in the coming decades.

This expansion of information technology at the core of government creates challenges. Among numerous other demands, governments need to ensure such systems are effective, secure, private, usable, and cost-effective. Compounding this challenge is a strategy of outsourcing that has often left governments dependent on both a small pool of government-focused vendors and expensive-to-maintain bespoke solutions. In light of this, and as software continues to eat the government, it is not surprising that the U.S. federal government alone regularly spends over \$100 billion on government IT, \$80 billion of which is on maintenance and operations.³ The governments of middle-income countries are also experiencing a substantial increase in IT spending; the Indian government’s IT spending is set to increase by 11.4 percent to \$7.3 billion in 2021 alone.⁴

All of this has sparked significant interest in alternatives to the development and maintenance of what is increasingly understood as the core infrastructure for a 21st-century state.

Digital Public Goods (DPGs), an institutionalized sharing of “open-source software, open data, open AI models, open standards, and open content,” present one alternative model. Inspired by the open-source movement, not only are DPGs non-rivalrous, but sharing them across jurisdictions could lower costs, speed adoption, and create standards to facilitate cooperation and trade.

However, the joint management of any resource by sovereign entities—particularly of key infrastructure for the maintenance of public goods and services offered by the state—carries with it significant questions of governance. This report delves into this largely uncharted territory of government- and foundation-sponsored DPG governance and seeks to uncover any existing best practices and provide some guidance that would enable the public sector to maximize the value of DPGs.

Who Should Read This Report?

This report is intended to serve as guidance for civil servants, technologists, and funders involved in the creation and maintenance of DPGs.

Given the range of capacities and services that use or could use the DPG model, there is no single, “one size fits all” template that will provide all the answers for setting up a DPG’s governance structure. Instead, this report is meant to guide our different target user groups in addressing the aspects that are important to them for their work. These aspects will differ depending on factors such as the problem they are trying to solve, the legal framework they are operating under, their resources, and their overall digital capabilities. Here is more information about our intended readers and how this report may be useful to them:

- **Government leaders & decision-makers:** This group consists of those intending to facilitate the co-development of DPGs across governmental or other entities through governance structures. These leaders and decision-makers may operate on different levels—federal, state, county, or city (to use the United States as an example). We hope this group can use this report to draw on best practices for setting up and operating a governance structure for their intended DPG project(s).

- **Digital government leaders:** This group is closely related to the government leaders and decision-makers described above, as they are also public servants. While digital government leaders, such as innovation or digital officers, share most general characteristics with other government leaders, they are uniquely positioned to become early champions of DPGs that follow best practices in their governance.
- **Technologists:** This group consists of tech-savvy individuals seeking to set up a non-governmental organization or utilize an existing structure to facilitate code sharing for a DPG. Like the abovementioned groups, this group can draw on this report for best practices.
- **Funders:** This group consists of individuals and organizations funding DPGs. We hope that this report will help them prioritize and shape their efforts based on DPG governance best practices.

Methodology

For this study, the research methodology involved three stages: (i) an interview process with leading experts in the field; (ii) the illustration of best-practice governance structures of DPGs through several miniature case studies, as well as two longer ones; and (iii) a literature review on governance and open-source communities.

20+ interviews with leading experts guide the recommendations

During this stage of the project, we conducted more than 20 interviews that included experts from:

- Open-source communities;
- Government at national and local levels—both in the United States and other countries; and
- Multilateral organizations and NGOs.

The methodology for the interviews included creating a questionnaire tailored for subject-matter experts—interviewees with a broad understanding of the field—or practitioners—interviewees directly involved in open source—and specific questions depending on the organization. The format of the interviews was informal, and interviews were recorded with previous authorization from the interviewees.

We identified these experts through five channels: our own professional network; snowball-sampling by gathering recommendations from other experts, including through a post on Twitter asking for examples and experts; the Digital Public Goods Alliance’s DPG registry; New America’s Digital Government Platform Tracker; and the State Software Collaborative’s list of software collaborations.⁵

We illustrate our recommendations through (mini) case studies

This phase of the project focused on illustrating the research findings, including the literature review, and applying the already-developed frameworks for governance in open-source communities through different case studies. This phase included an assessment of the intersection between the guidelines on governance set as part of the literature review combined with the interviews to produce best practices on governance of DPGs. We used the mini case studies, which we call “Cases in Point,” as spotlights on specific recommendations; we used the longer case studies to provide a more in-depth view of two particular communities. The latter are included in the appendixes of this paper.

The literature review focused on governance and open source

We drew from the most frequently cited academic papers, blog posts, and articles on the governance of open-source communities and governance in general. While a vast body of literature exists on the governance of open-source communities, there is little literature available on the niche of the governance of these communities through the lens of the public sector.⁶ Hence, we also included academic publications that only partially covered our focus on the governance of DPGs.⁷ Additionally, we complemented the academic private- and public-sector literature with practitioner literature to cover open-source governance best practices holistically.⁸ Finally, we reviewed governance through a more general lens centered around public management (focusing on Moore’s strategic triangle and Wardley Mapping—hereinafter, “Wardley’s maturity mapping” to emphasize the maturity aspect), country governance, and corporate governance.⁹

Limitations

The number of DPG governance examples is limited

While the number of DPGs continues to grow, the number with corresponding governance structures is still too limited to draw overarching quantitative conclusions. To partially counter this lack of examples, we draw extensively on existing literature from adjacent sectors. Hence, our research provides in-depth qualitative insights that will need to be complemented by further qualitative and quantitative studies.

One avenue for future research could entail work similar to that of Di Tullio and Staples or De Noni et al., who quantitatively assessed different aspects of governance in a number of open-source communities.¹⁰ Applied to DPGs, a similar study could quantitatively assess our findings.

Access to governance failures is limited

In theory, governance failures can provide valuable insights into pitfalls one should avoid when setting up a DPG governance structure. However, these governance failures are hard to study by nature. Not only are they harder to find, having ceased to exist, but when they *are* identified, former participants are likely not keen to talk about them.

Prior literature does touch upon DPG governance failure; Jaquith and Carnahan note that “the strongest theme tied to failure is the lack of a clear governance structure.”¹¹ In our report, we can only supplement this finding with additional qualitative evidence. Hence, one potential avenue for future research is to focus on governance failures in particular.

Frameworks

Once one accepts that governance is at the heart of what makes digital infrastructure a DPG, the task of defining a minimum level of governance for a DPG to qualify as such becomes essential. Neither the governance literature from the public sector nor the governance literature on open-source communities provides a clear-cut definition of governance.¹² Abstractly speaking, “governance” describes “all processes of governing”—which broadens the focus beyond formal government institutions, crossing the “boundary of state and society.”¹³

To start conceptualizing how a well-governed DPG can be approached, we rely on two frameworks: **the strategic triangle**, from which we derive the criteria for the term “well-governed”; and **maturity mapping**, which we use to determine when a DPG will have the capacity and the need for a more robust governance structure.¹⁴

The strategic triangle

Moore’s strategic triangle serves as a diagnostic tool, as well as a touchstone during subsequent implementation, focusing on three areas that provide a feedback system among themselves:¹⁵

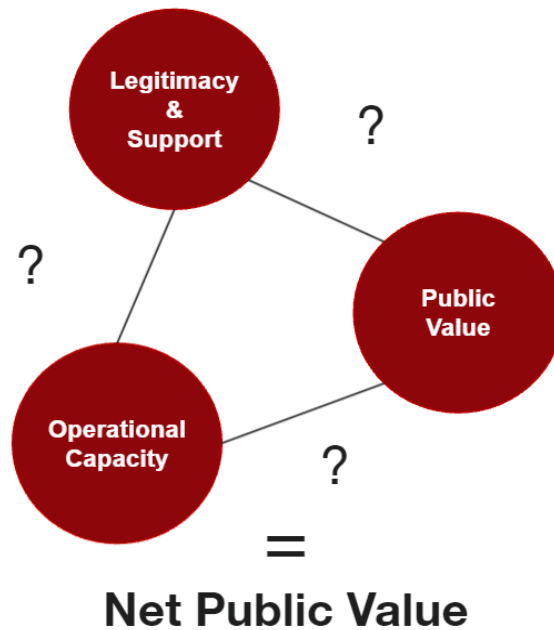
- **Public value**—a conception of the public value to be pursued;
- **Legitimacy and support**—a base of social legitimacy, public support, and financing; and
- **Operational capacity**—the capacity required to deliver results.

The governance of DPGs confronts public agencies with a central dilemma:

How can the competing needs of different stakeholder groups be balanced with the finite technical capacity of the government to achieve net public value sustainably?

Any governance structure needs to take these three areas into account and surface the stakeholders’ needs, put them at the heart of the governance process, and reconcile these needs with the limited technical capacity of the contributors (Figure 1: DPG Governance Needs to Resolve a Central Dilemma).

Figure 1: DPG Governance Needs to Resolve a Central Dilemma



Source: Our own depiction, based on Bloomberg Harvard City Leadership Initiative, “Creating Public Value: Concept Note.”

Maturity mapping

DPG governance must ensure projects create public value and maintain legitimacy and capacity. However, the resources to achieve such goals are not infinite. In addition, the governance mechanisms of government- or foundation-sponsored DPGs need to satisfy a plethora of competing needs.

Empirically, **the governance of DPGs and the DPGs themselves come in all sorts of different shapes and sizes.** The DPGA has begun to implicitly set a minimum standard for the governance of DPGs by referring to governance elements as part of its broader standard.¹⁶ That said, one recommendation of our report is that the bar for minimum governance standards for DPGs be raised in a calibrated manner.

To account for this empirical plurality of governance models and the significant range of capacities of DPGs, we use a second model—influenced by Wardley’s maturity mapping—to help scale and tailor recommendations. Specifically, we distinguish between four broad maturity types of DPGs: (i) **Experimental**, (ii) **Bespoke**, (iii) **Product**, and (iv) **Standardized Infrastructure** (**Figure 2: DPGs Have Different Goals and/or Levels of Maturity**).¹⁷

Figure 2: DPGs Have Different Goals and/or Levels of Maturity



Source: Our own depiction, based on Wardley, “Finding a Path.”

This second model helps us manage several risks and nuances in our recommendations.

The first is that some DPGs—particularly experimental or bespoke solutions that emerge from informal collaborations between public servants—should not be burdened with complex governance requirements that impede flexibility and prevent them from achieving some basic success before they scale.

The second is the inverse: the DPGs that do scale must not be held to a low bar of governance that will allow the emergence of a dysfunctional ecosystem or, worse, threaten the long-term viability of the work altogether. Any set of recommendations should scale with the size and impact of the DPG.

Third, DPGs may move from one maturity type to another over time. For example, suppose a DPG originates within one government entity. They make the code available on GitHub, and many other government entities start implementing this code. In this case, informal governance structures among the different government entities may develop. One option to scale the DPG would be to institutionalize its informal governance structure with other government entities by shifting from simply sharing the code base to jointly managing it with other governments. Such a change would require the DPG to revisit and—frankly—create new governance structures.

To better outline our understanding of the different governance maturity types, we mapped these out in more detail below, giving examples of types ii–iv.

Other maturity mapping approaches

Other approaches to mapping maturity include Digital Square’s Global Goods Maturity list, developed with a focus on global health goods.¹⁸

(ii) Bespoke solution—one stakeholder or a very small group of stakeholders with very specific, yet to be fully explored, DPG need.¹⁹ In this case, one (government) stakeholder is likely to control the governance structure and may interact informally with other (government) stakeholders who may at least fork and adapt the code for their own use.

We consider this type to be an **emergent DPG**, which may—from a governance perspective—fully qualify as a DPG only **once it has institutionalized a set of general governance best practices that we will highlight in the sections that follow.**

Direct examples: **GOV.UK Notify** (government-sponsored) and the very early days of the California Statewide Automated Welfare System, **CalSAWS** (government-sponsored; note that CalSAWS does not fully qualify as a DPG according to our governance recommendations since it does not open-source all its code base)²⁰

(iii) Product—a (slightly) larger group of stakeholders with a more stakeholder-agnostic DPG need.²¹ In this case, at least two government entities share, use, and develop at least partially the same source code in an at least somewhat institutionalized governance structure that includes the governance best practices outlined in this report. Either the governance structure is led by government entities or they are the main consumer of the DPG.

Direct examples: **NIIS** (government-sponsored), **OMF** (foundation-sponsored), **eGovernments Foundation** (foundation-sponsored)²²

Adjacent example for comparison: **Kuali** (privately sponsored)²³

(iv) Standardized infrastructure—a large group of stakeholders with a stakeholder-agnostic DPG need.²⁴ Here, a large group of stakeholders, including government entities, share, use, and develop at least partially the same source code in an institutionalized governance structure that includes the governance best practices outlined in this report. Either the governance structure is led by government entities or they are the main consumers of the DPG.

Direct example: **MOSIP** (Modular Open Source Identity Platform) (foundation-sponsored)²⁵

Adjacent examples for comparison: **Mojaloop** (foundation-sponsored), **W3C** (university-sponsored), **GENIVI** (now COVESA) (privately sponsored)²⁶

Where Governance Fits and What This Report Does Not Cover

While the reasoning behind addressing governance structures is clear, it is important to highlight other barriers to DPG deployment that we do not address in this report. The structure in **Figure 3: Enablers of DPGs** demonstrates the interplay of a variety of these factors, which are being explored in other research spaces.

Figure 3: Enablers of DPGs

+ Do the stakeholders have the ability to procure and contribute policy and legal tools?	Policies	Examples of research exploring enablers of DPGs: <ul style="list-style-type: none"> • Digital Public Goods: Guidance for Development, Governance, and Stewardship • Exploring Digital Public Goods • Open Source in Government²⁷
+ Do the stakeholders have the capacity to manage and resources to contribute?	Capabilities	
+ Does the DPG solve a problem that stakeholders can identify?	Assessment	
+ Does the DPG have a governance model to manage legitimacy, capacity, and value?	Governance	
+ Does the DPG have a funding model?	Funding	

Source: Our own depiction.

Broadly speaking, the first aspect to consider is **government policies** in the area of DPGs: Are they in place in a way that can enable collaborative efforts with other government entities? This component focuses on what is needed as the basic level for collaboration in a sector largely focused on procurement. The next level that one may consider is **(human and other) capabilities** within government. In addition to having the right government policies in place, one might ask: Do the government employees have the capabilities to steer and implement DPGs? The third level—**DPG assessment**—centers on assessing what type of DPG would answer to a common need. The fourth—and the primary focus of this report—centers on **governance** structures and the need for effective collaborations between stakeholders. The final level focuses on **funding**. Once all other levels are established and addressed, it becomes necessary to leverage financial resources.

Governance Is Essential. Governance Is Expensive.

Our starting point for defining DPGs

Throughout this report, we ground our use of the term “DPG” in the Digital Public Goods Alliance (DPGA) definition, which states that DPGs are “open-source software, open data, open AI models, open standards, and open content that adhere to privacy and other applicable international and domestic laws, standards and best practices, and do no harm.”²⁸ This definition is also part of the “Roadmap for Digital Cooperation” published by the Secretary-General of the United Nations.

Further, the DPGA, which was set up in accordance with the recommendation of a UN high-level panel on digital cooperation, translated the above definition of DPGs into a nine-indicator open standard called the Digital Public Goods Standard.²⁹ Through these indicators the DPGA tries to ensure that DPGs are indeed are public goods, in the sense that they contribute to the achievement of the Sustainable Development Goals (SDGs); are platform-independent; use approved open licenses; produce thorough documentation; have clear ownership and defined mechanisms for extracting data; and adhere to guidelines protecting data privacy and security. Potential DPGs can apply to be recognized as such through this standard. For example, the Fedora Linux community was recently recognized as a DPG by the DPGA.³⁰

While using the DPGA’s definition across this report, we acknowledge that tensions exist in strictly adhering to this definition. Our work focuses on code shared between two or more “sovereign” government entities—these could be nation-states, regional governments, or even local governments, as long as the actors are independent of one another.

Governance is directly linked to the ability to maintain a public good

There is a larger sense in which the definition of DPGs is directly connected to governance. On a high level, in economics, public goods “are not excludable and nonrival.”³¹ This means that these public goods have to adhere to two broad principles: (i) people cannot be “excluded from consuming” public goods, and (ii) “one person’s consumption does not reduce the amount available to other consumers.”³² In a similar though slightly less restrictive manner, the DGPA states that DPGs to qualify as such need to be “freely and openly available with minimal restrictions on how they can be adapted, distributed, and reused.”³³

In one sense DPGs can be freely adopted **without restrictions** on adoption, distribution, and reuse. Paradoxically, however, what gives DPGs their power is that participants voluntarily agree to restrictions—restrictions on the development of the road map, requirements as to the membership fee and membership criteria—in order to maintain a commonality that enables reusability and keeps costs down over time.

Hence, while the code of a DPG may be open to everyone, the control of the direction of the project needs to be both restricted and coordinated because, for example, if all users fundamentally altered a DPG in ways that made their own version incompatible with everyone else’s, the original code base would splinter. In essence, the code would cease to be a public good and would become a set of isolated bespoke solutions. Coordination and thus restriction, enabled by effective governance, is what makes digital infrastructure a *DPG*.

In some ways DPGs are like the solar system—new opportunities and needs are the centrifugal force pulling away, while governance is the force of gravity, restricting movement and choice, but necessary to ensure the system does not rip itself apart and fracture.

How DPGs Are Different from Open Source

We are not inclined to propose reinventing the wheel when models already exist, making the question of how DPG governance is different from “traditional” open-source governance particularly important. And, as many of our interviewees stressed, best practices from the open-source community should be adapted by government actors whenever sensible.

On the one hand, DPGs have much to learn from the management of open-source communities and owe an enormous debt to the trailblazing work done in this sector over the past several decades. On the other hand, several factors limit the seamless replicability of open-source communities in the public sector. Our research uncovered that they are rooted mainly in the following: **different assurances needed throughout projects** and **different bar levels that set the standards for the two sectors**.

In a broader sense, the assurances needed and the standard of care in the context of the public sector is higher given that the government is accountable to its citizens for the services it provides, and thus requires feedback that objectives are being met.³⁴ While governance models are not necessarily radically different in the two sectors, the standard by which the government can (and should) be held accountable to the public is different and has a cascading effect into governance needs. Governments must be more **transparent** with their DPGs while the private sector’s standard of care may be lower. This is not to say that the private sector does not care for standards, but the level of accountability is different. Similarly, in the public sector, the less the code sharing affects the public good or the smaller the public good—not being mission critical—the lower the standards.

From this assertion, we derive a variety of principles that can help explain why a governance model in the private sector cannot be replicated easily: (i) intentionality, (ii) equity, (iii) sustainability, and (iv) scale and capacity (**Figure 4: How DPGs Are Different from Open Source**).

Figure 4: How DPGs Are Different from Open Source

While both must address the following issues, a DPG must meet a government's need for stronger assurances than the private sector.

- | | |
|---|--|
| <p>+ Intentionality:
OS projects are often born and evolve organically, DPGs are often born relatively mature and defined.</p> | <p>+ Sustainability:
OS projects often have unclear sustainability models.</p> |
| <p>+ Equity:
The anarchical nature of an OS project can lead to under-representation of certain groups and/or poor norms around participation.</p> | <p>+ Scale and Capacity:
Government's ability to attract and retain developers is weaker than large corporate-backed OS projects <i>and</i> self-motivated, self-organizing actors.
<i>(This also raises concerns of sustainability.)</i></p> |

Source: Our own depiction.

In terms of **intentionality**, community-managed open-source projects are oftentimes organic, starting off sharing code with no bigger goal in mind, nor with a target population that must be included in the community.³⁵ Many start out solving a small problem and then scaling. For the governance of a DPG, the government is intentional in the need to solve a particular problem and clear on the resources that the government entity or level—e.g., regional, local, federal—has. Given these differences, project management functionality is different and the resources allocated are as well. The governance structure would therefore depend on what the nature of the problem is and the factors that contribute to it.

Special considerations for DPGs related to **equity** and **sustainability** (in the sense of DPGs' ability to maintain their existence over time) are rooted in the fact that governments have to be accountable to their communities for stakeholder support, which the private sector is not equally required to do.³⁶ This is not to say that the latter does not need to be concerned about these factors, but rather that the burden of proof is different for them. With time, the private sector is also being held accountable for issues pertaining to equity and sustainability; however, the standards they face to demonstrate that they take these matters seriously are lower.

Finally, **scale and capacity** are different in the two systems. Often open-source communities are willing to accept resources—financial and human—that fit into the size of the market, while governments are not able to do so. For example, the Debian community only introduced more formal governance mechanisms as it grew.³⁷ The public sector will try to find ways to direct more resources into the project given that they have a specific problem to address and solve. Human capital also limits the capacity of code sharing in the public sector. The government's ability to retain and manage software developers is weaker than in the private sector, making it challenging to compete. In most cases, governments are more reliant on external developers who are supplying expertise through consultancy.

The Core of Governance

The central governance dilemma of the strategic triangle raises several sub-questions. Following our interviews and the literature review, we distilled the core of governance to a set of key questions that need to be answered:

- **Who makes the decisions?** And who decides who makes the decisions?
- What are considerations around the **development of the road map**, which we refer to as strategy?
- How can **funding and sustainability** be ensured?
- Who can **participate in the DPG**?
- What **community norms and rules** exist, and how are they enforced?

Dilemmas regarding **decision-making** and the **development of the road map** may include:

How can representation in decision-making be balanced with stakeholders' differing capabilities and resources? How can governance surface and resolve stakeholder conflicts while maintaining stakeholder legitimacy and support? How does this differ for technical issues as opposed to strategy and direction? How does a DPG balance the needs of end users with the needs of member governments?

Questions surrounding **funding and sustainability** might be: How can a governance structure be organized in a way that its costs (such as time or member fees) do not outweigh its benefits (such as a decrease in costs or better service delivery)? How can governance structures sustainably raise funding while keeping in mind the constraints, obligations, and motivations of different stakeholders? How can differences in costs or having the same costs for stakeholders (e.g., membership fees) not create friction among stakeholders? How can governance balance reusability and stability with change and experimentation to ensure long-term sustainability? How do governance structures balance short-term political exigencies with long-term policy priorities?

Thoughts surrounding **participation in the DPG** and **community norms and rules** may include:

What is the best way to identify and empower appropriate decision-makers while nurturing a vibrant community of contributors? How can the need for strategic control of a public good be balanced with the benefits of openness that are associated with the open-source community? What role, if any, should private vendors play in the governance of DPGs?

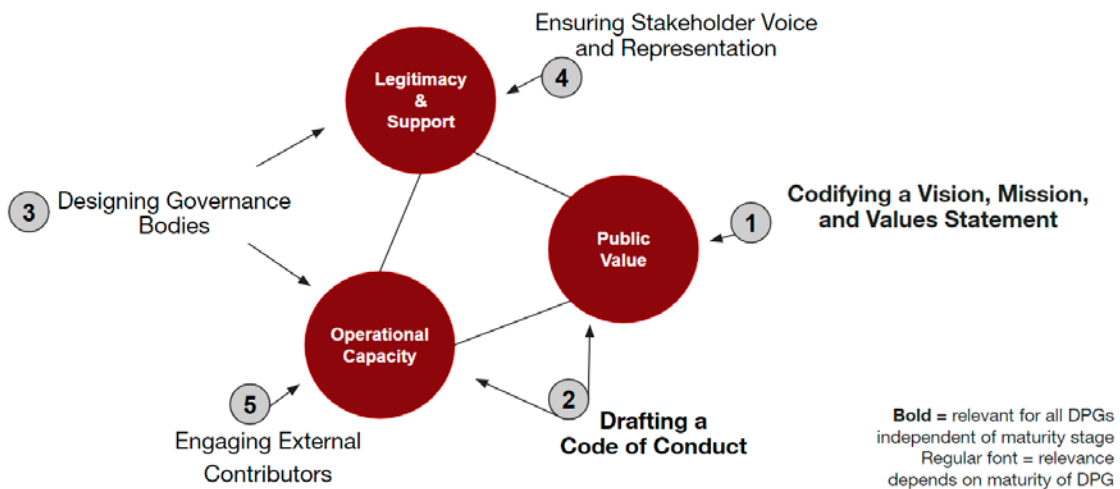
2. PLAYBOOK

Putting the Strategic Triangle and Maturity Mapping into Action: Our Recommendations

This report does not aim to find answers to all of the questions raised above. Instead, we provide five governance recommendations—best practices—for DPGs on the issues that we view as most pressing (Figure 5: Putting the Strategic Triangle into Action: Our Recommendations):

1. Codifying a Vision, Mission, and Values Statement
2. Drafting a Code of Conduct
3. Designing Governance Bodies
4. Ensuring Stakeholder Voice and Representation
5. Engaging External Contributors

Figure 5: Putting the Strategic Triangle into Action: Our Recommendations



Source: Our own depiction, based on Wardley, “Finding a Path,” and Bloomberg Harvard City Leadership Initiative, “Creating Public Value: Concept Note.”

In sum, the recommendations holistically reinforce different parts of the strategic triangle.

- A **Vision, Mission, and Values Statement** establishes a social contract that can serve as a north star for the other governance work—this social contract may be even broader than the category of **Public Value**.
- A **Code of Conduct** supports **Public Value** and **Operational Capacity** by outlining how stakeholders engaged in the DPG should treat one another.
- **Governance Bodies** that ultimately separate decisions about goals and strategy from operations will help ensure both **Legitimacy and Support** and **Operational Capacity**.
- **Ensuring Stakeholder Voice and Representation** in ways that maintain **Legitimacy and Support** by balancing competing needs of users but also prevent decision-making paralysis.
- Finally, **Engaging External Contributors**—particularly from the private sector—can bring much-needed capacity and capital to a project that can help ensure **Operational Capacity**.

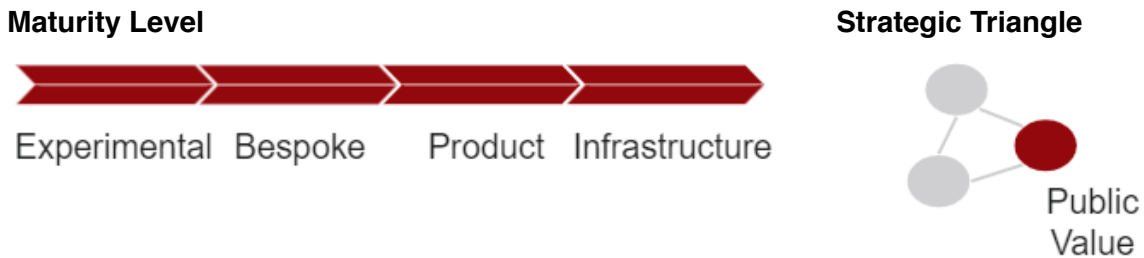
Some of the recommendations are so fundamental for governance that they should be adopted irrespective of the maturity stage of the DPG. In this light, we propose that **the first two recommendations (Codifying a Vision, Mission, and Values Statement and Drafting a Code of Conduct) should be part of a minimum viable governance model that would serve as a hurdle that all aspiring DPGs must clear in order to carry the name “DPG.”** The other governance recommendations should be added according to the maturity stage of the DPG. The sections that follow delve into each recommendation.

Codifying a Vision, Mission, and Values Statement

A **Vision, Mission, and Values Statement** establishes a social contract that can serve as a north star for the other governance work. This social contract may encompass even more than the concept of **Public Value**. We propose that a vision, mission, and values statement should be part of a minimum viable governance model that would serve as a hurdle that all aspiring DPGs must clear to carry the name “DPG.”

Figure 6: Maturity Level and Strategic Triangle for Vision, Mission, and Values Statement

Note: Items colored red indicate that the recommendation is relevant for this maturity level and applies for this part of the strategic triangle.



Source: Our own depiction, based on Wardley, “Finding a Path,” and Bloomberg Harvard City Leadership Initiative, “Creating Public Value: Concept Note.”

Key Points

- Investing in a well-defined vision, mission, and values statement is a starting point to arriving at a governance design that maximizes public value.
- Put together, the vision, mission, and values statements allow government- or foundation-sponsored DPGs to:
 - Communicate their purpose and objectives to internal and external stakeholders;
 - Delineate who would be effective or ineffective contributors;
 - Shape strategic decision-making; and
 - Create expectations and norms that dictate how stakeholders work.
- Anyone involved in the DPG space should be aware that when they refer to the sum total of these decisions related to a DPG, they are also discussing the best practices for a public service or an enabling service that is delivered through the DPG.

Vision, mission, and values statement is the foundation for a DPG social contract

A government- or foundation-sponsored DPG should develop “a conception of the outcomes” being pursued to inform and guide its formal governance structure.³⁸ **Within the strategic triangle framework, such an exercise would constitute the articulation of the public value of the DPG.** In a larger sense, this process is the foundation for a social contract or constitution to help inform all other governance processes for a DPG.

Within the management sciences, vision, mission, and values statements play three critical roles: “(i) communicate the purpose of the organization to stakeholders, (ii) inform strategy development, and (iii) develop measurable goals and objectives by which to gauge the success of the organization’s strategy.”³⁹

Our interviewees and the prior research on DPGs and similar structures—in both the private and the public sectors—point to having a relatively clear articulation of vision, mission, and values statements as potential success factors for an organization’s management.⁴⁰ For government- or foundation-sponsored DPGs, arriving at these statements can answer fundamental questions to guide the design and enforcement of governance structures. Conversely, the lack of an explicit vision, mission, and values statement signals a lack of clarity on the DPG’s purpose, objectives, and principles. This lack of clarity risks being carried over into the governance design.

A quick review of the DPGA registry shows that government-sponsored DPGs are sometimes created without an intentional mandate to invest in defining their vision, mission, and values. For example, a statistics aggregator⁴¹ released by a Swedish government agency and an agricultural forecasting tool⁴² released by the Norwegian government do not have explicit statements of vision, mission, and values.

In more specific terms, a **vision statement** can serve as an expression of an organization’s “desired future.”⁴³ For government- or foundation-sponsored DPGs, articulating a strong vision for the future may be an important prerequisite to forming purposeful governance structures. In their case study on one open-source community, O’Mahony and Ferraro note that the leader’s vision for the organization became more and more important as the community introduced more formal governance roles.⁴⁴

Since many such initiatives bring together a wide array of stakeholders, including open-source communities with varied incentives and motivations for participation, a vision statement helps signal shared purpose and values. In her comprehensive literature review of open-source communities, Markus notes that a statement of vision is a common trait of governance among different open-source communities studied.⁴⁵ Similarly, in their characterization of software-sharing cooperatives among government entities, Jaquith and Carnahan allude to the importance of a shared vision by noting that any software cooperative should have a joint understanding of their shared problem.

A **mission statement** can complement the vision statement by detailing for internal and external stakeholders an organization’s “objectives and its approach to reaching those objectives.”⁴⁶ Mission statements can greatly vary across organizations and contexts; they may evolve over time to adapt to organizational changes.⁴⁷ In the context of governing shared DPGs, mission statements can be revisited to ascertain whether organizational priorities continue to be in accordance with public value creation.

A **values statement** is a declaration of the principles underlying an organization’s “behavior, character, and culture.”⁴⁸ It is a high-level expression of a set of “core values” that are expected to be upheld by all stakeholders participating in an organization. A strong articulation of shared values is an important step for organizations that govern DPGs since they regularly engage with a diverse internal and also often external community of stakeholders.

Vision, mission, and values statements interact with their overarching policy framework

Finally, an interesting facet of the creation of vision, mission, and values statements for DPGs is their **interaction with the overarching policy framework within which they operate**. This interaction plays out across two broad thematic areas.

The first such area is the ability of government- or foundation-backed DPGs to define their aspirations given specific domestic or international contexts, capabilities, and laws. The need for operating within contextual limitations is emphasized in the DPGA definition, which states that DPGs should “adhere to privacy and other applicable international and domestic laws, standards and best practices.”⁴⁹

The second is how DPGs co-create, contribute to, or influence policy goals and vision. A DPG’s vision, mission, and values statement has to tread a nuanced path given that the creation of a DPG in itself amounts to a policy change or furthers a policy agenda. Thus, anyone who designs a vision statement for a DPG should be aware that in so doing they lay the foundation for **the best practice for a public service or an enabling service**—for example, digital identity. Let us assume a particular DPG scales and is widely adopted. Then whatever opinions and values are encoded into the DPG may become a “best practice”—on a local, regional, or country level, or maybe even worldwide. We cannot stress this enough: the software behind a DPG inevitably holds an opinion and values encoded into it; the DPG movement may lose its way if it does not recognize this.

CASES IN POINT

NIIS, an organization that manages a DPG across multiple member countries, uses its vision statement to depict a shared future by putting emphasis on the importance of “cross-border” capability and cooperation.⁵⁰ The organization states the following as its 2024 vision: “NIIS is a strong influencer in digital governance and a growing platform for cross-border cooperation and innovation. NIIS contributes to digital developments and initiatives in the Nordic countries, Europe, and globally and is onboarding new members.”⁵¹

Additionally, NIIS lists “Cooperation, Innovation, Agility, Quality, Sustainability” as its values.⁵²

As part of the vision statement for the Mobility Data Specification, the **OMF** attempts to integrate policy goals yet remain flexible enough to adapt to local needs and contexts. It notes: “Cities may share many of the same policy goals, but they may take different approaches to how they achieve these goals. MDS does not encode a singular view of how cities operate. [...] It is a toolkit from which city governments can pick the right tools for their local context and apply them to advance their goals for their communities.”⁵³

The **eGovernments Foundation**, with a more abstract vision to “catalyse urban transformation and enhance ease of living and ease of doing business at national scale,” introduces more measurable outcomes as part of its mission statement by stating that they aim to embed “an open digital infrastructure to transform governance in 4400+ ULBs [urban local bodies] by 2024.”⁵⁴

In terms of the values statement, the eGovernments Foundation is concise in listing “Trust, Collaboration, Ownership, Courage, Openness and Empathy” as their core values. Additionally, they state: “Our values are both our identity and our promise.”⁵⁵

GENIVI (now COVESA) explicitly states that it achieved its original mission and has now broadened its aims: “GENIVI Alliance has successfully completed its initial mission of delivering an open, Linux-based in-vehicle infotainment (IVI) platform and has expanded its scope [...]”⁵⁶

Drafting a Code of Conduct

A **Code of Conduct** supports **Public Value** and **Operational Capacity** by outlining how stakeholders engaged in the DPG should treat one another. We propose that a code of conduct should be part of a minimum viable governance model that would serve as a hurdle that all aspiring DPGs must clear to carry the name “DPG.”

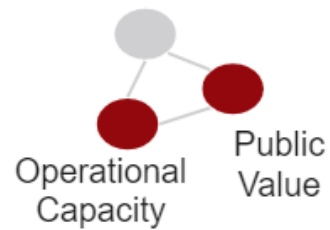
Figure 7: Maturity Level and Strategic Triangle for Code of Conduct

Note: Items colored red indicate that the recommendation is relevant for this maturity level and applies for this part of the strategic triangle.

Maturity Level



Strategic Triangle



Source: Our own depiction, based on Wardley, “Finding a Path,” and Bloomberg Harvard City Leadership Initiative, “Creating Public Value: Concept Note.”

Key Points

- **Several open-source communities face issues of inappropriate contributor behavior.**
- Government- and foundation-sponsored DPGs should be careful not to replicate this shortcoming.
- A best practice to govern this market shortcoming is creating a **code of conduct for contributors**.
 - Having a code of conduct is a best practice that has long been deployed in the commercial sector.
 - A code of conduct in government- or foundation-sponsored communities may serve several functions (e.g., connecting vision, mission, and values to contributors and making expected behavior explicit).
 - A code of conduct should be enforceable to manage potential tensions in the community.

Some open-source communities face issues of inappropriate contributor behavior.⁵⁷ Such behavior may include but is not limited to name-calling, threats, sexual advances and stalking.⁵⁸ An Open Source Survey by GitHub and collaborators from academia, industry, and the broader open-source community (2017) showed that this behavior has real consequences, such as respondents who experienced inappropriate contributor behavior withdrawing from contributing to these communities.⁵⁹ Other communities, such as the Perl Foundation, face the danger of fragmentation because of disagreements over how to respond to inappropriate contributor behavior.⁶⁰ In other communities,

such as OpenStreetMap (OSM), the struggle with contributor behavior has led to responses from the community itself to create explicit norms not only for expected behavior but for how to respond to misbehavior.⁶¹ In 2020, a group of OSM contributors sent out a statement titled “A Call to Take Action and Confront Systemic Offensive Behaviour in the OSM Community,”⁶² requesting support for the statement from others and prompting the OSM Foundation to implement the suggested changes. This bottom-up approach resulted in the Draft Etiquette Guidelines Revision, which was open for public discussion among contributors to address the concerns of the group.

The inability to govern contributor behavior may lead to a loss of diverse voices in the development process, and lack of representation may ultimately weaken the quality of an open-source product. One reason that we argue for governance is that the market will not naturally resolve this issue. For example, the gender imbalance in GitHub’s open-source communities remains stark. In GitHub’s 2017 survey, 95 percent of the respondents identified as men.⁶³ Government- or foundation-sponsored DPGs should be careful not to replicate these shortcomings of open-source communities when adopting open-source community practices.

A best practice to begin addressing this market shortcoming is a **code of conduct** for contributors.⁶⁴ For example, Mojaloop, MOSIP, OMF, and W3C each have a code of conduct publicly available on their website or GitHub. We recommend that a code of conduct be adopted regardless of community size. Behavioral issues often only become visible to outsiders once a project begins to scale. However, shifting the culture at that point in time is much harder than addressing the issue early on. Hence, it is critical that all DPGs work hard, and particularly that they do so early on, to establish cultures of inclusivity, respect, and empathy. A code of conduct is not a silver bullet to address this, but it is a starting point.

Generally speaking, having a code of conduct is a best practice that has long been deployed in the commercial sector.⁶⁵ These codes of conduct establish corporate legitimacy or, as Paine et al. more forcefully put it, “they are slowly defining the terms and conditions of companies’ license to operate.”⁶⁶ The Ubuntu community adopted one of the first codes of conduct in the open-source community more than a decade ago.⁶⁷ Today, many open-source communities adapt existing codes of conduct. For example, Mojaloop adapted the Ubuntu code of conduct, and MOSIP based its code of conduct on the Contributor Covenant—one of the most popular codes of conduct.⁶⁸ A newly founded government- or foundation-sponsored community may utilize a code of conduct to define for all its stakeholders “the standards that govern its conduct and can thereby convey its commitment to responsible practice wherever it operates.”⁶⁹

Codes of conduct can also serve as enforcement tools for protection from harassment for contributors. Designing a code of conduct is the first step toward creating accountability. In addition to this first step, consequences are needed to turn a code of conduct from a *de jure*—on paper governance—into a *de facto*—lived governance—tool. In practice, this entails designing consequences for noncompliance, assigning someone to handle potential complaints, making that person’s contact information readily available to community members, and potentially granting community members the right to comment on and help improve the code of conduct.⁷⁰

For example, in the case of the DPGA, the inclusion of an article that directly addresses this—9. c), “Protection from Harassment”—allows contributors to report interactions through an established mechanism that safeguards their interests.⁷¹ Projects must protect their contributors against “grief, abuse, and harassment,” including sexual harassment, by having explicit mechanisms in their codes of conduct.

A code of conduct in government- or foundation-sponsored communities may serve at least two additional functions. First, it may connect the vision, mission, and values statement to the contributors. This may be as simple as having contributors acknowledge the vision, mission, and values statement as the basis for appropriate community contributions. Second, it may make expected community behavioral norms explicit. Some community norms may already be indicated through the vision, mission, and values statement; however, the code of conduct should nuance these norms and apply them to desired everyday behavior. In practice, codes of conduct often outline appropriate as well as inappropriate behavior to make the abstract best practices more concrete.⁷²

Cases in Point

MOSIP uses an adapted version of the Contributor Covenant as a code of conduct for its contributors and maintainers.⁷³ Their code of conduct covers a high-level behavioral pledge, behavioral standards, a description of the code’s scope, and how it is enforced.⁷⁴

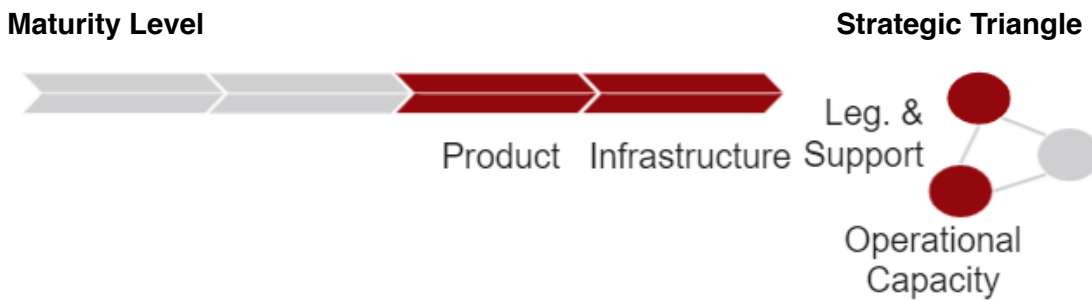
Mojaloop takes a similar approach as MOSIP. They adapted the Ubuntu Code of Conduct.⁷⁵ In their version, Mojaloop defines desired behavior, standards, and paths toward conflict resolution. They also incorporated their vision, mission, and values statement as the opening to their more detailed code of conduct. Hence, Mojaloop creates a direct connection between these different elements.

Designing Governance Bodies

Governance Bodies that ultimately separate decisions about goals and strategy from operations will help ensure both **Legitimacy and Support** and **Operational Capacity**. We propose that DPGs that reach the stage of a product implement this governance recommendation.

Figure 8: Maturity Level and Strategic Triangle for Designing Governance Bodies

Note: Items colored red indicate that the recommendation is relevant for this maturity level and applies for this part of the strategic triangle.



Source: Our own depiction, based on Wardley, “Finding a Path,” and Bloomberg Harvard City Leadership Initiative, “Creating Public Value: Concept Note.”

Key Points

- Governance bodies **institutionalize authority and accountability for decisions.**
- **Emerging best practices:** separate strategy and technology/implementation and allocate different decision rights and responsibilities to each board.
 - Emergent government- or foundation-led DPGs may not have the capacity to separate the two boards—they should be ready to follow this best practice as soon as they start scaling.
- **Guidance:**
 - The strategy board should be charged with road map and community-wide decisions;
 - The technology board should be charged with sub-project and code-level decisions.
- **Other notes:**
 - At scale these boards will need project-management staff to prepare decisions and liaise across boards and/or support their work.

Governance bodies are a key tool to orchestrate stakeholders

As research from the private sector puts it—in a best-practice scenario—governance bodies, such as boards, can lend strength to an organization’s “honest endeavor to set and fulfill overall strategy and mission.”⁷⁶ In this context, our interviewees generally pointed out that it is desirable to **separate a strategy board and a technology board**. Empirically these boards carry many different names—for example, the Executive Committee and the Technology Committee in the case of MOSIP or the General Meeting and the X-Road Working Groups in the case of NIIS.

Very large DPG projects may need to add several sub-technology boards to account for their size. This is more likely for a **mature product or a standardized infrastructure-focused DPG**. In this case, the technology board may have additional technical sub-working groups that focus on different sub-products.

Separating a technology board and a strategy board **allocates different decision rights and corresponding responsibilities to the respective governance bodies**. Research on open-source communities suggests that a robust governance framework is designed—and more importantly, used in practice—to resolve conflicts regarding various decisions.⁷⁷ Hence, these boards should not only be the place for making different decisions but also the place to resolve conflicts regarding these decisions.

The strategy and technology boards should be charged with different decisions

Generally speaking, decision rights in large open-source projects can be broadly assigned to three levels. In order of declining strategic importance, these are (i) community-wide decisions—such as setting the overall strategy (including a broad vision for the road map), fees, and membership criteria; (ii) sub-project-level decisions—such as strategic sub-project decisions (e.g., discontinuation of a project or new project components); and (iii) code-level decisions—such as bug fixes, new features, or modifications.⁷⁸

Government- and foundation-sponsored DPGs **tend to centralize some of the decision-making power**. Most successful government- and foundation-sponsored DPGs we analyzed centralized their decision-making power with governance bodies. By creating governance bodies, government entities allocate formal accountability and authority. Additionally, allocating a task to an organizational governance body allows for specific expertise, such as strategic or technical, to be considered for different decisions.

For government- and foundation-sponsored DPGs, the accountability and authority for decisions within these governance bodies does not rest with individuals. Instead, it rests with institutions that are represented by individuals. This means that the entities that control these governance bodies cannot only

AN EXCEPTION TO THE RULE:

Creating two large, separate boards for technology and strategy may not be sensible for emerging DPG projects. This may be the case for very small projects that consider themselves to be **a custom bespoke solution** or in some cases a **mature product**. For these smaller projects, the boards may consist of very few members or a single member, or some roles within the different governance bodies may be occupied by the same people so that the governance structure does not burden the **operational capacity unproportionably** in an already resource-constrained environment. While having a very minimal board structure at first may be sensible, all government- or foundation-sponsored DPGs should be ready to separate a strategy board and a technology board once they start scaling to fully qualify as a DPG.

steer these tasks but are also accountable for delivering results. Thus, the boards need to be designed to coordinate institutions—not individuals. Individual contributors are less likely to be present in these DPGs than are institutional affiliations—whether they be countries or governments that want to consume (and contribute to) the code base or vendors that are trying to contribute (or being paid by governments to contribute).

In contrast, a community-led open-source project delegates at least some of the decision rights to its community members.⁷⁹ These rights tend to be directly associated with the individual member instead of an institution that is represented by an individual. This means that these rights do not change if a member, for example, changes employers. Hence, the accountability for decisions in these communities rests with the individuals. In terms of the decision rights themselves, members—depending on their status—can make decisions on all or some of the three decision levels.⁸⁰ In community-led open-source communities, at least in theory, most—if not all—community members can obtain a position that grants them some of these decision rights.

In the case of a government- or

foundation-sponsored DPG governance structure, we observed that **the strategy board is often charged with the (i) community-wide decisions of the DPG. We consider this best practice.** This also means that the strategy board needs to be staffed with people that have experience in making such decisions. Suitable governance-body members are generally CXOs rather than operationally focused staff, and strategic rather than technology-focused. If the board—in practice—is staffed by technology-focused individuals with a lack of strategic experience, this tends to be a function of the DPG being dedicated to a small, specialized, highly technical product, rather than indicating a general best practice of technology-focused individuals without strategy experience heading the strategy board.

On a high level, a strategy board setting the general direction of a project also constitutes a best practice from the corporate sector.⁸¹ This best practice has also been adopted by international organizations, such as the International Monetary Fund (IMF). In practice, however, the corporate sector illustrates that the ability of a board to set strategy is often restricted by time—some boards only meet a few times per year—and expertise—related to the time aspect, board members may not have sufficient capacity to arrive at the level of in-depth understanding that may be required to develop a strategy for a given topic. Hence, the de facto development of the strategy for a DPG may need to be delegated to supporting project resources. These project management resources then form an additional governance layer that prepares community-wide decisions and supports the everyday tasks of the DPG project.

Compared to the strategy board, **the technology board and its respective working groups very likely possess more technical expertise.** They can thus be charged with making (ii) sub-project-level decisions and (iii) code-level decisions. This also implies that these technology boards need to be staffed with different expertise than the strategy board. Depending on the nature of the decisions that are to be

made within the technology boards, some sub-project-level decisions or code-level decisions may also be of an overarching strategic nature for the DPG and thus may have to be escalated to the strategy board.

We observed this best practice of having a strategy board and a technology board with separate tasks and staffed with different expertise in almost all of the successful government- or foundation-sponsored DPG governance structures. The failure to get this right may result in a failure of the overall governance structure to evolve and may prevent the project from, for example, developing novel code or may hinder scaling a DPG project.

Cases in Point

NIIS has a four-tiered governance structure. The highest body, the General Meeting, makes strategic-level decisions, including on matters of country membership. The Management Board also serves a strategic function, albeit at a day-to-day executive level. Under its technical functions, “NIIS has the responsibility of managing, developing, verifying, and auditing the X-Road source code.”⁸² These technical roles are implemented by informal organs of NIIS—the Advisory Group and the X-Road working groups.

As another example, the bylaws of **OMF** specify “a tiered governance structure, in which scope and strategy are directed by cities, while technical implementation is developed and managed by all stakeholders including private and commercial entities.”⁸³

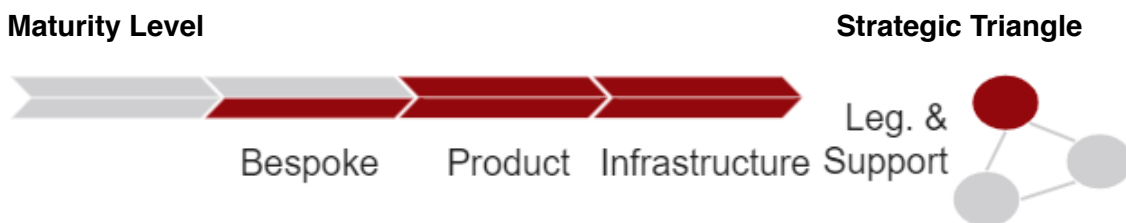
In the case of **CalSAWS**, what we refer to as a technology board and a strategy board are the JPA Board meetings along with the Project Steering Committee (strategy), and the different sub-committees that include an Integrated Project Team and Regional Committees (technology).⁸⁴

Stakeholder Voice and Representation

Ensuring Stakeholder Voice and Representation should be done in ways that maintain Legitimacy and Support by balancing competing needs of users but also prevent decision-making paralysis. We propose that this recommendation should be implemented starting at the bespoke maturity level—though it may not be suitable for all DPGs at this level and may be fully implemented at product level.

Figure 9: Maturity Level and Strategic Triangle for Strategic Decisions

Note: Items colored red indicate that the recommendation is relevant for this maturity level and applies for this part of the strategic triangle.



Source: Our own depiction, based on Wardley, “Finding a Path,” and Bloomberg Harvard City Leadership Initiative, “Creating Public Value: Concept Note.”

Key Points

- Government- and foundation-sponsored DPGs need to make choices about who can make strategic decisions and how those decisions will be arrived at.
- We observed **three dilemmas in decision-making culture that can foster or hinder best practices regarding strategic decision-making:**
 - (i) difficulties in adjusting decision structures when a DPG scales,
 - (ii) the dilemma of unanimous decision-making, and
 - (iii) weighting of stakeholder voices.
- (i) The **stakeholder that controls the strategy board controls the direction of the DPG.** The considerations that should determine who should be on the strategy board vary according to the DPG's maturity. This leads to a challenging situation if a government- or foundation-sponsored DPG grows. Empirically, we did not observe many examples of projects that managed this governance transition well.
- An organizational norm of making (ii) decisions unanimously to avoid conflict may undermine the formal governance structure by creating a governance structure that informally relies on unanimity.
- Design considerations regarding (iii) stakeholder voice should include: designing for pluralism, uplifting voices from resource-constrained stakeholders, a “meet at eye level approach,” and/or giving more voice to stakeholders according to their capabilities.

The decisions that we are particularly interested in relate to the strategic direction of a DPG. The academic literature on community-managed open-source projects often views the process and rules of how decisions are made as factors that influence the positive or negative climate for their contributors.⁸⁵ These studies tend to focus on the questions of what kinds of actors contribute to community-managed open-source projects and the reasons for which these actors choose to contribute to said projects. In contrast to this, the questions of how well decisions are managed and the process that determines how the decisions are made play an equally vital role in fostering a climate for stakeholder legitimacy and support in a government- or foundation-sponsored DPG.

We observed three significant themes in decision-making culture that can foster or hinder best practices regarding strategic decision-making: (i) **difficulties in adjusting decision structures when a DPG scales**, (ii) **the dilemma of unanimous decision-making**, and (ii) **careful design of how to include and weigh stakeholder voices**.

Difficulties in adjusting decision structures when a DPG scales

A key finding from our interviews is that the ultimate power in a governance structure comes down to who controls the strategic direction (and more specifically, the development road map) of the DPG. One best practice we observed is to concentrate high-level control over the road map into a strategy board. Then, the **stakeholder that controls the strategy board controls the direction of the DPG.** Ultimately, strategic control can include a mix of stakeholders or full control by government, philanthropic funders, university, expert, or commercial stakeholders. Any of these choices may be legitimate, depending on the different levels of maturity of the project and the specific circumstances.

The considerations that go into the question of who should be on the strategy board vary according to the DPG's maturity. When a project is in an experimental phase, or is a small, bespoke solution used by a few governments in a mostly ad hoc manner, the functions of a strategy board may lie in a single core contributing government employee or are likely limited to a small number of participating (government) entities—let's say one or a maximum of three.

In these early days of the DPG, success is more contingent on having *any* government join the project than on the specific rules or processes of how the project is governed. Formal rules are often not needed as much, as the limited number of stakeholders means many problems can be tackled informally or tactically as the work is being done. Additionally, because participating governments are the users of the project, they often bring with them valuable insights. This makes them natural drivers of the strategy.

At this stage, having a new government consuming the DPG's code or better still dedicating resources of both money and time to the DPG can serve as a powerful signal of the DPG's value and effectiveness—making it more likely that still more governments will join the project.

It is critical to note that while DPGs that focus on bespoke solutions and rely on informal networks and governance structures can be effective, these projects typically do not scale well. DPGs that have a strong product focus or are standardized infrastructures likely have a more diverse and larger set of stakeholders. In this case, there may be dozens or hundreds of participating governments, which cannot all directly participate in the governance. Now it becomes more important to have these stakeholders adequately represented in light of this constraint; the importance of independent subject-matter expertise as part of the governance bodies also increases.

The problem of representation as a DPG project scales leads to a challenge: How do they move from one governance model to another? Should nascent DPGs be burdened with more formal governance structures from the get-go, or is it better to hope they can evolve over time? Empirically, we did not observe many examples of projects that managed this governance transition well, and some of our interviewees explicitly pointed to this as a major challenge.

The dilemma of unanimous decision-making

In some government- or foundation-sponsored DPG projects, we observed that decisions are often made unanimously even if the governance documents have mechanisms that allow a measure to pass without unanimity.

Consensus-based decision-making is not always problematic—under some conditions it may be sensible. For example, in the early stages of a DPG stakeholders often have to allocate precious resources to their road map—a consensus approach may be essential to keeping the coalition together and maintaining trust among the government parties. At the implementer level, the need for consensus in a governance model can lead to a beneficial caution about taking actions that may have unintended or problematic consequences.

We identified through our interviews that when there is a lack of consensus, there is also a need to identify the root cause of the problem—for example, whether the lack of consensus stems from unresolved policy or value issues that should be addressed in the governance structure. However, despite the observations on the need for consensus, we believe DPGs should revisit the norm of unanimous decision-making as projects begin to scale.

As several academic contributions to the literature on open-source communities highlight, governance of open-source communities can serve the function of resolving conflicts to enable authority and accountability among members.⁸⁶ **Making decisions unanimously even if the governance documents have mechanisms that allow a measure to pass without unanimity to avoid conflict may undermine the formal governance structure by creating an informal governance structure.** Instead of prioritizing the project's strategic steps through decision-making, entities may start forking and developing their own versions of the DPG. While forking can be expected in any open-source project to some degree—and in some cases may be encouraged—an overuse of forking may eventually lead to the splintering of the DPG's development resources. Ultimately this could hinder the growth or even undermine the value of the project.

Weighting of stakeholder voices

Another dilemma DPGs must face in their governance structure is both the mix and weight of stakeholder representation. For example, should representation within the governance structure flow to those who contribute the most labor to the project? The most financial capital? Or should it flow to the biggest users of the project? And should this representation be in absolute terms? Or means-tested? For example, should a country of only 10 million people that makes significant per capita contributions have lesser, the same, or greater voting rights compared to a country of 500 million people that contributes more in absolute terms, but less on a per capita basis?

Governments have many models for balancing these competing considerations for voice and decision-making. For example, the United States balances similar competing considerations through the U.S. Senate—where every state has an equal voice—and the U.S. House of Representatives—where each state has a voice according to its population. Other examples include the IMF, where countries receive votes based on a “quota formula measuring the relative size of each country to the world economy,”⁸⁷ and the UN Security Council, where a few nations dominate the world’s security decisions.

What does this mean in practice? DPGs will need to wrestle with how to balance equitable representation with the reality that the resources that flow into the project may not be equally distributed among stakeholders. There is no single right answer to this dilemma. However, the larger and more successful a DPG project becomes, the more likely it will have to **consider designing for stakeholder pluralism**.

More than one of our interviewees pointed to the lack of stakeholder pluralism as a potential issue in open-source communities, as the stakeholder that contributes the most resources often ends up having the most influence over the project. Recognizing this issue, some research suggests using stakeholder pluralism in decision-making bodies as a criterion to evaluate whether an open-source project is truly “community-managed.”⁸⁸ While a government- or foundation-sponsored community is likely to restrict its openness by only accepting a specific set of members, these projects can still be evaluated for internal stakeholder pluralism. For example, a project may cap the number of representatives from the same geographical region, organizational entity, or stakeholder group, e.g., a cap on actors from the private sector. Likewise, a project may consider having a minimum number of entities according to similar criteria.

A variation of this pluralism approach may include **uplifting voices from resource-constrained stakeholders**. Examples of this resource-constrained group include small resource-constrained government entities and early start-ups in the commercial sector. An approach to uplifting their voices may include a provision that these resource-constrained entities have to contribute less from a financial or other resource perspective to a project while having equal voice in decisions compared to other stakeholders that contribute more.

It should be noted, however, that even if government- or foundation-sponsored communities strive for a “meet at eye level” approach, operational factors may influence their actual voice at the table. For example, suppose one set of stakeholders can put more resources into a project than another set. These stakeholders potentially have the power to develop their prioritized features with their own resources independently of an official decision. In this case, more resource-constrained entities might simply agree to proposals from the more powerful stakeholders. This would translate into the resource-rich stakeholders having a greater voice at the table despite officially having equal decision-making power.

On the other end of the spectrum, governmental and other entities **may consider explicitly giving stakeholders more voice** according to their operational capabilities or other criteria, such as size. This model may enable particular champions of a government- or foundation-sponsored DPG and may be necessary to achieve stakeholder support from this group.

Cases in Point

The UK Government Digital Service (GDS) manages **Notify**'s governance, even though Notify provides a service to other government agencies on all levels.⁸⁹ GDS is part of “the Ministerial Group on Government Digital Technology, and the digital, data and technology leaders of the central government departments and devolved administrations.”⁹⁰

While there is internal GDS governance, aside from periodic budgetary check-ins with the Treasury, Notify controls its own road map.⁹¹ We place it in the category of a bespoke DPG given that it is institutionalized and has a set of governance practices and is not merely a project. Running the product under a governance structure allows it to maintain sovereignty from other agencies. In order to scale in the future, more stakeholders would need to be included, and an overarching strategy board would be needed.

Kuali—which began as a group of universities and colleges that wanted to find a way to jointly build financial software—treats the university entities as customers.⁹² They brand these customers as “partners” that may provide input into different software or SaaS options or direction of projects. The ultimate decision of how the products are strategically developed lies with the commercial entity.

Similarly to many community-managed open-source communities, **W3C** has introduced a formal membership structure.⁹³ W3C allows institutions—private- and public-sector actors—as well as individuals to join its organization. The latter cannot enter any of its major governance bodies. While there have been discussions about turning W3C into a legal entity, W3C is not incorporated and is instead represented by four host institutions (Beihang University, the European Research Consortium for Informatics and Mathematics, Keio University, and the Massachusetts Institute of Technology). These host institutions grant W3C regional stakeholder legitimacy and help portray the effort as somewhat more neutral than commercial entities hosting the endeavor.

Every W3C member organization appoints one representative to the W3C Advisory Committee.⁹⁴ The Advisory Committee selects a small Advisory Board that provides strategic advice to the W3C operational management team. This strategic advice includes matters of strategy, management, legal matters, process, and conflict resolution. W3C stresses that any elected member of the Advisory Board changes their role from an employee of a particular organization to an advisor to W3C as a whole. This acknowledges the potential role conflict of such members. On the one hand, they are still employees of their respective organizations; on the other hand, they are now responsible for giving strategic advice to the entire organization.

A strategy board and a technology board govern **MOSIP**.⁹⁵ In their case, the strategy board is called Executive Committee and advises on strategic matters (governance, finances, IP, etc.). The board consists of a mix of Indian Institute of Technology Bombay affiliates, funders, and technologists. This mix of people allows MOSIP to benefit from different types of stakeholder expertise that may enhance the operational capacity of the project. Their technology board is called Technology Committee and is tasked with technical decisions, including operational management of the road map and community management. This group consists of a mix of university affiliates (all based in India) and technologists.

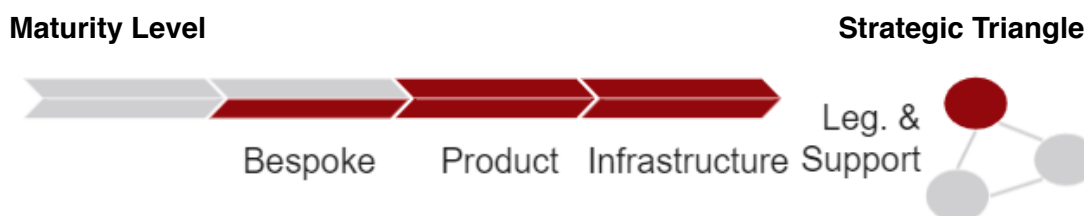
Additionally, MOSIP is supported by an International Advisory Group.⁹⁶ This group can be viewed as an additional strategy board that provides guidance on the overall goals and direction of the organization. The group draws upon expertise from international organizations, universities outside of India (based in the United States), and government advisors. This group can be viewed as an effort to draw on additional (international) stakeholder expertise to enhance the legitimacy of MOSIP in the eyes of, e.g., government entities.

Engaging External Contributors

Engaging External Contributors—particularly from the private sector—can bring much-needed capacity and capital to a project that can help ensure the **Operational Capacity** of a DPG. We propose that this recommendation should be implemented starting at the bespoke maturity level—though it may not be suitable for all DPGs at this level and may be fully implemented at product level.

Figure 10: Maturity Level and Strategic Triangle for Engaging External Contributors

Note: Items colored red indicate that the recommendation is relevant for this maturity level and applies for this part of the strategic triangle.



Source: Our own depiction, based on Wardley, “Finding a Path,” and Bloomberg Harvard City Leadership Initiative, “Creating Public Value: Concept Note.”

Key Points

- We distinguished three types of contributors:
 - (i) Contributors that the members of a community pay,
 - (ii) Contributors paid by an entity that is not part of the project governance structure, and
 - (iii) Voluntary contributors.
- Government- and foundation-sponsored DPGs have three options to engage with external contributors:
 - (i) No formalized external community governance,
 - (ii) Formalized mechanisms to govern the contributions of the external community, or
 - (iii) Formalized access and path to involvement in the DPG’s governance as a future DPG member.
- (i) Having no formalized external governance corresponds to the minimum definition of a DPG and has its code publicly available; we advocate that a DPG should go beyond this.
- With a (ii) formalized contribution mechanism, a DPG additionally allows external contributors to make comments on, or contribute to, the code base.
- (iii) Formalized access and path to involvement in the DPG’s governance as a future DPG member outlines who can get involved in the DPG and under what rules.
- There are real costs, such as expenses in terms of resources, to enabling outside contributions to a DPG. In the open-source communities, full-time community managers are often needed to oversee and coordinate external contributors’ activities.

In general, one can distinguish three types of contributors: (i) contributors that the members of a community pay, (ii) contributors paid by an entity that is not part of the project governance structure, and (iii) voluntary contributors.

Decision-making and power in government- or foundation-sponsored DPGs tend to be centralized. This may naturally tend to incline them toward paying contributors.⁹⁷ In contrast to this, a large body of academic literature discusses voluntary contributors and their motivation to participate in open-source communities.⁹⁸ In this light, it is no surprise that a community of voluntary contributors and maintainers is at the heart of a community-managed open-source project.

Government- and foundation-sponsored DPGs need to make conscious decisions regarding how to engage with external contributors—voluntary or paid by an external organization—in addition to project-paid contributors. These options can be simplified into three broad choices: **(i) no formalized external community governance**, **(ii) formalized mechanisms to govern the contributions of the external community**, or **(iii) formalized access and path to involvement in the DPG’s governance as a future DPG member**.⁹⁹

No formalized external community governance

(i) No formalized external community governance corresponds to the minimum definition of a DPG—as defined by the DPGA standards—and makes its code publicly available.¹⁰⁰ This allows other entities—that are not members of the government- or foundation-sponsored DPG—to fork the code. This step is often regarded as the very minimum of open source.¹⁰¹ In addition to publicly available code, a government- or foundation-sponsored DPG may allow participation by external actors that do not include a contribution to the code—for example, by opening up meetings to the public.

Legitimacy and support are the main governance aspects that are affected by publishing the code, since it makes the software accessible to a larger group of potential stakeholders and encourages reuse by other (government) entities. These stakeholders can include interested citizens, as well as other governments that are not members of the project or the open-source community.

Generally speaking, simply publishing the code this way might be a sensible option for a very small, very defined niche with a limited number of users—a bespoke solution that is just emerging as a DPG. These projects may not have the operational capacity yet to benefit from outside contributions. By contrast, more mature projects—a mature product or an underlying infrastructure commodity or standard, as well as a custom bespoke solution project with sufficient capacity—may greatly benefit from outside ideas and may choose to opt for an informal shared community governance concept concerning nonmembers.

Formalized mechanisms to govern the contributions of the external community

With the concept of **(ii) formalized mechanisms to govern the contributions of the external community**, a government- or foundation-sponsored DPG makes the code visible to the public and allows external contributors to make comments on, or even contribute to, the code base under conditions set by the members of the DPG. Generally, the original author of the code—i.e., a stakeholder that is an official member of the government- or foundation-sponsored community—decides whether and how these contributions are incorporated into the original code base. In contrast to fully community-managed open-source communities, these stakeholders or sponsors likely remain in control of strategic decision-making, including the authority to grant different rights.¹⁰²

In contrast to the first option, this option additionally provides a formalized mechanism for external contribution. The approach allows government entities to benefit from external contributions that may detect bugs in the code or have innovative ideas for moving the source code forward.

Formalized access and path to involvement in the DPG’s governance as a future DPG member

The third option, (iii) **formalized access and path to involvement in the DPG’s governance as a future DPG member**, includes the existing pathways to membership in a government- or foundation-sponsored DPG. Members in this case generally refer to different entities, e.g., cities. This formalized path would ensure the new contributor (i.e., member) would have full access to the rights and responsibilities of the rest of the members and would become involved directly in the governance of the DPG. NIIS is an example of this: under its specifications of membership “rights and obligations,” there are preconditions to becoming a member of the Association. These are “(i) having power to implement the core e-Government infrastructure components directly or indirectly within a member country in public interest; (ii) payment of a membership fee; and (iii) agreeing with the membership terms.”¹⁰³ The most important aspect of these stipulations, however, is the fact that the decision relies ultimately on the General Meeting of the governing body, which decides on memberships for the Association. In the case of NIIS there is a formalized path to include external contributors as members in its membership guidelines.

To be clear, opening up a government- or foundation-sponsored DPG to external contributors does not necessarily mean that a community will develop around the open source code. For example, a study analyzing public engagement with the U.S. federal government’s Open Source Pilot Program shows that only a few open-source repositories organically attracted a community of contributors.¹⁰⁴ Supporting this finding, many of our interviewees pointed out that institutionalized open-source communities, such as the Linux Foundation, employ full-time personnel to grow their communities. This leads us to conclude that there are costs to enabling general outside contributions to a DPG.

If a government- or foundation-sponsored DPG decides to promote community building, it should draw on best practices from sizable open-source foundations. Some of these best practices that our interviewees stress are having community managers, community meetings, community mailing lists, and source-code documentation.

Cases in Point

NIIS allows for external contributions and development requests if they are in line with their road map.¹⁰⁵ These contributions and requests are reviewed according to the same criteria as internal contributions before they are incorporated into the code base or made part of the product road map (or declined).

OMF additionally allows for significant outside development work (unsanctioned development).¹⁰⁶ While this work is not performed by an individual external contributor, it is an interesting example of a variation of outside contribution. This type of work is performed by a member institution and can then be requested to be integrated into the original code base. As this may entail strategic matters, the strategic senior board makes the decision of whether to incorporate or reject a contribution.

MOSIP has an even more open approach to contributors. The organization provides flexibility and ultimately serves as a “best practice” system built by global experts by allowing contributors to present new features or to fix bugs.¹⁰⁷ Contributions range from requirements and design to coding, testing, and documentation—making the system robust and providing set paths for contribution while adhering to submission or reporting guidelines.

3. LITERATURE REVIEW

We turned to the academic literature to develop governance principles. For this, we asked: **How do different streams of literature conceptualize “well-governed”?** From this, we extracted principles that serve as the foundation for the recommendations in the playbook.

Public Value

One stream of literature focuses on public management with the goal of creating net public value.¹⁰⁸ Moore’s strategic triangle is foundational to this school of thought. The author proposes a performance measurement that helps public managers name, observe, and measure the value they create through the development of public goods for public value.¹⁰⁹ Public value in this context is defined as a “very broad set of political, social, and economic objectives: improving the material wellbeing of individuals, families, and communities; protecting the rights of individuals and groups; improving social cohesion and quality of life in neighborhoods; and so on.”¹¹⁰

Public value theory further argues that the focus of public management is ultimately on the final purpose for which, for example, citizens will hold public managers accountable for delivering the result on all levels.¹¹¹ For this, the strategic triangle serves as a diagnostic tool, as well as a subsequent implementation practice, focused on three areas that function as a feedback system among themselves:

- **Public value**—a conception of the public value to be pursued);
- **Legitimacy and support**—a base of social legitimacy, public support, and financing; and
- **Operational capacity**—the capacity required to deliver results.

Country and Corporate Governance

While public value theory contains implicit governance principles, they are not explicitly named as such. The literature that focuses expressly on governance principles predominantly centers on (i) **country governance** and (ii) **corporate governance**.¹¹²

Country governance

In the literature and the real world, country governance is often considered in conjunction with development practices.¹¹³ It is commonly associated with indicators that are used to assess the political status of developing countries and has implications for monetary aid by external organizations.¹¹⁴ As a result of the varying concepts that “governance” can refer to, there has been no firm consensus on defining “good” governance for countries or institutions.¹¹⁵

For example, the World Bank’s Worldwide Governance Indicators (WGI) program used the terms “governance” and “institutional quality” interchangeably from its inception in the 1990s until proposing a broad definition of the terminology.¹¹⁶ Their definition focuses on “the traditions and institutions by which authority in a country is exercised.”¹¹⁷ It further includes “the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them.” The different parts of this definition correspond to a total of six governance indicators: (i) voice and accountability, (ii) political stability and absence of violence, (iii) government effectiveness, (iv) regulatory quality, (v) rule of law, and (vi) control of corruption.

Similarly to the World Bank, Keping defines the purpose of governance as being “to guide, steer and regulate citizens’ activities through the power of different systems and relations so as to maximize

the public interest.”¹¹⁸ While he identifies the governance goal as “the public interest,” this concept could also be considered to be interchangeable with Moore’s “public value.” He boils down the different literature on achieving the purpose of “good” governance into the following six essential components: (i) legitimacy, (ii) transparency, (iii) accountability, (iv) rule of law, (v) responsiveness, and (vi) effectiveness.¹¹⁹

The World Bank’s and Keping’s indicators are similar to the components of the strategic triangle. For example, “legitimacy” and “voice and accountability” can be mapped directly onto “legitimacy and support” in the strategic triangle, while “government effectiveness” and “effectiveness” are related to “operational capacity.”

Finally, the World Bank distinguishes formal government institutions and practices from the type of governance that exists in practice, primarily by separating them into *de jure* and *de facto* categories.¹²⁰ The former focuses on rules-based indicators of governance, primarily on existing legislative frameworks, while the latter centers on outcome-based indicators of governance. Therefore, according to the World Bank, the key concepts for country governance focus on the processes that are at play between agencies to allow for authority to be exercised, whether *de jure* or *de facto*. These concepts provide essential nuance to the strategic triangle—*de jure* applies to all three components of the triangle; in contrast, *de facto* outcome is an explicit dimension of the operational capacity component.

Corporate governance

Another stream of governance literature relevant to this research is corporate governance. Corporate governance is well researched.¹²¹ A case study that first extracts generally applicable principles from the private sector and then discusses their implications for the governance of the International Monetary Fund (IMF) itself is insightful for government- or foundation-sponsored DPGs, for two reasons.¹²² First, the study abstracts corporate governance principles independent of country legislation. Second, the principles were authored to be applied to an institution that is arguably closely related to country collaboration in the public sector—the IMF.

The IMF case study presents 14 principles and practices in the private sector that the authors describe as an emerging consensus in governance codes.¹²³ These principles are sub-sectioned into five groups that are closely related to Moore’s strategic triangle: (i) strategy and mission, (ii) accountability, (iii) oversight, (iv) stakeholder interests, and (v) principles that cut across governance areas. While corporate governance differs from public sector governance—for example, the agents in the sectors are different—the overarching principles can be applied to both. Thus, the principles are relevant to government- and foundation-sponsored DPG governance efforts.

Governance in Open Source

Community-led governance

One possible way of approaching the open-source community-led governance literature is to divide it into two streams:

- (i) Literature that discusses the **relationship between contributors and governance** within open-source communities, and
- (ii) Literature that discusses the introduction of **formal governance mechanisms into open-source communities**.

Contributors and governance

It comes as little surprise that a large body of literature regarding the governance of the broader open-source community focuses on one of their most important stakeholders: **the contributor**.¹²⁴ Generally speaking, voluntary contributors—in various roles and for multiple reasons—are the ones that move the software development from one release to the next in the open-source community. Simply put, without them, there would be no open-source community.

In contrast to community-led open-source governance, government- or foundation-sponsored DPG governance structures are likely artificially introduced and tend to focus on a smaller number of stakeholders—primarily government actors. For example, Shah notes that the context of creating a governance structure around a limited number of stakeholders gives voluntary contributors a different role compared to community-led efforts and may influence the contributors' motivation to contribute to a project.¹²⁵ Our report moves even further away from a contributor focus, turning to the contributor literature primarily to gain generally helpful pointers for governance best practices for formal government-led governance. Thus, this section does not have the objective to review the rich body of literature surrounding this subject in detail. Instead, it focuses on learnings from the literature that are relevant to the focus of this study.

Our elaborations above do not imply that consortia that introduce formal governance structures instead of organically developing a community do not exist within the open-source community. Studies that discuss these governance structures include, for example, West and O'Mahony and Mäenpää et al.¹²⁶ However, this section looks at the governance literature of open-source communities as a whole without particularly focusing on this sub-segment.

Markus provides a comprehensive literature review of contributors and their conceptual relation to governance in the open-source community.¹²⁷ Her review (2007) has subsequently been used as a basis both for theoretical considerations on governance and for further empirical studies.¹²⁸ Markus structures the existing literature through three underlying goals with corresponding governance items for open-source governance.¹²⁹ Two of these goals concern strategic governance considerations and are thus more relevant for our DPG study than the tactical considerations presented in the third goal.

- Governance can serve the goal to be a “**solution to collective action dilemmas** about individuals' or organizations' incentives to contribute to, or appropriate the benefits of, [open-source software] development.”¹³⁰
- Another group views governance mechanisms as having “inherent motivational potential, affecting decisions about which”¹³¹ project to join or how much to contribute, and therefore its goal is to **create a favorable climate for contributors**.

Applied to government- or foundation-sponsored DPG governance, both goals capture how a government agency—and potentially other actors—balance their competing needs to achieve net public value.

The emergence of formal governance

A complementary way of looking at the governance of open-source communities is to investigate how—if at all—formal governance structures emerge. O'Mahony and Ferraro have been at the forefront of examining the **emergence of formal governance systems in open-source communities**.¹³² Other research in this area includes nuancing the emergence of governance and coordination processes through a case study,¹³³ and an evaluation of different governance tools along the community lifecycle.¹³⁴

O'Mahony and Ferraro trace and categorize the Debian open-source community's journey designing and implementing an explicit governance system.¹³⁵ Their analysis distinguishes four

phases of governance: de facto governance, designing governance, implementing governance, and stabilizing governance.¹³⁶

This evolution toward a more formalized model of governance is a crucial characteristic of many large, mature, and successful community-led open-source communities.¹³⁷ A more formalized governance of open-source communities “often [...] includes a formal leadership role, a representative body of decision-makers and a non-profit foundation to protect the community’s interests.”¹³⁸

Instead of using an explicitly open-source-related concept of community maturity, we ultimately used Wardley’s mapping to capture the concept of maturity in our discussion and recommendations.¹³⁹ Other approaches to mapping maturity include Digital Square’s Global Goods Maturity list, developed with a focus on global health goods.¹⁴⁰

What can we learn from the governance items in open-source communities once they are introduced? First, O’Mahony and Ferraro’s case study illustrates what Markus generally observed in her literature review. Second, they further nuance and reinforce Moore’s strategic triangle by adding a “maturity” component to it.

Government-sponsored governance

While a rich body of literature covers governance in the open-source community, the number of articles that specifically discuss open-source governance in the public-sector niche is limited. One rare example is an article written by Eaves and Lombardo as a follow-up to a Digital Services Convening. In their article Eaves and Lombardo distinguish three different types of community engagement—no community, informal community, and formal community—in their analysis of public-sector open-source communities.¹⁴¹ The other literature on open-source governance in the public sector can be mapped to that scale.

Some articles focus on a no-community-to-informal-community approach to governance where one government agency publishes code that another agency may reuse.¹⁴² Hence, they do not address the founding of a governance structure on day one of a potential code-sharing collaboration among governmental entities. For example, one article discusses the informal collaboration among contributors around open-source government repositories and the reuse of open-source government code by other government entities following a U.S. federal government push in that direction before 2015.¹⁴³ Similarly, Rashbass and Robertson analyze the Federal Source Code Policy’s pilot program (which expired in 2019) to promote the use of open-source software in government.¹⁴⁴

More interesting for understanding government- or foundation-sponsored DPG governance structures is another article that explicitly focuses on governance but covers government agencies collaboratively building software more generally.¹⁴⁵ Jaquith and Carnahan develop eight software-sharing models that do not distinguish between open-source and proprietary software development. Hence, while all their models are software collaboratives, not all the models are DPGs.

Their sharing models partially overlap with the aforementioned informal governance structure findings.¹⁴⁶ However, some of the sharing models imply more formalized community governance structures.¹⁴⁷

Beyond government-led models, Jaquith and Carnahan propose sharing models that are less relevant for this report since they do not focus on the public sector exclusively¹⁴⁸ or do not imply a distinct governance model.¹⁴⁹

Government-adjacent-sector-sponsored governance

To map and better understand governance adjacent to government open-source efforts, we also reviewed literature covering government-adjacent sectors.

We included the education sector—as an adjacent sector—in our literature review for two main reasons. First, the sector is home to some examples of successful governance of shared software

development. These examples include Kuali—which started as a group of universities and colleges collaborating to build financial software—and REDCap—which began with several researchers looking for “a secure data collection tool.”¹⁵⁰ Second, these education-sector governance examples have inspired a distinct literature stream: research on consortium-based open-source software (COSS).¹⁵¹ COSS is a highly formalized type of governance for multiple institutions working on a common problem. Liu and Tu conceptualize COSS development as a hybrid of open-source—e.g., commitment to open source code and emphasis on the role of shared values—and commercial—e.g., institutional control and formal partnership—software development.¹⁵²

Privately sponsored governance

Finally, we turned to the academic literature on the private open-source sector to discover what it had to offer our investigation of collaborative software-building efforts. We focused our search on more formalized governance types that may serve as a close point of comparison with government- or foundation-sponsored DPG efforts. For this sub-segment, the literature primarily focuses on sponsored open- or mixed-source case studies.¹⁵³ Other authors review a mix of sponsored and community-based governance to quantitatively develop their own governance archetypes.¹⁵⁴

APPENDIX 1: Case Study on NIIS

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The Nordic Institute for Interoperability Solutions (NIIS) describes itself as “a non-profit association with a mission to ensure the development and strategic management of X-Road and other cross-border components for digital government infrastructure.”¹⁵⁵ The X-Road is “an open-source software and ecosystem solution that provides unified and secure data exchange between organizations” that is recognized by the DPGA as a DPG.¹⁵⁶ Currently, the member countries of NIIS are Estonia, Finland, and Iceland.¹⁵⁷

In terms of maturity, our research categorizes a **DPG as a product** when at least two government entities share, use, and develop at least partially the same source code in an at least somewhat institutionalized governance structure. Given this definition, X-Road is a product and NIIS is the institutional structure responsible for governing the product.

NIIS provides a model for the governance of a DPG (i.e., the X-Road). In this case study, we explore the formation, governance design, and governance structure of NIIS.

Formation of NIIS

At the end of 2001, Estonia began deploying the X-Road nationwide.¹⁵⁸ Slowly, the software became the foundational component for many digital services enabling e-Estonia. By 2013, Estonia and Finland had begun collaborating toward the joint development and maintenance of the X-Road.¹⁵⁹ In the years that followed, the Population Register Center (VRK) and the Information System Authority (RIA), agencies representing Finland and Estonia respectively, facilitated this collaboration. The two agencies also signed a Cooperation Agreement and agreed on a “set of practices and guidelines” for their joint work.¹⁶⁰

Estonia and Finland established NIIS in 2017 as a “jointly managed special-purpose organization tasked with administering the development of the X-Road.”¹⁶¹ The creation of NIIS both formalized and deepened the countries’ relationship in the field of digital cooperation. In 2018, the two national agencies—VRK and RIA—handed over the responsibility for development and maintenance of the X-Road to a joint institutionalized governance structure—NIIS. In 2021, Iceland joined NIIS as the latest member country.¹⁶²

The formation of NIIS came well after X-Road had been adopted in Finland and Estonia. However, it is worth mentioning that the implementation of X-Road was carried out in differing contexts in the two countries. For example, Petteri Kivimäki, CTO of NIIS, notes that the two countries adopted the X-Road from very different starting points: “On the one hand, Estonia has built their digital infrastructure on top of X-Road. In 2001 they started from scratch since they did not have a large legacy in place. [...] On the other hand, when the implementation project was starting in Finland in 2014, there were already a lot of legacy systems as well as connections between the systems.”¹⁶³

Given these contextual differences, two factors prompted Finland and Estonia to begin what would become a successful partnership in developing and managing the X-Road and helped lead to the eventual formation of NIIS.

First, as noted previously, Finland and Estonia began cooperating with the intention to jointly develop and manage the X-Road.¹⁶⁴ It is important to note that when Finland began implementing X-Road, they did not fork or customize the source code to meet their distinct requirements. Instead, Finland and Estonia “develop[ed] the source code together, so that both countries use the same source code.”¹⁶⁵ Contextual differences were and continue to be taken into account through different

configurations of the same source code. As of late 2021, all member countries use the same source code for the X-Road.

Second, even while acknowledging the contextual differences in the state of digital transformation, the two founding members of NIIS—Finland and Estonia—are more similar than they are different. For example, they are geographically proximate and have close trading relations.¹⁶⁶ We can reasonably conclude that their partnership in governing a DPG was more likely to succeed than if a country member with a largely divergent context had been involved. It remains to be seen if this continues to be true with the recent inclusion of Iceland as a NIIS member country.

Governance Design and Structure

NIIS is organized around the aim of ensuring “the quality, sustainability, and cross-border capability of core e-Government infrastructure components” while saving resources through “the development of digital society solutions and cross-border cooperation.”¹⁶⁷ Their 2024 vision states the following: “NIIS is a strong influencer in digital governance and a growing platform for cross-border cooperation and innovation. NIIS contributes to digital developments and initiatives in the Nordic countries, Europe, and globally and is onboarding new members.”¹⁶⁸ As noted in our report, a clear articulation of the organization’s **vision, mission, and values statement** is a prerequisite to designing and enforcing effective governance. Additionally, NIIS works in the open, in the sense that in the development model of the X-Road, its change-management documentation and workflow are published on relevant digital platforms.¹⁶⁹

NIIS is designed to protect and promote the interests of its member countries.¹⁷⁰ Country membership is contingent on preconditions that require members to “have power to implement the core e-Government infrastructure components directly or indirectly within a member country in public interest; payment of a membership fee; agreeing with the membership terms.”¹⁷¹ Prior to becoming a NIIS member, a country is designated as a partner and invited to participate in a pre-agreed-upon set of meetings and tasks. For example, from 2018 to early 2021, “Iceland participated in the NIIS Working Group and contributed to the development of the X-Road.”¹⁷²

The X-Road Product Roadmap and Product Backlog are owned and managed by NIIS. The Product Roadmap “outlines the flow of new business features needed to satisfy the needs of the NIIS members” and “helps reach a consensus about future developments and [...] provides a framework to help plan and coordinate upcoming releases.”¹⁷³

NIIS has a formalized access and path to governance involvement. NIIS member countries have pre-defined pathways to fully access rights and responsibilities and participate in governance. While NIIS membership is restricted to countries, the organization accepts change requests to the X-Road source code from both internal, NIIS-hired developers (NIIS members) and voluntary external contributors (X-Road Community).¹⁷⁴ External contributors can be from outside NIIS member countries. Requests must be in line with the Product Roadmap (otherwise they may be sent to the Advisory Group for approval) and are evaluated through the change management process (**Figure 11: Change Management Process, NIIS**) outlined in the X-Road Development Model.

Figure 11: Change Management Process, NIIS



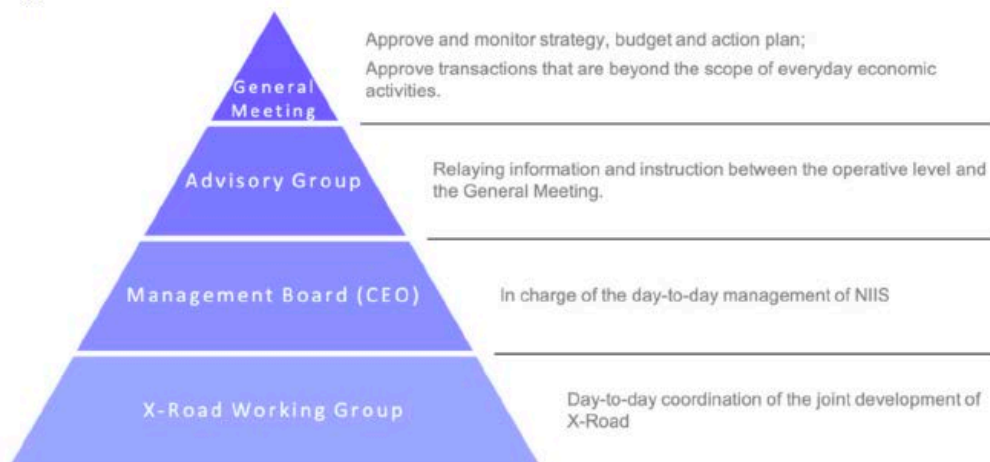
Source: X-Road Development.

As of late 2021, NIIS does not have an explicitly outlined **code of conduct**. Our research shows that open-source communities face issues with inappropriate contributor behavior. Given that NIIS aims to foster a robust community of external contributors,¹⁷⁵ establishing an enforceable code of conduct can help to mitigate and create accountability for these behaviors.

NIIS has a host of both strategic and technical functions. On the strategic side, administration of documentation and business requirements, conducting development, developing and implementing principles of licensing and distribution, and facilitating international cooperation fall under the purview of NIIS.¹⁷⁶ Under its technical functions, NIIS has the responsibility of managing, developing, verifying, and auditing the X-Road source code.¹⁷⁷ The governance structure delegates technical and strategic functions to different entities within NIIS.

The governance structure of NIIS, as defined in the organization’s Articles of Association, consists of a General Meeting, an Advisory Group, a Management Board, and the X-Road Working Groups (Figure 12: The Governance Structure of NIIS).¹⁷⁸

Figure 12: The Governance Structure of NIIS



Source: Nordic Institute for Interoperability Solutions; graphic published in Eaves and Lombardo, “2020 State of Digital Transformation,” 19.

The General Meeting and the Management Board are the two components of the governance structure that are mainly dedicated to serving the strategy function. The General Meeting is the highest body in NIIS's governance structure and makes most strategic-level decisions—such as achieving “membership in the Association” or amending the Articles of Association.¹⁷⁹ It consists of three members that represent NIIS's member countries—Estonia, Finland, and Iceland.¹⁸⁰ Each member has one vote.¹⁸¹ Further, the Articles of Association specify different voting mechanisms that will become more relevant once NIIS has grown beyond three members. For example, the Articles of Association can only be amended by a two-thirds vote, and at least half of the members need to vote in favor of a resolution for the resolution to pass.

The Management Board consists of up to three members and is responsible for executive, day-to-day decision-making.¹⁸² In its current form the Management Board consists of a sole member—the CEO of NIIS.¹⁸³ The CEO is supported by different technical functions—such as the CTO—that are not part of the Management Board. In terms of decisions, the Management Board, for example, can “call the General Meeting,” “carry out everyday economic activities,” and “hire personnel.”¹⁸⁴

The other components of the NIIS governing structure are an Advisory Group that provides tactical-level advice and the X-Road Working Groups, which make operational decisions and coordinate the development of the X-Road.¹⁸⁵ Both components mostly serve technical functions.

The Advisory Group supports the Management Board and relays “information and instruction between the operative level and the General Meeting.”¹⁸⁶ As of late 2021, the Advisory Group consists of two representatives per NIIS member country.¹⁸⁷ It is important to note, however, that the “Advisory Group is not a formal organ of the Institute and has no decision-making power on its own.”¹⁸⁸ The Advisory Group does serve an important function within the X-Road development process, which is that “new business feature requests [that are not aligned with the Product Roadmap] are submitted to the Advisory Group for approval.”¹⁸⁹

The practical collaboration and coordination of the joint development of X-Road takes place in the X-Road Working Groups. This is the arm of NIIS that deals with “enhancement requests, error reports, and other proposed changes” to the X-Road.¹⁹⁰ The Working Group is led by the CTO of NIIS and “consists of representatives from the operators of X-Road environments of NIIS members, NIIS employees, and NIIS development team members.” Like the Advisory Group, the X-Road Working Groups are not a formal organ of NIIS.¹⁹¹

APPENDIX 2: Case Study on CalSAWS

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Through our research we have found that CalSAWS exemplifies a governance structure that was developed from the bottom up. For this case study, we focus primarily on a specific governing body—the Board of Directors—and its decision-making rights. A key disclaimer for this section is the fact that CalSAWS began its official merger in September 2021, as this report was being written.

Understanding CalSAWS’s Historical Background

In the early 1990s, several welfare systems for delivery of benefits emerged in the state of California. The emergence of these systems was an effort to comply with the U.S. Personal Responsibility and Work Opportunity Reconciliation Act of 1996, a major welfare reform law that required every state to track their public assistance recipients.¹⁹² Given the number of emerging systems, in 1995, the California legislature approved a plan to establish four consortia of counties and limit the number of consortia that could exist—to no more than the established four.¹⁹³ As a result, the counties aligned around four emergent systems: the Interim Statewide Automated Welfare System (ISAWS), Los Angeles Eligibility, Automated Determination, Evaluation, and Reporting system (LEADER, which transitioned to the LEADER Replacement System, or LRS), the CalWORKs Information Network (CalWIN), and Consortium IV (C-IV Project).¹⁹⁴

In 2007, the number of consortia underwent further consolidation from four to three as the counties that used ISAWS migrated to the C-IV Project. This left three active consortia: **CalWIN, C-IV Project, and the LRS project.**¹⁹⁵

The first, **CalWIN**, was developed and implemented by 18 counties and is “one of the nation’s largest automated welfare benefits and eligibility systems.”¹⁹⁶ As of 2018, the CalWIN system “processes 11 million transactions daily and serves nearly 40% of the State of California’s Social Services clients.”¹⁹⁷ The CalWIN consortium had its structure formalized under the Joint Powers Authority (JPA) of the Welfare Client Data System (WCDS) Consortium.¹⁹⁸ A JPA is a joint exercise of powers agreement under which “two or more public agencies by agreement may jointly exercise any power common to the contracting parties” under the jurisdiction of California law.¹⁹⁹

The second, the **C-IV Project**, was established in 1996 as a standalone JPA by four counties.²⁰⁰ These counties worked together to document a shared set of specifications for “a web-based, automated system to manage the increasing complexity of public assistance and employment programs.”²⁰¹ They then contracted with Accenture to build out a shared solution. As a JPA, the C-IV Project differed from CalWIN in that it was developed as a single legal entity that oversaw the management of the project and system, separate from county authority. As mentioned, C-IV then absorbed the former ISAWS counties in 2007.²⁰² As a result, the consortium now has 39 member counties and serves around 30 percent of California’s public assistance caseload.²⁰³

The third and final consortium was the **LRS Project**. The **LA County Department of Public Social Services (DPSS)** worked “with Accenture to implement, modify, and maintain” this project.²⁰⁴ By 2016 it was implemented countywide. This consortium targets the remaining 30 percent of caseloads in the broader LA area, with the largest user base for a single county (4.5 million).

Starting in September 2021 and aiming for a finalized merger by October 2023, the 18 counties in CalWIN, 39 counties in C-IV, and LA county (LRS consortium) have started to be converted and migrated to a single consortium: the **California Statewide Automated Welfare System (CalSAWS).**²⁰⁵ For some

consortia this process will be easy: the C-IV’s 39 counties migrated to CalSAWS over a single weekend in September 2021, as compatibility between the two systems made the transition relatively simple.²⁰⁶ In contrast, the incorporation of the 18 CalWIN counties will be more complex. CalSAWS will ultimately serve 58 California counties with users comprising 16 million citizens and 69,000 county officials.²⁰⁷

CalSAWS’s Governance Structure

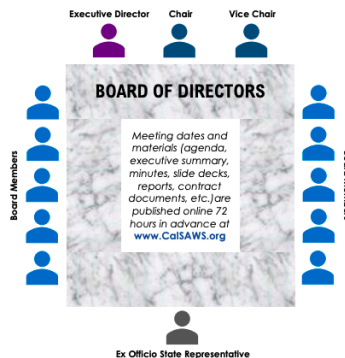
Based on the background we present above, and as we learned through interviews with representatives of CalSAWS, those original consortia broadly emerged as a county-led response to a federal mandate. In contrast, the emergence of CalSAWS is a broadly state-led initiative to consolidate and standardize the administration of benefits.

Thus, historically the need for integration and collaboration came from the bottom to the top, eventually proving out benefits that resulted in the state pushing for the creation of CalSAWS. Now that a single consortium (CalSAWS) is perceived as optimal, the state is imposing it from the top down, shifting both governance and implementation from the initial model.

CalSAWS is a JPA—much like two of the previous consortia—and it now includes all counties—divided into six regions.²⁰⁸ The CalSAWS JPA “oversees and controls the budgets, investments, contracts, and resources of the CalSAWS portfolio.”²⁰⁹ From a strategic perspective, CalSAWS is **governed and administered by a Board of Directors. This board is made up of 12 members, with voting representation from each of the six regions. The selection of this Board is a democratic process for which nominations are slated on a yearly basis followed by an election process with the general membership of the 58 counties, ensuring regional equity and representation (Figure 13: The Board of Directors of CalSAWS).**

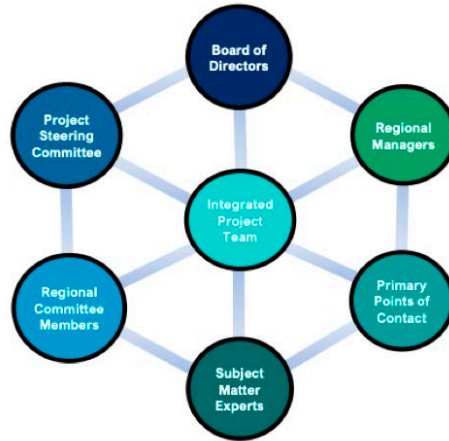
The full governance ecosystem of CalSAWS consists of Regional Managers—“the key management point of contact between the Project and the Counties”; Primary Points of Contact—an additional liaison between county and project; a Project Steering Committee—to “ensure [...] a consolidated business approach”; an Integrated Project Team—liaison between “government employees and vendor staff”; Regional Committee Members—county voices, and Subject Matter Experts (Figure 14: Ecosystem of CalSAWS).²¹⁰

Figure 13: The Board of Directors of CalSAWS



Source: CalSAWS Information Transmittal, “CalSAWS Executive Overview.”

Figure 14: Ecosystem of CalSAWS



Source: CalSAWS Information Transmittal, “CalSAWS Executive Overview.”

Decision Rights: Representation and Decision-Making

What then are the membership and decision rights as well as funding mechanisms of the CalSAWS structure?

The CalSAWS Consortium is composed “of 58 member counties, which are organized into six regions based on geographic proximity and loosely based on persons being served by such counties” (See **Figure 15: Overview of CalSAWS**).²¹¹ It was important that CalSAWS balance the persons-served count between the different counties as well as the regional proximity and representation on the specific boards. At first, and worth noting, larger counties had stronger voices than smaller counties in the governance process—particularly within the C-IV Project given that the four original counties were stronger than the 35 ISAWS counties that joined at a later date.²¹² However, through negotiation between the directors, an equal membership and representation that ensured representative decision-making was developed. So far, different membership levels have not been explored, as all counties in California are highly incentivized to opt into the structure.²¹³

Figure 15: Overview of CalSAWS

CATEGORY	REPRESENTATION
General Membership	58 Member Counties
Member Representatives	60 Member Representatives <i>LA County has 3 Member Representatives</i>
Number of Regions	6 Regions
Board Officers	Board Chair and Vice Chair <i>Nominated and elected in June to serve for one year in the upcoming SFY</i> Board Secretary <i>Role performed by the CalSAWS Executive Director in support of facilitating Board meetings</i>
Board Members	12 Board Directors/Alternates <i>Regions 1 and 4 each have 2 Voting Members</i> <i>Regions 2 and 3 each have 1 Voting Members</i> <i>Regions 5 and 6 each have 3 Voting Members</i>
State Ex Officio	1 State Director of OSI, CDSS, or DHCS
Board Quorum	Presence of 7 Board Members from 5 Regions
Affirmative Votes for Board Action	Minimum of 7 Board Votes from 5 Regions
Fiscal Agent	San Bernardino County
Operating Mode	San Bernardino County
Legal Counsel	Kronick, Moskovitz, Tiedemann & Girard <i>Law firm retained by CalSAWS to function as JPA legal counsel</i>
Public Meetings <i>Conducted in accordance with the Ralph M. Brown Act</i>	JPA Board Meeting – Monthly Meeting Project Steering Committee – Monthly Meeting Member Representatives – Semi-annual Meeting WCDS Subcommittee – Monthly Meeting

Source: CalSAWS Information Transmittal, “CalSAWS Executive Overview.”

For decision-making, voting is representative (Figure 16: CalSAWS Votes by Aided Person Count), and is based on the California Welfare Directors Association model.²¹⁴ This model follows “a regionalized voting structure: 3 votes for regions with aided Persons Count (PC) greater than 4 million; 2 votes for regions with a PC greater than 2 million; [and] 1 vote for regions with a PC less than 2 million.”²¹⁵

Decisions on both the Board of Directors and the Project Steering Committee are usually reached unanimously.²¹⁶ The management of CalSAWS is active in reinforcing this consensus norm. The State of California maintains a non-voting, ex-officio representative who can intervene to explain policy considerations and implications. As noted in our playbook, consensus approaches risk sidelining dissenting views or reinforcing confirmation bias. For CalSAWS the Board of Directors’ role is to focus on the business needs and requirements of the counties—resolving road-map issues at the highest level. In contrast, technology decisions are raised, discussed, and resolved at a lower—more operational—level and are generally outside the counties’ purview and oversight.²¹⁷

Figure 16: CalSAWS Votes by Aided Person Count

	Region	Counties	Votes	RMs	Person Counts
	1	12	2	3	15.12%
	2	13	1	2	6.49%
	3	14	1	2	2.84%
	4	11	2	3	16.35%
	5	7	3	4	30.53%
	6	1	3	4	28.66%
	Total	58	12	18	100%

Source: CalSAWS Information Transmittal, “CalSAWS Executive Overview.”

CalSAWS has a tiered-member-contribution system based on each county’s caseload (number of people served).²¹⁸ CalSAWS also receives state funding through the JPA.

As a final note, the CalSAWS governance structure is clearly defined and attempts to engage many of the issues that we raise in the playbook. The degree to which the CalSAWS governance model is a success remains hard to assess until at least 2023 when the merger is finalized, and possibly a few years afterwards.

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