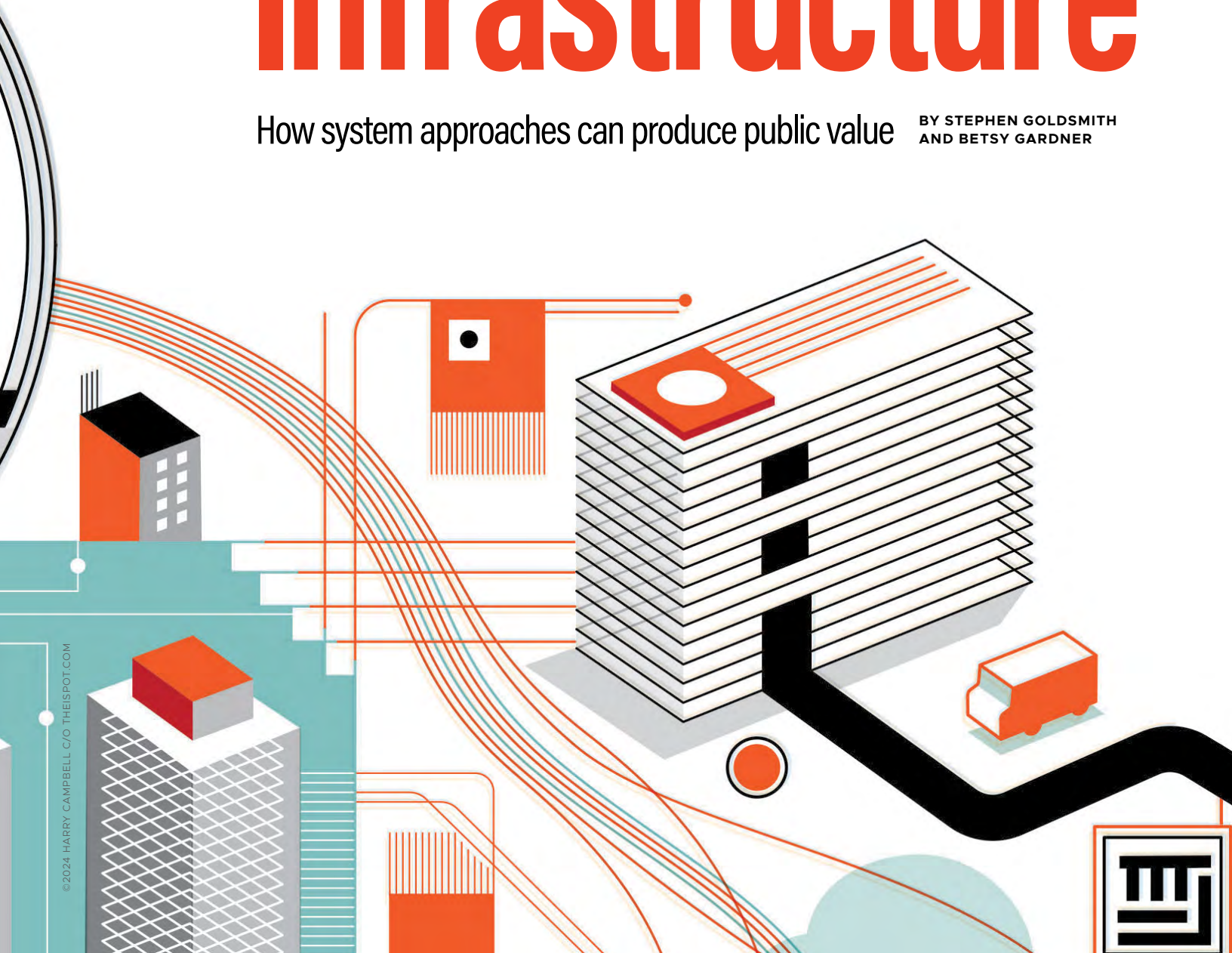




# Procuring Digital Infrastructure

How system approaches can produce public value **BY STEPHEN GOLDSMITH  
AND BETSY GARDNER**



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If your government is planning to adapt and innovate a new digital process via a public-private partnership (P3), a good first step is to attain a better understanding of the ways in which technology partnerships differ from the use of P3s to deliver civil works infrastructure such as roads, bridges, and water systems. The differences between digital P3s and civil works infrastructure, which must be clearly defined, include intangibility, scalability, interoperability, and multitenancy, which require modifying procurement and contracting approaches from public civil works infrastructure of the past.

While there are imminent advantages to well-structured digital P3s (for example, access to cutting-edge technologies and technical expertise, faster deployment, and the potential for real-time lifecycle updates and lifecycle savings), there are also concerns (such as, scoping, data privacy, security, and intellectual property ownership) as well as the difficulty of designing procurement processes and contracting structures that optimize risk allocation.

### WELL-STRUCTURED P3S

Local officials can develop some technology themselves, but the costs and talent barriers create limitations. When structured appropriately, governments could potentially use digital P3s to tap into the private sector's expertise, innovation, and scale to improve the delivery of public services and stay current with changing technology—while reducing the risks associated with research and development. By partnering with the private sector, governments may access specific expertise, cutting-edge technology, and innovation in the private sector, like carbon-capture roadways, solar paved highways, and artificial intelligence that monitors pipeline safety, which in turn need to be combined with other investments that further the systems approach.

Well-structured P3s optimize risk allocation by assigning project risks to the party best positioned to manage them. This results in significant project delivery and performance risk being borne by the private partner. According to a report on international

infrastructure P3s, risks can be categorized as “construction, financing, operations and maintenance; political risks; administrative licenses; and other risks (such as the price of the need to make ex post changes—changes based on actual results rather than forecasts—to the P3 service contract).”<sup>1</sup> These conventional P3 risks also apply in the digital space, along with a newer set of concerns that need attention.

### P3 CONCERNS

Whether the procurement is for a platform itself or for the inclusion of digital components in a traditional purchase, moving into a new digital mode presents even more challenges to the standard public and private relationships. One definition of success is all parties working together to produce more public value for dollar spent, while ensuring that the relationships respect privacy and produce equitable results. The structure of the relationship between local government and its vendors determines the success or failure of a project or undertaking.

Failure can take many forms: overpaying for services of inferior quality or items that don't work as intended, deploying technology that's obsolete by the time it's installed, unfunded maintenance or poor response times, or other defaults. Ultimately, failure could mean wasting the taxpayer's money, losing their trust, or providing insufficient benefit. A particular area of focus is those digital platform P3s that allow value to be produced across agencies, governmental units, or sectors.

The breadth of these agreements, and the fact that so few of them follow a standard model, puts even more stress on defining the scope and service-level agreements.

### DIGITAL P3 CONTRACTUAL PRINCIPLES

The move to digital P3s should be guided by the best aspects of traditional P3 contract modalities, but with reforms tailored to the characteristics and potential associated with technology. As opportunity grows, so does complexity. The following principles are keys to successful digital P3s.

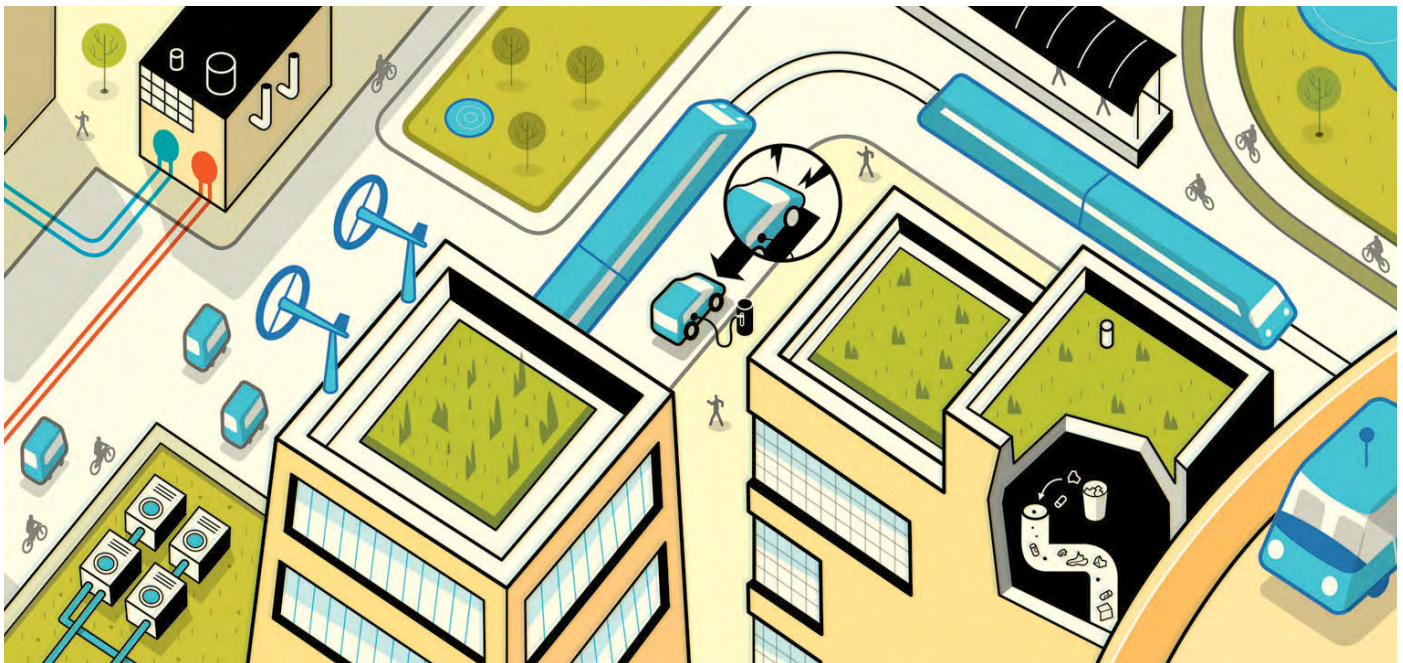
#### 1 Use system thinking and imagination in the problem definition and criteria.

A digital P3 should be solution-oriented. It is not the purchase of a commodity, but the purchase of a performance output. One of the fundamental differences between P3 contracts and traditional administrative contracting is that the former is output-based, with a focus on meeting prescribed outcomes and service levels, while the latter has been based on prescribed inputs.

During the COVID-19 pandemic, many governments needed to help residents secure emergency rental assistance and issued emergency contracts to vendors to this end. Governments needed a more imaginative and comprehensive solution, though, because residents also needed other programs including short-term COVID benefits, Medicaid, and the Supplemental Nutritional Assistance Program (SNAP).

On the other hand, governments needed a more comprehensive, novel, outsourced front end that would allow residents to secure all the benefits they were qualified for. Many were able to meet this challenge during the pandemic, although these tools were typically enacted as one-off tactical solutions. Ideally, this system should be easier for the recipients and the government, with more accountability.<sup>2</sup> This difference illustrates that digital P3s should be designed around residents' needs and create incentives for private-sector innovation to meet those needs.





Even the process of writing criteria for the competitive solicitation often needs cross-agency participation and criteria greater than just one program. Digital P3s, because of their capacity to stretch across stakeholders and sectors, must incorporate a broader set of criteria. For example, many digital solutions are two-sided, providing better processes internally (to the government administrator) and externally (to the public seeking a service). The internal and external user experience and ease of use for each stakeholder must be considered.

technologies will be used. Systems also require the use of protocols that govern information exchange nationally. An efficient system will use the innovation of national technology companies and will benefit residents who visit, drive, walk, bike and work in more than one city. National protocols—such as those now promoted by the Open Mobility Foundation, with its curb management specifications and scale innovation—help make innovations available to small and large cities alike. For example, the Open Mobility Foundation's Mobility Data Specification standardizes communication and data sharing between cities and private mobility providers to facilitate a repeatable experience for residents and vendors across local jurisdictions.

and paid for by government during the contract term need to be accounted for.

## TIP

Use federal civilian contracting and federal acquisition regulations as guidelines. In these regulations, vendors usually retain ownership of technical data and commercial software, but the government receives a license to use them during the contract.<sup>3</sup>

## 3

**Incorporate rules concerning data security and privacy.**

Data privacy is one of the biggest concerns in a digital world. In a situation where points of data are mixed or merged, with some derived from governmental sources and relationships and others from private parties, governments need to control the rules on data privacy and commercialization.

One of the best-known examples of digital P3 privacy controversy is the Sidewalk Labs Quayside proposal in the City of Toronto, Ontario—an ambitious but failed plan for a real estate P3 infused with digital infrastructure. With substantial data interactions, access to personal information occurred regardless of whether a resident was on a public or private right of way, blurring the lines and rules between public and private.

Bennat Berger, in an article about the Quayside failure and the future of smart cities, emphasized the importance of trust and transparency when he said the private partner “must adopt a near-nonprofit perspective that prioritizes social gain over profits to avoid accusations of corporate greed and involve advocacy groups in their decision making processes. Residents must understand how their data will be used, who has access to it, and what they can do to maintain their privacy in a space

where data collection is a necessity.”<sup>4</sup>

If a government gives a vendor the right to provide a product that has access to data, then the government should set the privacy boundaries, regardless of whether access to the public's data comes from the product itself or from easements on public property. This is the case with LinkNYC, which provides free street-level connectivity in return for data and advertising rights. According to Michael Bennon, managing director of the Stanford Global Projects Center, “the public partner needs to set clear guardrails up front, as well as know what is feasible within these systems and incentivize private partners to be flexible in terms of data issues and terms.”<sup>5</sup> We go even further, advocating that ownership and use of data needs to be clearly articulated and legally codified in the P3 agreement (or alternatively, subject to more generalized regulations, as is the case in the European Union).

Although security liability issues are less controversial, they are no less difficult than privacy, as data breaches happen regularly in multiple industries and many popular apps. According to Jill Jamieson, a leading P3 expert, “The issue is who is legally liable for each layer of data security and what, if any, limitations exist on exposure. This allocation of responsibility is a major source of contention in the negotiation of these contracts, as most financing institutions and technology providers are unwilling to assume unlimited liability in the case of breaches.” A breach could occur through a private but connected device, so things like connected vehicles—which can communicate directly to city traffic sensors—should meet local and national security standards.

The privacy issues raise a range of questions. The rules cannot be easily set out in advance and, in fact, require the preferred parties and the government to negotiate the range of approaches. Not all data is equal; aggregated data is the safest, but anonymized personally identifiable information can often be reidentified.<sup>6</sup> Developing rules related to collection, use, and archiving will evolve during the negotiations and implementation of a project.

**Digital P3s often involve significant upfront costs and, when coupled with lifecycle operations and maintenance costs, present an interesting challenge for government budgets.**



## TIP

Make sure that a city official or a separate consulting expert oversees data privacy and the rules and audits for employees and external partners. Ensure that anonymous data cannot be easily reidentified and clearly understand the revenues and risks involved with authorized commercialization. Look to other best practice examples in setting citywide standards.

## 4

### Use consultants to compensate for asymmetric expertise.

Private partners generally understand more about their product, its capacities, and risks than the city official with whom they are negotiating. According to research published in *The Rand Journal of Economics*, “the long-term relationship inherent in a public-private partnership may create particular scope for information asymmetries to develop between the public sector and the private entity,” which means that “the private-sector entity may become better informed than the public authority about additional costs that may arise in the operation stage when changes in circumstances occur.”<sup>7</sup>

And ordinary boilerplate provisions from procurement officials may miss the point of a newly tailored technology solution and restrict innovation while inadvertently accepting risks. While serving as mayor of the City of Indianapolis, Indiana, co-author Stephen Goldsmith experienced this first-hand. Goldsmith’s administration bid out one of the country’s first, big-city full information technology (IT) outsourcing. His team faced challenges concerning service-level agreements in defining where scope ended, and whether a change order would occur. Faced with these challenges, the administration sought out one of the few law firms in the country with applicable experience.

Since then, the availability of digital technologies has exponentially increased. Yet this commercialization also creates complexity in evaluating technical and business risks. Government officials cannot easily evaluate the chances that a startup

with an innovative solution will stay in business during the length of a contract. As is standard with infrastructure P3, public agencies should consider what steps should be taken at the outset to provide protections on a change in ownership or even a failure of the vendor and ensure that the appropriate terms and conditions are codified in the P3 agreement.

## TIP

Revise or prepare standard contract language for digital P3s and engage knowledgeable outside advisors or counsel for expertise.

## 5

### Ensure and create incentives for congruence.

There are several funding models for P3s, including budget-based performance payments, monetization models, and revenue-sharing models. In a revenue-sharing model, the public and private sectors agree to share the revenue generated by the project based on predefined criteria. This creates incentives for the private sector to maximize the revenue generated by the project. In a performance-based payment model, the private sector receives payments based on achieving performance milestones, which may involve meeting certain quality or safety standards, completing the project on time, or achieving specific environmental or social outcomes.

Digital P3s often involve significant upfront costs and, when coupled with lifecycle operations and maintenance costs, present an interesting challenge for government budgets. Upfront design-build costs are often accounted for as a capital expense, with little to no consideration of lifecycle operations and maintenance costs, which is contemplated within an agency’s operating budget. This disconnect between the design and installation of a system and its lifecycle operations and maintenance needs often leads to a focus on first-cost savings over total lifecycle system costs, resulting in both inadequate systems and persistent budget shortfalls for future upgrades and major maintenance and

repair. Full lifecycle system costs should include criteria for modernization and preventative maintenance.

## TIP

Enhance value engineering responsibilities to include true lifecycle costing evaluations and realistic programmatic savings determinations in all agencies. Also, evaluate costs and benefits of revenue sources, including data.

## 6

### Streamline processes.

As technology advances rapidly, public agencies need to accelerate the procurement process. But digital P3s have a broad scope that includes stakeholders from different departments, which can complicate this goal. Innovative digital P3s should be driven by the program officials and supported by procurement experts, not the other way around.

First, digital tools such as online applications and comprehensive cloud-based data maps can make the entire process more transparent and efficient.<sup>8</sup> Governments should set tight timelines and determine whether they can make use of a contract from another jurisdiction or from a cooperative purchasing group. Senior program managers should control the procurement process. Only lawyers who are experienced with technology contracts should participate, to avoid slowing down the process over terms and conditions.

Second, meetings with vendors, requests for information (RFI) or request for approval (RFP) invitations, and procurement meetings with potential bidders that are commercially confidential are crucial to better contracting processes, especially for innovative technologies and novel digital tools. These invitations can help stimulate innovative proposals and better identify and allocate risks.

Third, government entities should consider progressive contracting approaches that will allow solutions to be developed collaboratively between the public and private sector, allowing the public agency to make fully informed decisions before committing to a long-term agreement. This process



**In addition to the loop of civic engagement, digital tools can assist with equity planning.** For example, geographic information systems (GIS) tools should be used to map existing and planned infrastructure to expose inequities and plan investments.

also allows for greater public input, as well as enhanced transparency of system lifecycle costs. In contrast to traditional P3 models, which typically involve a fixed payment structure, progressive P3s aim to align financial incentives and increase certainty around scope and performance as the project progresses. The main characteristic of a progressive P3 is its ability to adapt to changing circumstances over the course of the project.

According to Bennon, “pre-development agreements are not new, but the ways in which they’re being used now is novel. Essentially, the government will select a preferred proponent or private partner very early in the development process and will be governed by an agreement with the private partner that will define pre-development activities and can also include other things, including grant applications and community consultation.”

## TIP

The city executive should ensure that there’s a program management team on significant digital acquisitions. The team should include representatives from all departments that might benefit and meet at regular intervals from the start with legal and procurement officials who are not in control but are advisors.

## 7 Build in off-ramps.

As with most public contracts, many P3 arrangements set forth the terms and conditions under which the government may terminate or withdraw from the arrangements. These moments can of course occur at any time upon a material

default, but they also can and should be allowed under standard termination for convenience options as well, with clear terms. Yet replacing a major piece of a technology stack, or even the platform itself, can be challenging and needs special attention. Digital P3s also need provisions dealing with data and customer access if the digital agreement puts a company or companies between the government and resident users. The original contract should anticipate situations by addressing transitions for those connected to a platform by application performance interfaces and interoperability arrangements. The sudden disappearance of an app, particularly without a transition to another digital tool, confuses residents and leaves them concerned about their personal data. The same issue can occur internally, when public-sector employees potentially lose access to a tool that managed services or resident information, putting them back to square one and again damaging their trust in digital systems.

## TIP

Encourage vendors to align as teams that provide broader digital services, but explicitly plan on contractual transitions that may occur if technology becomes obsolete or important new approaches are developed.

## 8 Visualize benefits, collaborate, and plan for equity.

In addition to the loop of civic engagement, digital tools can assist with equity planning. For example, geographic information systems (GIS) tools should be used to map existing

and planned infrastructure to expose inequities and plan investments. Augmented reality should be used to show the community variations of what is planned. And sentiment mining and polling will help with construction mitigation. Using newer technologies to involve the public is particularly important.<sup>9</sup>

## TIP

Use digital tools to plan for equitable services distribution and to acquire digital P3s.

## CONCLUSION

The move toward digital P3s might seem daunting, but the more formidable the task, the greater the potential benefits. Maximum benefits require a new way of structuring partnerships and procuring system-wide solutions. Digital infrastructure is indispensable and requires rethinking the foundations of the public-private relationship. This is a moment to reexamine, correct, and create a new model that will influence the very shape of the future city. ■

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**Betsy Gardner** is the editor of *Data-Smart City Solutions* and the producer of the *Data-Smart City Pod*.

<sup>1</sup> Joaquim Sarmiento and Luc Renneboog, “Anatomy of public-private partnerships: their creation, financing and renegotiations,” *International Journal of Managing Projects in Business*, February 2014.

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<sup>3</sup> Susan B. Cassidy, Alexander B. Hastings, and Jennifer L. Plitsch, “What Every Company Should Know about IP Rights When Selling to the US Government,” *Landslide*, Vol. 9, No. 6, July/August 2017.

<sup>4</sup> Bennat Berger, “Sidewalk Labs’ Failure and the Future of Smart Cities,” *Triple Pundit*, June 16, 2020.

<sup>5</sup> Michael Bennon, personal interview, February 17, 2022.

<sup>6</sup> Jascha Franklin-Hodge, “Bikes, Scooters, and Personal Data: Protecting Privacy While Managing Micromobility,” *Medium*, October 8, 2018.

<sup>7</sup> Eva I. Hoppe and Patrick W. Schmitz, “Public-private partnerships versus traditional procurement: Innovation incentives and information gathering,” *The RAND Journal of Economics*, Spring 2013.

<sup>8</sup> Matthew Leger, “GIS Enables Collaborative Infrastructure Investments in Normal, Illinois,” *Data-Smart City Solutions*, December 15, 2022.

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## What Is the Progressive Delivery Model?

**P**rogressive contracting is an umbrella term used to describe contracting models that engage a contractor to work collaboratively with the project owner during the design phase, before fixing the final price and schedule for delivering the infrastructure or digital system. Following a competitive procurement process, a contractor is engaged to deliver work under two separate agreements. The first agreement, commonly referred to as the preliminary services agreement or pre-development agreement, involves the progressive, collaborative, and iterative development of key project parameters such as project scope, design, open-book cost estimation, risk identification, etc. At a specified design level (typically the 60 percent level), the contractor will typically submit a binding proposal for the second phase (project delivery phase) with a fully defined scope, schedule, and price, thereby allowing the project owner to make a fully informed

decision about whether to proceed to the project implementation based on either a fixed price or guaranteed maximum price.

If the project owner accepts the contractor's proposal, the contractor delivers and completes the project in accordance with the agreed scope, schedule, and price, which are codified in a project agreement. Nevertheless, the public agency retains the right to off-ramp at any point during the preliminary services period, at which time it can either abandon the project altogether or terminate the relationship with the original contractor and use the designs and other work products prepared during the preliminary services phase in a subsequent procurement for project implementation.

Payment terms during the preliminary services period vary significantly, ranging from preliminary services costs being carried at-risk by the contractor until project implementation to payments being made on either a service agreement or milestone basis. Progressive contracting structures

are best suited for projects that are not well defined or that require extensive owner/public input, making fixed-price procurements challenging. Likewise, progressive contracting is particularly useful when project risks are not well defined or understood. The progressive preliminary services agreement approach is particularly valuable when there is a need or desire for extensive public input during design processes or where it is important for project owners/stakeholders to retain input and control over project outcomes.

The collaborative nature of progressive contracting, including the iterative build-up of project scope, schedule, and cost estimates, allows significant opportunities for project owner input and control throughout. The progressive approach also aligns well with projects that involve systems engineering for emerging technology, where iterative design and testing is required prior to project implementation. Of course, the procurement will depend on the necessary digital infrastructure.

In short, the progressive contracting approach offers a less cumbersome and costly procurement process, allowing public agencies to focus more on project development and less on complex procurements based on imperfect information. That said, progressive contracting is not suitable for all projects, particularly those where scope and risk are well understood. Moreover, government agencies must be prepared to scrutinize and oversee their contractor during the preliminary services phase to avoid the risk of capture or questionable pricing outside of a competitive environment.

— Jill Jamieson, president of Illuminati Infrastructure Advisors and distinguished senior fellow at the Global Resilience Institute at Northeastern University

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