A WELL-ARCHITECTED FRAMEWORK FOR PUBLIC PROCUREMENT: UPGRADING INSTITUTIONAL CAPACITY IN THE AGE OF AI

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WHAT IS TIAL

The Institutional Architecture Lab was formed in 2023 by Sir Geoff Mulgan, Jessica Seddon and Juha Leppänen in an effort to help the institutional design community coalesce, learn together, and grow. Each of us has been involved in various stages of creating new organisations and other institutions. Like many other people, we have witnessed first-hand the absence of a formal community along the way — or a place where we can learn from past experience. We are aware that there is a lot of great work happening around the world, but nowhere to recognise it.

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THESIS

Adaptability and agility, accuracy and accessibility. These should be the features of modern public procurement: the strategic process through which institutions acquire instruments to improve their operations and deliver on their missions.

These capabilities are especially urgent for public institutions to acquire, while Generative Artificial Intelligence (AI) develops at exponential speed into the next general-purpose technology. And they apply to procurement in all its forms.

Today, public procurement is instead associated with slowness, rigidity, and wastefulness. It follows that advanced economies sub-optimally spend 12% of their GDP annually in public procurement[1].

This paper proposes a *Well-Architected Framework for Public Procurement*. It borrows this model from cloud computing, where Well-Architected Frameworks offer a set of "practices and design principles that guide the development and management of secure, efficient, and cost-effective systems".[2]

Applied to public procurement, the Well-Architected Framework provides principles that guide the development and management of public institutions that are dynamic, purpose-built, and value-creating. These characteristics are critical at a time when exponential innovation in fields such as AI calls for institutions to be adaptive.

PUBLIC PROCUREMENT: AN IMPORTANT AND NEGLECTED TOOL FOR INNOVATION

"No children dream of becoming a procurement officer when they grow up" – said a civil servant who reformed digital public procurement in a supranational institution. Public procurement is too often a synonym of "compliance with absurdity":[3]

> *"The dysfunction loop begins when absurd processes are given to public servants who will be judged on their compliance with absurdity. If they do their jobs right, the nation purchases obsolete overpriced software. If they make a mistake or take a risk that defies the absurdity, politicians hold hearings and jump all over them — which is far simpler than fixing the process. Each recrimination drives more good people out of public service. Rinse, repeat."*

As a result, public procurement is treated as a standardised shopping function, rather than a tool for strategic investment. According to a Nordic Council of Ministers study, this happens despite public procurement being linked to over 80% of total Sustainable Development Goals (SDG) indicators.[4] It occurs in developing and advanced economies alike, where the OECD estimates that public procurement represents more than 12% of GDP. That is as much as Western Europe allocated to the pandemic response against COVID-19.[5] Every year.

The COVID-19 pandemic accelerated the **growth in public procurement expenditures**. Governments had to source unplanned resources, from vaccines to face masks and additional compute capacity to sustain their operations. In the European Union, for instance, public procurement increased from **13.7%** of GDP in 2019 to **14.8%** in 2021.[6] The same trend can be observed across the OECD.

A parallel trend is **increased government spending on industrial policy** to spur innovation. This wave of policies is generated by pressure to gain a competitive advantage in strategic sectors, such as emerging technologies.[7]

CALLS FOR GREATER INNOVATION IN PROCUREMENT

Innovating procurement and using procurement to drive innovation have been public pursuits for decades, but their successful implementation has been more the exception than the rule.

Sought-after inventions will come from startups, and public procurement will be the mechanism for operating many of these funding plans. Yet, today the inaccessibility of procurement

mechanisms for startups risks turning these plans into a consolidation of legacy markets.

Large incumbents will likely capture new opportunities because small companies cannot afford the legal and financial costs of complying with absurdity. A striking example comes from the US defence industry, once one of the world's greatest innovators. Today, nearly **80%** of US defence revenue is produced by 10 companies, according to a report by the Financial Times.[8]

Precious public resources are, therefore, sub-optimally used without producing the expected returns on investment. In the best-case scenario, labyrinthic requirements create a static market and an inefficient use of resources. In the worst-case scenario, waste is associated with corruption and **estimated losses** can range from **10%** to **20%** of total procurement expenditures[9].

The broad commercialisation of exponential technologies such as generative AI will likely exacerbate the tension between the linear inertia of most procurement processes and the need for innovative tools in government. While the challenges that the public sector faces grow in speed, complexity, and scope, public institutions' ability to procure new tools and training remains the same. Hence, state capacity decays. This is an incomplete plan and a missed opportunity to use inventions, such as Generative AI, to save and re-invest billions of dollars.[10]

WHAT'S WRONG WITH PROCUREMENT: RECURRENT, TRACTABLE, AND NEGLECTED ISSUES

Context matters, both in life and public procurement. Procurement problems will be characteristic of their economic, social, and institutional contexts. Some countries have more **devolved public procurement functions**, having local authorities operate budgets, even when those are decided and distributed at national levels. In other countries, **procurement will be a prerogative of the national government**. Because procurement is a market function, **market demand** is another fundamental variable: in some countries, developing guidelines to procure AI is not a priority yet, because purchasing essential healthcare equipment is.

One could indulge in a long list of caveats tending to relativism. Or one can follow a Pareto Principle and find that most problems recurring across procurement systems correlate with the same small number of institutional fallacies. From a perspective of institutional architecture, we identify seven recurrent issues across public procurement systems:

1. **Asymmetry of information.** The buyer knows – and understands – less than the seller about the product or service being purchased. This is especially true when it comes to the purchase of new technologies, based on innovative business models. Asymmetry of information can lead to suboptimal purchases, cancellation of tenders, or lock-in into unfavourable conditions. The origins of this asymmetry are related to the "ownership problem".

2. **The ownership problem.** The end users of a new product are incentivised to purchase the best tool for their mission, but they are rarely in charge of the purchase. Instead, procurement officers make the call, incentivised by compliance with rulebooks. They have good reasons: in many cases, they would incur personal liabilities if they deviate from contractual standards. In most cases, they are punished for mistakes but not rewarded for good performance. However, as a result, procurement purchases tend to serve the bureaucracy's needs, rather than the end users. An expert interviewed for this paper shared an example in which a buyer at a public sector organisation applied a professional services contract to the purchase of on-demand IT services, forcing the IT department to create fictitious usage forecasts to justify the inclusion of new services through amendments. As a result, the IT department was involved in internal negotiations for contract amendments longer than they focused on product development.

3. **The lexicon barrier.**[11] Because buyers are often not experts, they miss information and understanding of their purchase and cannot attract the right participants to a tender response, such as startups. As a result, public purchases are skewed towards renewals of existing contracts, rather than net new acquisitions. Second, the pool of suppliers remains limited, contributing to:

4. **The selection problem.** This is to the market what "asymmetry of information" is to a negotiation. One of the buyers' fundamental challenges is that they cannot see all the offers they can access. This consolidates the market of a few primes, leading to a risk of lock-in and the missed opportunity of using procurement to create a dynamic market.

5. **The hammer-nail problem.** Because of the ownership problem and the intricacies of compliance, public buyers tend to hammer different contracts as if they were the same nails. For example, this means using capital expenditures, a one-off purchase of a fixed quantity in time, to purchase operational services which are variable costs over time. To illustrate:

> *"Most government projects work backward from an outcome — a bridge will be built from point X to point Y and cost Z. Software is an abstraction moving toward a destination that's always changing. Google didn't create a search box and then close up shop; it kept spending and staffing because that's how technology gets better and more usable. Unlike a bridge, software is never done. Try selling that to bureaucrats who are told they must pay for only what they can document."[12]*

6. **The vending machine fallacy.** Because public buyers are used to buying fixed quantities and because the owners of the purchase are not the users of a service, contracts tend to be forgotten once they have been concluded. An executive at a contract automation firm shares that, on average, 80% of the contracts at an enterprise-size organisation are "unmanaged". That means that they lie in an administrative cemetery, absorbing resources without providing any value. What is more, these contracts tend to be renewed because it is the most straightforward and least risky choice from the point of view of compliance. Like at the vending machine, procurement officers leave when their goods are delivered. Except they own the vending machine and are responsible for maintaining it.

7. **The accumulation of exceptions.** Unfortunately, the common solution to deviating from procurement standards is not using flexible interpretations of the rules, but creating new exceptions. As a result, the volume and complexity of purchasing requirements grows and, with it, the incentives to comply with absurdity. The guidelines are too complicated to make no mistake and the rewards of taking a risk are too low – if non-existent. Therefore, not only does the institution accumulate administrative costs without innovating, but it also creates new loopholes. For example:

> *"The [Authority to Operate] process has unintentionally created a new form of vendor lock-in, where companies that have successfully navigated the arduous process can use their ATO as a barrier to entry for competitors. This lock-in effect stifles competition and hinders the DoD's ability to tap into the latest innovations from across the commercial sector. Smaller, more agile companies with cutting-edge software solutions may be deterred from working with the DoD altogether due to the time and resource demands of the ATO process."*[13]

INNOVATION AS A VALUE FOR PUBLIC MANAGEMENT

Procurement fallacies emerge in the tension that exists in balancing the core values of a public system. In **Christopher Hood**'s terminology, public management systems need to uphold probity and honesty, and avoid conflicts of interest (theta values).[14] At the same time, they need to maximise efficiency and value for money (sigma). Innovation tends to be sacrificed in this polarity between theta and sigma values, even when the rules allow the flexibility to do things differently.

Today, public management needs to adopt innovation as a core value as a matter of survival. Because technologies develop exponentially, institutions must do so as well. The alternative is linear decline and the obsolescence of core public functions that are unable to adopt and adapt to new technologies. Historically, in fact, the most competitive states and organisations have not necessarily been those who generated inventions, but those that adopted them faster, more broadly, and deeply across their systems.[15]

Procurement is an essential tool to uphold innovation and increase adoption capacity in the public sector, because it is the main tool for governments to adopt and diffuse technology and talent. The re-architecture of procurement is, therefore, urgent to fit the requirements of the age of AI.
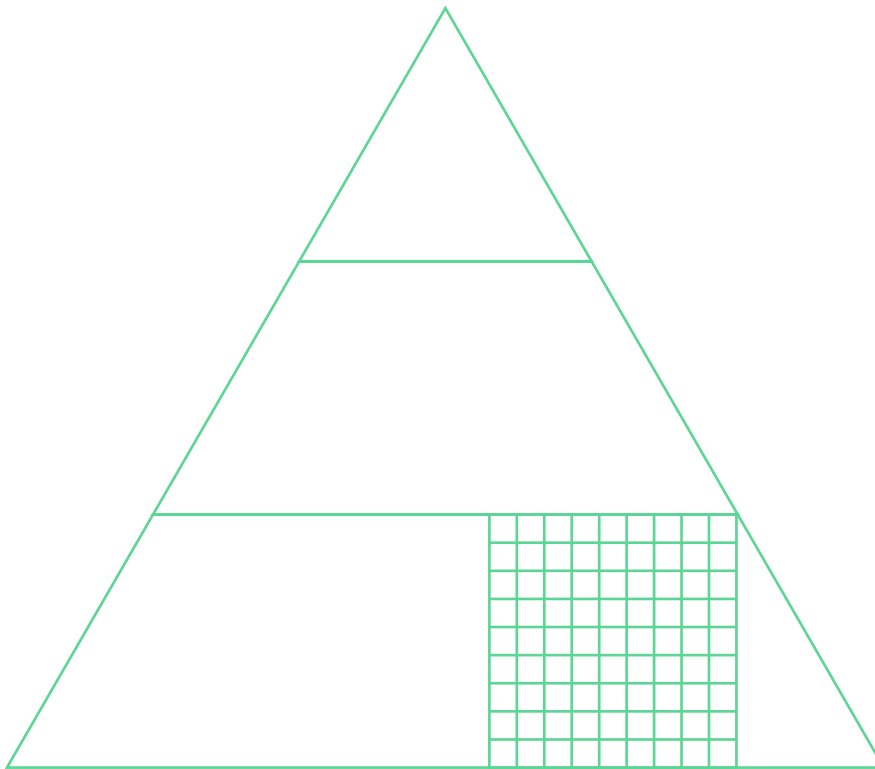
WELL-ARCHITECTED FRAMEWORK FOR PUBLIC PROCUREMENT

Well-architected software offers valuable principles to re-form public procurement, especially in times of exponential technologies. Why?

First, because *Software is Never Done*[16]. Software is fleeting: there is always someone, somewhere introducing new features and releasing upgrades to fix bugs. Failure to update means lower performance, vulnerabilities, and loss of trust. Similarly, if public procurement fails to upgrade the operating system of institutions, they will incur those same risks of obsolescence. Like software, procurement needs to be fluid, not frozen.[17]

Second, like software development, procurement is a service. As such, the metrics that measure successful procurement should be the functionality it provides to users — and their satisfaction — while respecting budgetary thresholds that responsibly administer public funding. The assumption behind procurement should be to increase institutions' performance and operational excellence, to serve public missions better, rather than simply comply with constraints.

Finally, the lens of software architecture can help institutions and managers focus on the higher-added value issues of the procurement process. Standardised, off-the shelf operations for established practices offer opportunities for automation of procurement and standardisation of purchases: these are routine tasks that can be executed by tested products, with minimal human supervision. In emerging areas, such as deep tech, where issues are bespoke and products are untested, there will be a need for specific process and, even, Institutions. Such is the case with the AI Safety Institutes, which assess Generative AI tools for public interest, and the selection of post-quantum algorithms in the US by the National Institute for Standards and Technology.

Table 1. Maturity of service or product against the issue type

	MATURITY OF THE SERVICE/PRODUCT	
TYPE OF ISSUE	**Bespoke issue/ Tested Product** Prototype with Superusers	**Bespoke Issue/ Bespoke Product** Specialised Testing
	Standard Issue/ Tested Product Automate	**Standard Issue/ Bespoke Product** Dynamic Purchasing (competition)

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WELL-ARCHITECTED PRINCIPLES FOR PUBLIC PROCUREMENT

There are successful precedents in employing principles of IT architecture for institutions. In India, the whole techno-legal architecture of its public digital infrastructure (DPI) is based on five architectural principles (**Figure 1**).[18] While DPI is digital infrastructure, the same principled approach can apply to public procurement because it aims to provide governments with a better operational infrastructure.

Figure 1. Five Digital Public Infrastructure technical architecture principles
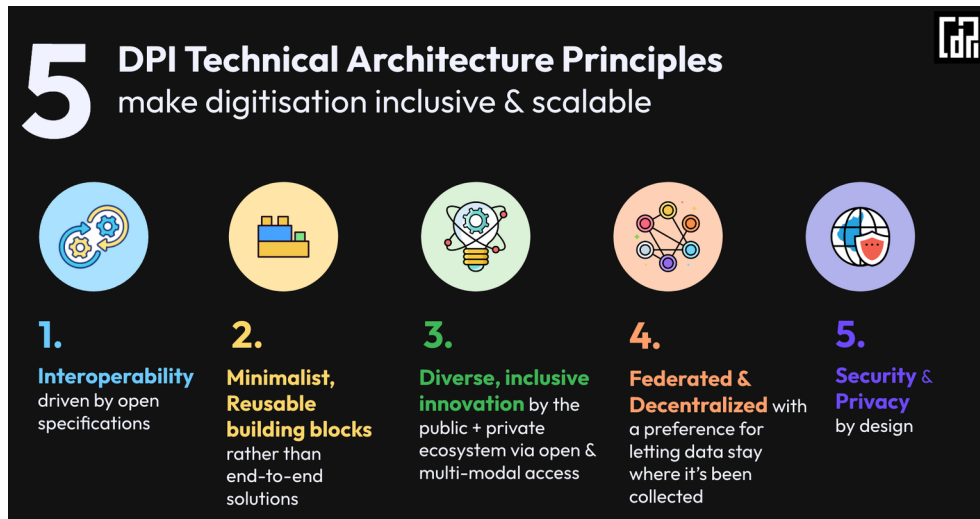
Source: "DPI Tech Architecture Principles," Centre for Digital Public Infrastructure.
https://docs.cdpi.dev/the-dpi-wikipedia/dpi-tech-architecture-principles

> *The assumption behind procurement should be to increase institutions' performance and operational excellence, to serve public missions better, rather than simply comply with constraints.*

FOUR PRINCIPLES FOR WELL-ARCHITECTED PROCUREMENT

We propose four principles for Well-Architected Public Procurement: adaptability, agility, accuracy, and accessibility.

ADAPTABILITY

> *"Adaptability is not an inherent feature of software; all too often we are victims of stale, outdated software that stands in the way of our desired outcomes."*[19]

Adaptability needs to become an institutional priority — and an institutional incentive — to anticipate, understand, and act on new challenges in a tech-driven economy. In public procurement, this means shifting:

—   From eliminating risks to managing risks;

—   From complying to procure to procuring to deliver;

—   From buying from a vending machine to operating a control tower;

—   From commissioning projects to maintaining products.

This paradigmatic shift is especially urgent and important today as exponential improvements in AI risk opening unrecoverable gaps in public sector capacity unless institutions adapt their commissioning tools. This should be common sense, which Nobel Prize winner Jan Tinbergen codified in his Rule: for every policy objective, policymakers should have at least one tool to pursue them[20].

Thus, public institutions must have timely ways to procure AI competitively and become AI-ready. However, the experience of cloud computing shows that public procurement looks like commissioning nails because you have a hammer. Precedents exist: during the COVID-19 pandemic response, the US government launched Operation Warp Speed, which developed, tested, manufactured, and distributed a vaccine in months, rather than a decade. The pandemic allowed exceptions to rise to exceptional circumstances, but the ingredients that made OWS successful are replicable and relevant. **Jennifer Pahlka** summarises them in a transition from project to product models[21] (see **Table 2** and **Figure 2**).

Table 2. Summary of differences between project and product models

PROJECT MODEL	PRODUCT MODEL
Episodic large investments	Ongoing moderate investment
Heavy reliance on procurement, oversight, and IV&V	Requires internal product ownership and management
Abdication of responsibility to vendors	Partnership w/ vendors
Vendor lock-in	Low switching costs, smaller contracts
Acquiring static software	Acquiring ongoing capabilities
Constant loss of knowledge	Constantly growing understanding
Customers consulted at end	Customers integral at all times
Built in silos	The walls come down
Subject to the "100% trap"	85% to start costs 10% of the proce
High rates of failure and frustration	Actual working software

Figure 2. Spending for project and product models

AGILITY

If adaptability is the capacity of an institution to change, **agility is the ability to be responsive**. It is the capacity to change according to market circumstances or user demands. The method is feedback loops rather than linear processes, where buyers and sellers, procurement officers and users collaborate in producing better iterations of public purchasing systems. In the words of **Jennifer Pahlka**:

> *"Our current 'once and done' frameworks don't allow for this ongoing evaluation, and our workforce is not suited to these challenges. We cannot simply engage procurement officers to evaluate and purchase a system like that, and hope it works out. AI demands agility and competence in ways we can no longer afford to ignore."*[22]

CASE STUDY: DYNAMIC PURCHASING SYSTEMS

Dynamic Purchasing Systems, for instance, strive to adopt the principle of agility. In the definition from the OECD's E-Leaders Handbook on the Governance of Digital Government, these systems aim to establish: "A strong, dynamic, responsive relationship [between public buyers and sellers, where] information is exchanged efficiently such that the regulations … can be updated often according to the needs and context of the private sector."[23]

Dynamic Purchasing Systems have been implemented by several countries: Australia, the United Kingdom, Ireland, and the European Commission. This system's most common form is a Marketplace, where validated suppliers can register and offer their services off the shelf. The benefits of this direct interface between buyers and sellers – validated by an institutional broker – are broad and deep selection, access to small and medium enterprises that do not need the mediation of incumbents, and competitive pricing.

Like good software development, the developers of the Dynamic Purchasing System can – and should – interrogate users to adapt their offerings. Is the user experience simple? Does the selection balance the depth and breadth of offerings, incumbents, and newcomers? Are the barriers to entry low enough for startups to be willing and able to join the government marketplace?

To illustrate the approach, Australia announced the launch of a new version of its ICT Marketplace in 2024. To upgrade it, it sought "to understand what our users want to get from the new marketplace and set the direction for its design and delivery over the coming months".[24] Procurement mechanisms should be the tool through which governments upgrade their institutional versions based on explicit supply and demand requirements.

ACCURACY

Accuracy means that the procurement system is purpose-built. The notion of purpose-built comes from the world of application development. It refers to the optimal match between the architecture of an application and its intended use, to maximise performance.

In public procurement, accuracy is a method to avoid the hammer-nail fallacy. Its premise is the recognition that procurement is a function that spans multiple uses and that one process may not fit every purchase. The buyer should assess every purchase based on various dimensions, and tailor the procurement method accordingly. **Table 3** outlines core procurement parameters.

The form of procurement should be adapted to the object of the purchase. For example, cloud computing is an on-tap, recurrent expense — the more you use it, the more you pay for it, like other utilities such as water or electricity. As such, its budget needs to be fluid. If one tries to buy utility computing with the same fixed capital accounting used for chairs, then the misalignment between the purchasing and consumption model will create problems. For example, users will underuse a service because they fear the infringement of fixed capital thresholds. Or buyers will overbudget, leading to a waste of resources that could be invested elsewhere.

Table 3. Core Parameters for Purpose-Built Procurement

PARAMETERS		
Source	In-source	Out-source
Specifiability	Specifiable	Non-Specifiable
Dimensionality	Low	High
Duration	Annual	Multi-Annual
Occurrence	One-off	Recurrent
Geography	Local	(Inter)national
Market maturity	Emergent	Mature
Selection	Limited	Broad

ACCESSIBILITY

Accessible procurement is simple to operate and centred around users. It starts with understanding the users' needs and finding the simplest – possibly most delightful – way to service them. Would one buy on a website if navigating it was harder than a few clicks, with financial and legal repercussions if you clicked the wrong button? Then how can one expect startups to be encouraged to sell into governments or governments to commission innovation?

Some public institutions have moved to a user-centric model. Step 1 of Australia's guidelines for digital sourcing is "Refine your problem based on user needs".[25] Defining requirements is only step 4.

In Norway, the multi-agency StartOff program created a custom process for startups to bring innovation into government and address challenges like: "Decision tools for tomorrow's green power system" or "Easier access to health information" with AI. A cross-functional team worked with startups to create a commissioning process for startups. The team included a project manager to ensure consistency in delivery and startup experts to turn the needs of the companies into procurement features.

What the Australian and Norwegian model have in common is that they put the users at the center of their innovation process, and they put the end-users from the side of the institution in charge of the process. That way, those who will use a given product participate in the procurement of it, so they can adjust the conditions of use to the purpose of the purchase. This is not unlike the innovation process of the most inventive companies in the world and it shows that such methods are replicable within public institutions, with the necessary adaptations.[26]

India took a radically different approach to making public services accessible and using procurement as a market-shaping tool. It reinterpreted the government's responsibilities as building and maintaining open and scalable infrastructure that companies can build on, as illustrated by the Case Study below on India's Open Network for Digital Commerce.

**CASE STUDY: INDIA'S OPEN NETWORK FOR DIGITAL COMMERCE (ONDC):
WELL-ARCHITECTED PRINCIPLES IN PRACTICE**

India's Open Network for Digital Commerce is the next addition to India's Public Digital Infrastructure. While not strictly a public procurement tool, ONDC is an inventive model that inspires the re-design of government purchasing functions, according to well-architected principles.

First, what is India's Public Digital Infrastructure?

> *"In the last decade and a half, much of India's digital economy has been constructed over a scaffolding of digital public infrastructure (or DPI) - made up of lightweight software platforms that mimic the effects of building roads, bridges, ports and highways in the 'real world' - i.e. they help to lubricate the movement of people and things online."*[27]

ONDC aims to replicate the principles that made DPI successful into digital commerce. ONDC's focus is on unbundling. Unbundling is the name of the game. The method of the India Stack is to break down value chains into their bare components – like Lego bricks – make them interoperable, and build the essential infrastructure that others can come and build on. In the words of Rahul Sanghi: "It's like a come-one-come-all digital mall in cyberspace."

ONDC manages the infrastructure layer of the marketplace and makes it accessible to sellers so they can create purpose-built applications on top of it. That way, different organisations can offer specific products based on direct demands from consumers.

The unique feature of ONDC is that it is network-centric. Each participant in the network is equally discoverable through the network. As a result, its comparative advantage is to specialise in a function, be it enabling services or delivery of goods. This way, ONDC aims to solve the selection problem.

Figure 4. Platform-centric models VS. network-centric models
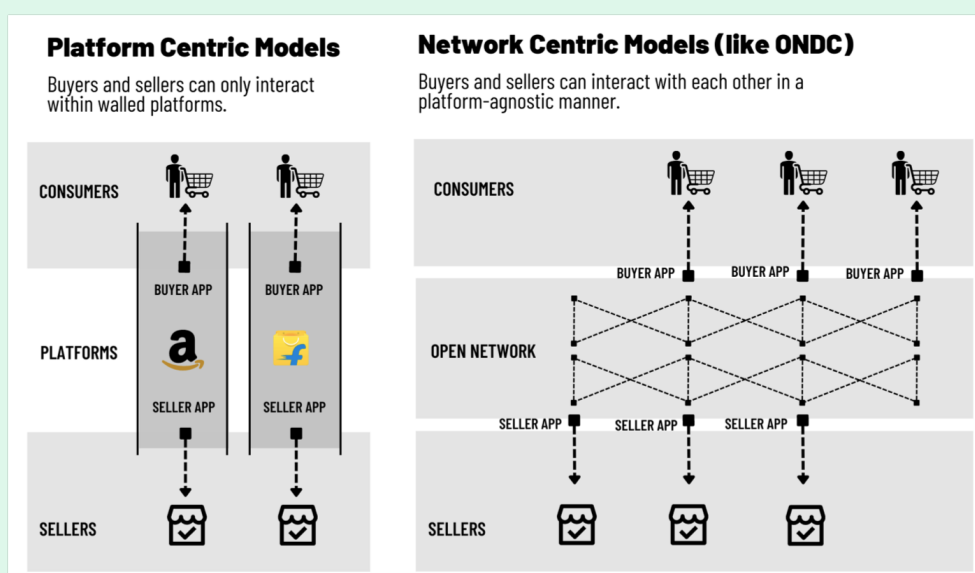
Source: Internet Freedom Foundation

In the ONDC model, the governing authority is an infrastructure provider whose role is to:

— **Validate** that participants in the networks – both buyers and sellers – are legitimate and compliant with technical and legal requirements;

— **Adapt and iterate** on the network infrastructure to improve its performance, security, and features;

— **Make accessible** the network to a larger number of participants and markets;

— **Scale** the ecosystem to maximise its value, nationally and internationally.

Could public procurement systems be considered infrastructure providers, based on a shared responsibility model where institutions provide the purchasing bedrock for a dynamic network of sellers?

FOUNDATIONS OF
WELL-ARCHITECTED PROCUREMENT

Principles are necessary but insufficient to architect public procurement well. Operational capacity needs to be proportionate to an organisation's goals for the principles to bear fruit. There are four essential drivers of a high-performing procurement function. These are Rules, Culture, Talent, and Data.

RULES

To implement the principles of adaptability and agility, rules need to provide simplicity, flexibility, and authority. In the words of **Jennifer Pahlka**, former US Deputy Chief Technology Officer:

> *"Today, as we bemoan the lack of expertise in highly specialised, complex domains like advanced software, it's worth noting that the inner workings of procurement seem as specialised, complex, and mysterious to the layperson as the inner workings of an AI model. Government is clearly capable of developing capacity in specialised domains. We just picked the wrong ones."*[28]

Risk management starts with understanding the rules, so that risks can be calculated. At the same time, most civil servants and procurement officers interviewed for this paper agree that flexibility is built into existing rules. The European Procurement Directive was adopted in 2014, and it already provides mechanisms to allow specific transactions to deviate from the norm. The problem is the risk-averse, precautionary interpretations of the rules. In other words, culture.

CULTURE

Rules without culture lead to compliance with absurdity and conservative interpretation.

The **UK Innovation Strategy** spells out the underlying reason for the weak uptake of innovation procurement: "The overall culture, expertise and incentive structure of the public sector means there is a low appetite for risk and experimentation."[29]

The history of the **Other Transaction Authority** – the clause that allows DARPA to fund innovation quickly and strategically – is illustrative. OTA states "such other transactions as may be necessary". This simple and widely interpretable clause has allowed DARPA to fund big, bold initiatives such as the Internet and GPS. However, in an interview with Statecraft the author of OTA states:

> *"Other agencies, instead of saying, 'this is really special, it gives us lots of flexibility and authority', what they say is, 'this is just another tool, another contracting tool. We'll either give it to the procurement people or to the assistance people.' And these people are trained as rule followers. [T]he first duty of a contracting officer is to make sure that all laws, regulations, executive orders, policies are followed. That's what they're trained to do, that's what their mindset is. And it's absolutely inimical to executing the flexibility of other transactions."*[30]

A former Deputy Director at DARPA, confirms:

> *"Legislation or process alone cannot drive exceptional outcomes; it is important to recognise the creativity and ingenuity of the department's leaders and seek to amplify and replicate their success... Conventional acquisition processes emphasise trying to get up-front predictions right: requirements, system specifications, schedules, and cost estimates."*[31]

To incentivise the adoption of flexible rules in procurement, public institutions need to hire and train talent that makes procurement inventive.

TALENT

Public procurement is not designed or treated as the strategic instrument it is and this reflects on the talent it supports and attracts. According to a 2020 survey by the OECD, only **38%** of OECD countries recognised public procurement as a standalone profession.[32]

Today, those in procurement roles are conceived as compliance professionals. They should be promoted to strategic negotiators or product managers. **David Rothzeid**, a member of the US Airforce Defense Innovation Unit, went into procurement because it had clout: "businessman in the Air Force felt natural."[33] Others could start seeing it like that.

According to a study of US Federal contracts "**a one standard deviation increase in competence reduces cost overruns by 29 percent and the number of days of delay by 23 percent**. It also reduces by half the number of renegotiations. This implies that, if all federal bureaus were to obtain NASA's high level of competence (corresponding to the top 10 percent of the competence distribution), delays in contract execution would decline by 4.8 million days, and cost overruns would drop by $6.7 billion over the entire sample analysed."[34]

The OECD has extensively documented guidance and examples for the professionalisation of public procurement. Three elements emerge as essential:

1. TRAINING

Training includes guidance on operating procurement processes and formal competencies that officials must acquire, such as negotiation. The European Commission's ProcurCompEU identified **19 procurement-specific competencies**.

The lack of formal training in government is common: according to a survey by **Apolitical, less than 50% of civil servants tasked with policies on climate change are trained in that area of expertise**.[35] The gap is likely greater if the profession is not formalised, as in procurement. Guidance should be written directly in the tools, such as the marketplaces, to make adoption easy and focus officials' time on core activities, such as market research and contract management.

2. COMMUNITIES

Peer validation is essential to sustain the application of new skills and the experimentation of new working methods, such as a shift from risk elimination to management. In an example coming from the realm of digital and data, **GovTech Singapore** succeeded in training over **60%** of its workforce in tech because it provided learning networks.[36]

3. RECOGNITION

Making procurement "cool", as it is for David Rothzeid in the Defense Innovation Unit, implies **creating a system of hard and soft rewards**. On the one hand, competitive salaries and clear promotion paths. In **Finland**, for example, an agency experimented with bonus systems where procurement officials receive financial rewards when they meet performance objectives. These objectives should include metrics related to innovation, not just compliance.

On the other hand, public institutions can complement rigid compensation systems by elevating the status of procurement officers. In **New Zealand**, for example, they instituted **Procurement Excellence Awards** that recognise the strategic role of public procurement in building government capacity.

There are two additional areas that this report highlights:

4. OWNERSHIP TO EXPERTS

When institutions lack the in-house expertise to assess innovative offers, they default to paths of least resistance that minimise risk. One way to mitigate this bias for precaution is to **assign the right expert to the right job**. For big challenges, **DARPA** uses an approach called **Tour of Duty**: it recruits top experts to manage the full cycle of a project, from commissioning to delivery, with time limits. The terms of the assignment are set and the chances of renewal are limited. This time-boundedness breeds innovation and attracts talent that would not otherwise join the public sector. A similar approach could be replicated inside institutions, where, once procurement is made cool, top performers would be called to own the commissioning of projects of their competence.

5.   ARTIFICIAL INTELLIGENCE

As Generative AI makes the automation of repetitive tasks widely available to those without engineering skills, **AI can make procurement more efficient and effective**. Examples from the private sector show this use across various functions: enhancing supply chain visibility, accelerating response to disruptions, deepening relationships with existing suppliers, discovering new suppliers pre-crisis, and automating negotiations. This does not mean taking the hands off the steering wheel, but adapting the role of procurement owners to a strategic steering and analysis. AI is an opportunity to focus the procurement function on innovation, delegating compliance to machines. For example, Walmart uses AI to automate supplier negotiations.[37]

DATA

Data is a critical resource for well-architected public procurement, especially in the AI age. Without transparent data, there can be no learning and adaptation. Traditionally, data federation has been encouraged for transparency, waste reduction, and combating corruption. In the AI age, these data lakes are a necessary engine to innovate the public sector and how it can raise its operational excellence through public procurement.

Even before this latest wave of Generative AI, the **World Bank** had identified a portfolio of interventions that would make public institutions more competitive through smart commissioning.[38] In **Croatia**, analytics showed that only **13%** of procurement volume was spent on Small and Medium Enterprises.[39] In **Bangladesh**, near real-time evaluation of procurement performance confirmed the validity of a pilot.

Today, without healthy data governance, there can be no effective use of AI. In fact, the Offices for Management and Budget in the United States[40] and the United Kingdom[41] recommend running a data assessment as a first step in commissioning AI. Beyond that, agencies should meet the standards they ask of third parties, developing data infrastructure to use, test, and operate AI.

THE RIGHT INSTITUTION
FOR THE RIGHT JOB

Software that does not constantly evolve is outcompeted, vulnerable to threats, and abandoned by users. The same can be true for institutions. Public procurement is how institutions acquire the tools and the skills to avoid obsolescence. To that end, public procurement itself must change. Well-architected software is an effective metaphor for updating public procurement in the AI age.

Like well-architected software, effective procurement needs to embrace four principles:

1. **Adaptability**: the capacity to re-programme processes based on the features of the objects being commissioned. This implies a shift from risk elimination to management.

2. **Agility**: the ability to operate changes in ways that are timely and responsive to new market features and user needs. Once-and-done procurement leads to technical and administrative legacy, which balloons into costs, lower value for money, and vulnerabilities. Procurement needs to be re-designed into a flywheel.

3. **Accuracy**: optimising the procurement model based on the parameters of the service or product being commissioned. That is, not buying software the same way one buys chairs.

4. **Accessibility**: simple, transparent, and actionable systems for buyers and sellers. Clarity leads to predictability; predictability leads to productivity. Institutions need to hold an "accessibility review" of procurement systems.

> *Software that does not constantly evolve is outcompeted, vulnerable to threats, and abandoned by users. The same can be true for institutions.*
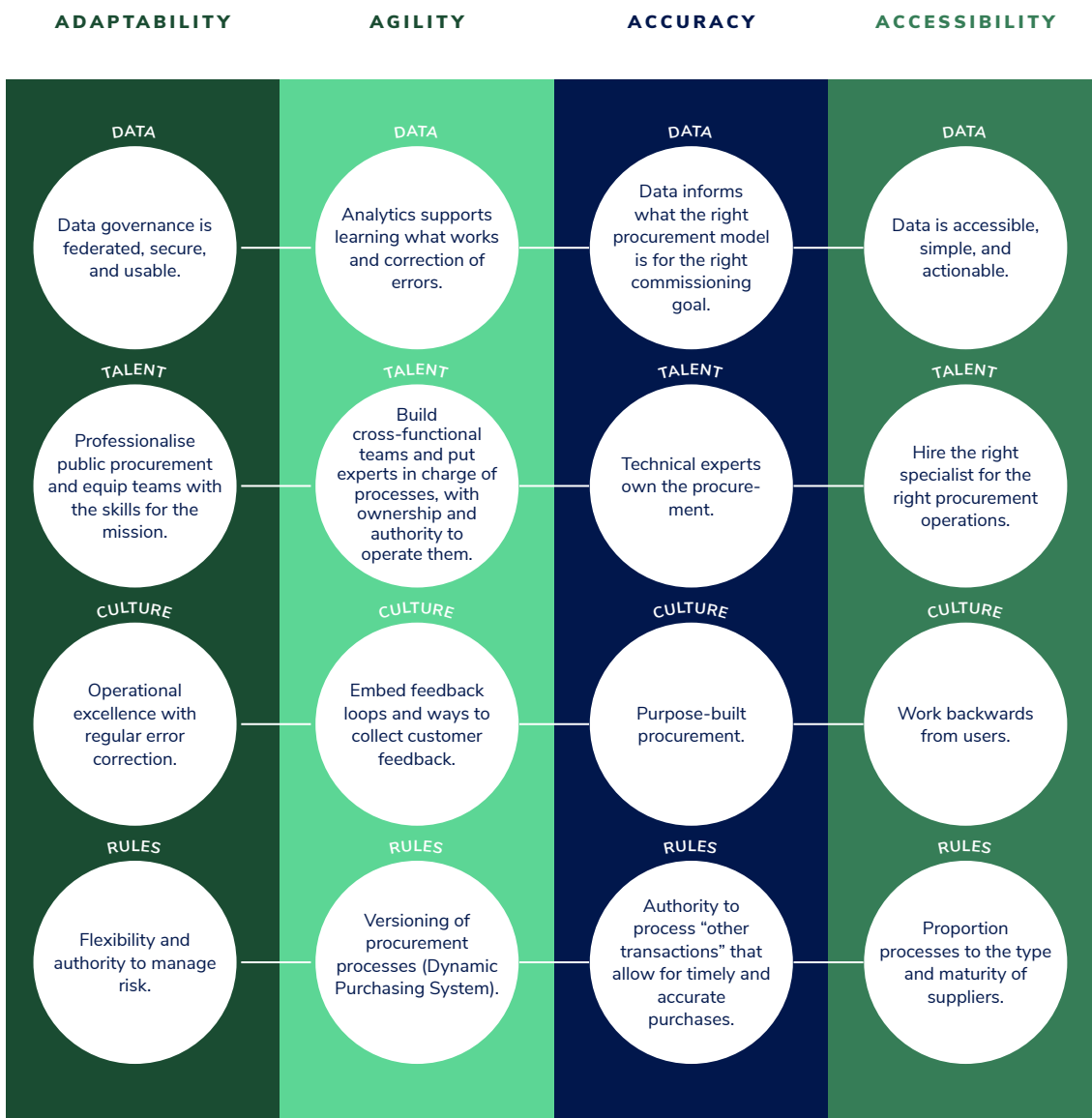
Translating these principles into institutional architecture has requirements. These fundamental building blocks can become barriers to change if they are not invested in, to support institutional reform. Like software foundations, each architecture component needs to be upgraded to improve the performance, security, and resilience of the whole system. In public procurement, institutions should invest in:

1. **Data**: Institutions that lack a data infrastructure will not be able to learn and adapt; equally, they will not be able to leverage the emerging capabilities of AI. Mapping, assessing, and integrating data are prerequisites to public procurement reform.

2. **Talent**: Public procurement should be made a strategic function, not compliance. Institutions need professional paths, modern training, and cross-functional teams to operate control towers that make them competitive.

3. **Culture**: Procurement should manage risks and invest in raising the bar of institutional capacity. Culture – and incentives – should reward this paradigm shift, so that rules can be interpreted flexibly, rather than perpetuate a tyranny of precaution. Processes should turn from linear to loops, based on iteration.

4. **Rules**: Rules and requirements should be adaptive to the learnings from data and talent. They should enable adaptability, rather than entrench complexity.

While principles and their enablers are largely universal, the implementation of these architectures will be characteristic of their social, economic, and institutional contexts. Indeed, different models are emerging to address the same recurrent problems with procurement — from Dynamic Purchasing Systems to India's invention of public digital infrastructure applied to commerce.

Whatever the model, public procurement can be to institutions what data science is to technology: a data-driven infrastructure to enable excellence. Procurement officers should be cool hackers and savvy negotiators, rather than compilers of absurd bureaucracy. Like software, public procurement does not need to be a static monolith; it can become an institutional cloud.

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Figure 4. An institutional framework for public procurement in the age of AI

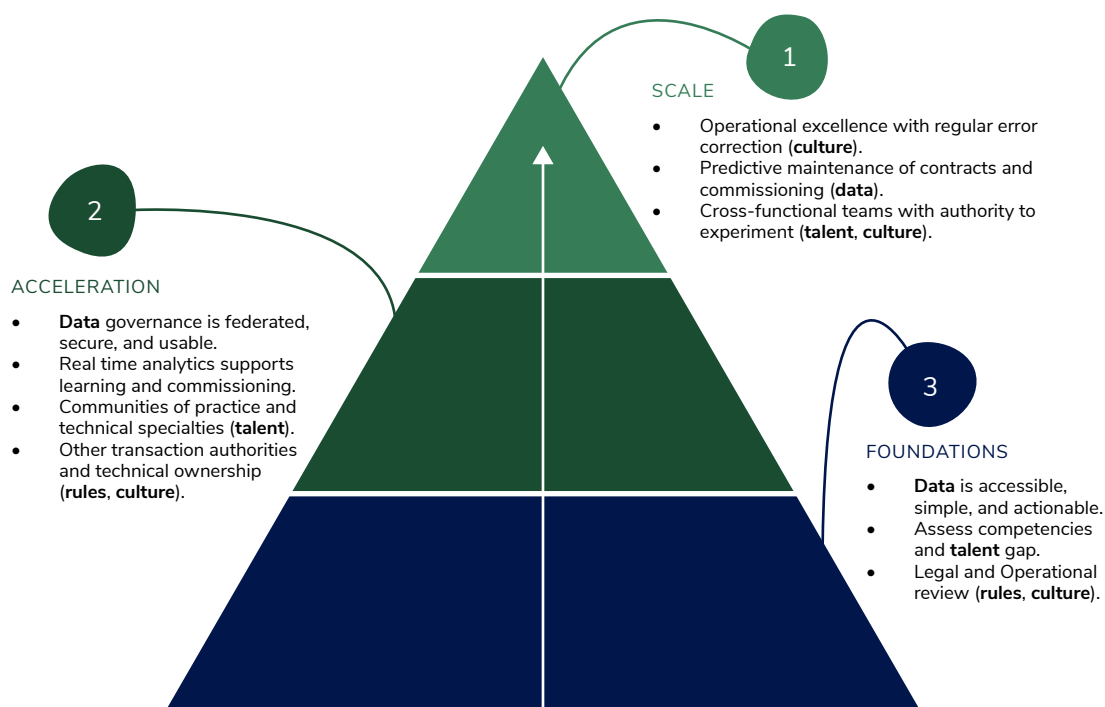| ADAPTABILITY	AGILITY	ACCURACY	ACCESSIBILITY
DATA Data governance is federated, secure, and usable.	**DATA** Analytics supports learning what works and correction of errors.	**DATA** Data informs what the right procurement model is for the right commissioning goal.	**DATA** Data is accessible, simple, and actionable.
TALENT Professionalise public procurement and equip teams with the skills for the mission.	**TALENT** Build cross-functional teams and put experts in charge of processes, with ownership and authority to operate them.	**TALENT** Technical experts own the procure-ment.	**TALENT** Hire the right specialist for the right procurement operations.
CULTURE Operational excellence with regular error correction.	**CULTURE** Embed feedback loops and ways to collect customer feedback.	**CULTURE** Purpose-built procurement.	**CULTURE** Work backwards from users.
RULES Flexibility and authority to manage risk.	**RULES** Versioning of procurement processes (Dynamic Purchasing System).	**RULES** Authority to process "other transactions" that allow for timely and accurate purchases.	**RULES** Proportion processes to the type and maturity of suppliers.

As a result of a Well-Architected process, institutions will achieve a greater fit between their purpose and their design. This will be based on the one hand on the capacity of the institution, its stock of skills and data, and, on the other hand, the "conditions" of the purchase: how standard the need is, and how mature and tested the solution is (**Table 1**).

PROCUREMENT AS A PORTFOLIO OF INSTITUTIONS

Modern procurement needs to be thought of as a portfolio of institutional options, rather than a standardised template, for at least two reasons. First, the speed of development of the technologies that governments need to adopt renders any static template quickly obsolete. Second, the development of institutions needs to be contextual, both to the system and the technology. Nobel-winning research[42] shows that institutional structures have long-term consequences on a country's prosperity. Similarly, a system's features will impact its performance long-term.

Given these premises, this paper proposes principles and enablers that, combined, form the basis for a **maturity model** for innovative procurement. A maturity model proceeds from assessing the foundations of a procurement system, identifying its gaps and addressing them with specific solutions that allow the system to scale. That does not preclude replicating templates that work elsewhere, but it ensures that function takes priority over institutional forms.

Figure 5. Maturity model for well-architected procurement

1

SCALE

- Operational excellence with regular error correction (**culture**).
- Predictive maintenance of contracts and commissioning (**data**).
- Cross-functional teams with authority to experiment (**talent**, **culture**).

2

ACCELERATION

- **Data** governance is federated, secure, and usable.
- Real time analytics supports learning and commissioning.
- Communities of practice and technical specialties (**talent**).
- Other transaction authorities and technical ownership (**rules**, **culture**).

3

FOUNDATIONS

- **Data** is accessible, simple, and actionable.
- Assess competencies and **talent** gap.
- Legal and Operational review (**rules**, **culture**).

Hence, innovating *how* organisations develop their procurement systems will help them attain *what* and *why* these procurement functions are supposed to accomplish. There are several ways in which procurement can benefit innovation policy,[43] but these benefits will only be temporary if procurement models cannot keep pace with changes in the market, like good software.

Depending on the purpose of the acquisition and the maturity of the market, public systems will have to manage different functions. Some will orchestrate procurement-as-infrastructure, like in the case of India, others will broker cloud services by pooling expertise, as with Dynamic Purchasing Systems. There will be market-shaping accelerators for technologies that are more science than engineering, but hold great potential, and R&D task forces that serve as arbiters of different values in polarity within the system.

Figure 6. Procurement as a portfolio of institutional models
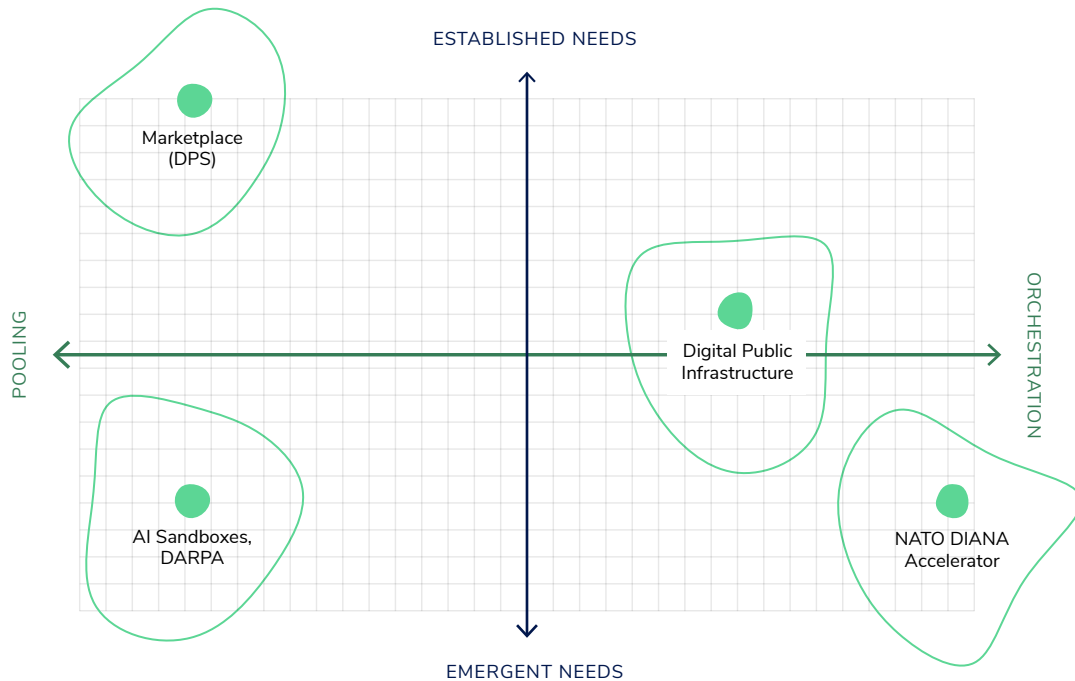
Well-architected public procurement is the essential mechanism for public systems to evolve, to adopt and manage the technologies defining our age. The alternative is institutional obsolescence.

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Leonardo Quattrucci is an Adjunct Professor of Digital Transformation and Innovation Management at Sciences Po and a Senior Fellow at the Centre for Future Generations (c.f.g.).

His career spans the public sector and the technology industry, from big tech to deep tech startups. Today, he advises startups and governments on putting technology to public service.

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Leonardo's work has received several recognitions. Forbes Magazine nominated him among the 30 Under 30 'top young leaders' in European policy (inaugural cohort). The BMW Foundation named him a "Responsible Leader", Schmidt Futures named him an International Strategy Fellow, the World Economic Forum named him a Global Shaper, and the Aspen Institute named him a Jr Fellow.

Leonardo has a Master of Public Policy from the University of Oxford.

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ENDNOTES

1   "Public Procurement." OECD, available at: https://www.oecd.org/en/topics/public-procurement.html
        (Accessed: [date you accessed it]).

2   "AWS Well-Architected." *Amazon Web Services*, available at: https://aws.amazon.com/architecture/well-
        architected/ (Accessed: 30 Jan, 2025)

3   Smith, J. (2024) "Artificial Intelligence and the State of the Union," *The Washington Post*. Available at:
        https://www.washingtonpost.com/opinions/2024/03/06/artificial-intelligence-state-of-the-union/

4   Nordic Council of Ministers. (2021) "Sustainable Public Procurement and the Sustainable Development
        Goals. "doi:10.6027/nord2021-010.

5   OECD (2023), *Government at a Glance 2023*, OECD Publishing, Paris, https://doi.org/10.1787/3d5c5d31-
        en.

6   OECD (2023), *Government at a Glance 2023*, OECD Publishing, Paris, https://doi.org/10.1787/3d5c5d31-
        en.

7   Dabla-Norris, E., Garcia-Macia, D., Gaspar, V., and Liu, L. (2024) "Industrial Policy Is Not a Magic Cure for
        Slow Growth," *IMF Blog*, 10 Available at: https://www.imf.org/en/Blogs/Articles/2024/04/10/industrial-
        policy-is-not-a-magic-cure-for-slow-growth

8   Kinder, T. (2024) "How Silicon Valley's 'Oppenheimer' found lucrative trade in AI weapons," *Financial Times*.
        Available at: https://www.ft.com/content/ce6f96f8-6ab8-4089-b7db-f99db22c2071

9   United Nations Development Programme (UNDP). (2021) "Building Transparent and Open Public
        Procurement Systems for Achieving the SDGs in ASEAN." *UNDP*. Available at: https://www.undp.org/
        indonesia/publications/building-transparent-and-open-public-procurement-systems-achieving-sdgs-
        asean

10   Teale, C. (2023) "Generative AI could save governments nearly $1.8T annually," *Route Fifty*. Available at:
        https://www.route-fifty.com/emerging-tech/2023/12/generative-ai-could-save-governments-nearly-18t-
        annually/392606/

11   https://www.statecraft.pub/p/how-to-quickly-procure-military-technology

12   Smith, J. (2024) "Artificial Intelligence and the State of the Union," *The Washington Post*. Available at:
        https://www.washingtonpost.com/opinions/2024/03/06/artificial-intelligence-state-of-the-union/

13   Patt, D. (2024) *Too critical to fail*. Available at: https://www.hudson.org/information-technology/too-
        critical-fail-getting-software-right-age-rapid-innovation-dan-patt (Accessed: 19 Feb 2025).

14   Hood, C. (1991) "A Public Management for All Seasons?" *Public Administration*, Volume 69(1): 3-19.
        doi:10.1111/j.1467-9299.1991.tb00779.x.

15   Ding, J. (2024) *Technology and the Rise of Great Powers*. Princeton University Press. Available at: https://
        press.princeton.edu/books/paperback/9780691260341/technology-and-the-rise-of-great-powers

16   McQuade, J. M., Murray, R. M., Louie, G., Medin, M., Pahlka, J., & Stephens, T. (2019) "Software Is Never
        Done: Refactoring the Acquisition Code for Competitive Advantage." *Defense Innovation Board*. Available
        at: https://media.defense.gov/2019/Mar/26/2002105909/-1/-1/0/SWAP.REPORT_MAIN.BODY.3.21.19.
        PDF

17   Patt, D. (2024) "Too Critical to Fail: Getting Software Right in an Age of Rapid Innovation," *Hudson Institute*.
        Available at: https://www.hudson.org/information-technology/too-critical-fail-getting-software-right-age-
        rapid-innovation-dan-patt

18   Centre for Digital Public Infrastructure (CDPI). (2024) "DPI Tech Architecture Principles," *The DPI Wiki*.
        Available at: https://docs.cdpi.dev/the-dpi-wiki/dpi-tech-architecture-principles

19   Patt, D. (2024) "Too Critical to Fail: Getting Software Right in an Age of Rapid Innovation," Hudson Institute.
        Available at: https://www.hudson.org/information-technology/too-critical-fail-getting-software-right-age-
        rapid-innovation-dan-patt

20   Del Rio, Pablo; Howlett, Michael P. (2013). "Beyond the'Tinbergen Rule'in Policy Design: Matching Tools
        and Goals in Policy Portfolios". *Lee Kuan Yew School of Public Policy Research Paper* (13–01).

21   Pahlka, J. (2024) "Testimony: Jennifer Pahlka on harnessing AI to improve government services and
        customer experience," *Niskanen Center*. Available at: https://www.niskanencenter.org/testimony-jennifer-
        pahlka-on-harnessing-ai-to-improve-government-services-and-customer-experience/

22   Ibid.

23   OECD (2021), The E-Leaders handbook on the governance of digital government. *OECD Digital Government Studies*. Available at: https://www.oecd.org/en/publications/the-e-leaders-handbook-on-the-governance-of-digital-government_ac7f2531-en.html

24   Australian Government. (2021) "Digital Sourcing for Government," *BuyICT*. Available at: https://www.buyict.gov.au/sp?id=lifecycle&tab=planandresearch#navtabplanandresearch

25   Australian Government. (2021) "Digital Sourcing for Government," *BuyICT*. Available at: https://www.buyict.gov.au/sp?id=lifecycle&tab=planandresearch#navtabplanandresearch

26   Quattrucci, L. (2023) "What I learnt at Amazon that I wish I knew in government," *Blavatnik School of Government*, 12 December. Available at: https://www.bsg.ox.ac.uk/blog/what-i-learnt-amazon-i-wish-i-knew-government

27   Srinivasan, S. (2024) "ONDC: Remixing Commerce," *Tigerfeathers*. Available at: https://tigerfeathers.substack.com/p/ondc-remixing-commerce

28   Pahlka, J. (2024) "Testimony."

29   Innovation Procurement Empowerment Centre (iPec). (2024) *The Art of the Possible in Public Procurement: New Horizons for Empowering Innovation*. Available at: https://www.ipec.org.uk/wp-content/uploads/2024/01/iPec-Art-of-the-Possible-Full-Report.pdf

30   Ruiz, S. (2024) "How to Buy Stuff Like DARPA Does," *Statecraft*, 14 February. Available at: https://www.statecraft.pub/p/how-to-buy-stuff-like-darpa-does

31   Patt, D. (2024) "Too Critical to Fail."

32   OECD (2023), "Professionalising the public procurement workforce: A review of current initiatives and challenges", *OECD Public Governance Policy Papers*, No. 26, OECD Publishing, Paris, https://doi.org/10.1787/e2eda150-en.

33   Leffew, J. (2023) "How to Procure Advanced Military Tech," *Statecraft*, 25 October. Available at: https://www.statecraft.pub/p/how-to-quickly-procure-military-technology

34   Decarolis, F. et al. (2018) "Bureaucratic Competence and Procurement Outcomes," *National Bureau of Economic Research*. Available at: http://www.nber.org/papers/w24201

35   Apolitical. (2024) "How climate is changing everyone's job in government," *Quarterly Global Insights*. Available at: https://apolitical.co/pages/quarterly-global-insights-2

36   Apolitical. (2023) "How are Singapore, Canada and the UK building data skills in their workforces?" *Apolitical Insights*. Available at: https://apolitical.co/pages/government-data-capability

37   Van Hoek, R., DeWitt, M., Lacity, M., & Johnson, T. (2022) "How Walmart Automated Supplier Negotiations," *Harvard Business Review*. Available at: https://hbr.org/2022/11/how-walmart-automated-supplier-negotiations

38   World Bank. (2022) *Using Data Analytics in Public Procurement: Operational Options and a Guiding Framework*. Available at: http://hdl.handle.net/10986/37467

39   Cocciolo, S. S. D. (2022) *Measuring Performance of Public Procurement in Croatia*. World Bank. Available at: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099655202262241785/p1736820c6f79d0b608b2b002cb87885cba

40   Office of Management and Budget. (2023) "Advancing Governance, Innovation, and Risk Management for Agency Use of Artificial Intelligence," *The White House*. Available at: https://www.whitehouse.gov/wp-content/uploads/2023/11/AI-in-Government-Memo-draft-for-public-review.pdf

41   UK Government. (2024) *Guidelines for AI Procurement*. Available at: https://assets.publishing.service.gov.uk/media/60b356228fa8f5489723d170/Guidelines_for_AI_procurement.pdf

42   Nobel Prize Outreach. (2025) "Popular Information," NobelPrize.org. Available at: https://www.nobelprize.org/prizes/economic-sciences/2024/popular-information/

43   Monteiro, B., A. Hlacs and P. Boéchat (2024), "Public procurement for public sector innovation: Facilitating innovators' access to innovation procurement", *OECD Working Papers on Public Governance*, No. 80, OECD Publishing, Paris, https://doi.org/10.1787/9aad76b7-en.

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