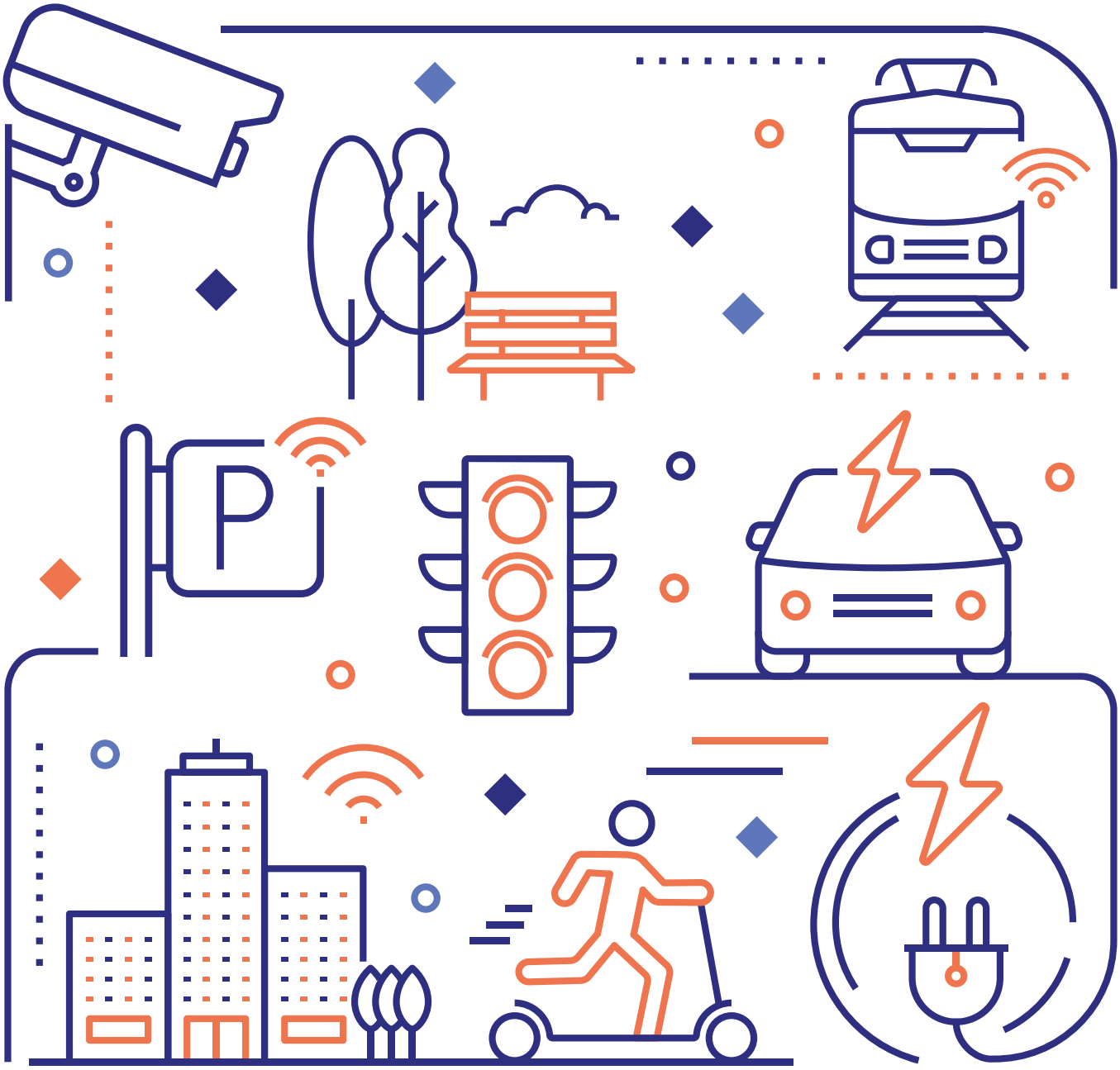

The Next Infrastructure Crisis?

BY JANET ANDERSON PHD

Two decades ago, when I first designed service-based budgeting tools for the City of Detroit, Michigan, I created an inventory of the city's services to catalogue how we serviced the needs of our deteriorating neighborhoods. There were 36 physical infrastructure-related services on city streets out of nearly 100 services across regulatory enforcement, safety responses, amenities, and related planning support areas. Today, in all cities, the list is likely much longer.

Interaction and innovation are the heart of cities, so some of the allure of an urban place is how many things are fit together in small spaces. But the pressure for cities to find their most efficient form is ever greater. Leaders must look at the true costs of city assets in relation to the whole package of services provided.

More and more stuff on city streets

The list of infrastructure assets in cities today is longer than ever. New technology has found its way onto street corners and storefronts, with monitored cameras, 5G telecommunications, public Wi-Fi, and gunshot detectors. Smart sensors for everything from streetlight outages to autonomous vehicles can't be far behind.[1] Bike lanes, bike repair stations, and transit islands have transformed Motor City roads, alongside speed bumps, pedestrian signs, and kiosks. More electric vehicle chargers, or magnetic inductive charging in roadbeds, will pop up. Strategies to address climate change has brought the city onto residential property to install seawalls and basement protection devices, and green stormwater infrastructure is starting to blanket the landscape. Other cities have similar stories.

Private entities also have more infrastructure on city streets, often in close quarters with the city's things: emergency call boxes, neighborhood gateway signs, scooters, dog water stations, solar panels, cell towers, power distribution lines, fiber optic cable, freeway overpasses, fencing, and viaducts. It's an impressive package, representing admirable visions for transforming daily life.

It's just that some sidewalks are thoroughly laden with manholes and handholes, signage, and devices attached to pavement and poles. In some cases, installation of one may compromise another. In other cases, uses collide. They take up space and they require attention. Whether or not all this hardware is necessary, or the city's "fault," is not the point—it adds value for somebody. A city government must understand the collective value it adds and assure that it is sited and operating in a safe and orderly manner. (See Exhibit 1 for a catalog of Detroit's physical infrastructure services since 2000.)

> A city understands the value of its infrastructure by understanding how that infrastructure supports public services.

The art and science of defining your service catalog

A city understands the value of its infrastructure by understanding how that infrastructure supports public services. The service is what constituents focus on. Cataloguing public services can help reconcile spending, to make sure it meets public expectations and so infrastructure works in concert, supported by sufficient funding over its life.

EXHIBIT 1 | CATALOG OF DETROIT PHYSICAL INFRASTRUCTURE SERVICES SINCE 2000

FY2000 Physical Infrastructure Service	Additional/Changed Services Since FY2000
Traffic signal maintenance	Informational kiosks
Street lane markings	Bike lanes, approvals for bike service stations
Street and traffic signage	Cameras at intersections
Street maintenance	Speed bumps on residential streets
Routine street cleaning	Accessibility curb cuts
Dangerous tree removal	
Plantings and maintenance	More neighborhood gateway signs
Tree trimming	
Median island maintenance	
Freeway berm maintenance	
Vacant lot maintenance	Temporary seawalls in flood zones
Sidewalk maintenance	More pavers and decorative inlays
Parking meter maintenance	Parking meter kiosks
Fire hydrants	
Park/playlot maintenance	Community-based park amenities partnerships
Street lighting	Telecommunications attachment permits
Steam power generation in central city	*No longer a city responsibility*
Bus shelters	More boarding islands
Recreation centers	
Branch libraries	
Water distribution	
Water drainage	Green stormwater infrastructure
Sewerage collection	
Weekly refuse collection	Now includes recycling containers
Quarterly bulk collection	Now biweekly
Illegal dumping cleanup	
Business district cleanup	More involvement in derelict private business properties
Yard waste collection	
Scrap tire collection	
Transfer station disposal	
Commercial refuse container services	
Hazard materials collection and handling	
Abandoned car removal	
Brownfields remediation	
Public water fountains in public spaces	
City Engineering survey map and "MISS Dig" coordination	

The service is the product delivered to the public—it is the output of programs or agencies. It comes with a lot of gear:

- Road paving, curbs, curb cuts, lane stripes, medians, sprinklers, crosswalks, speed bumps, and sewer grates.
- Street, traffic and informational signs, bus stops and benches, bike racks or bike share stations.
- Handholes or manholes in sidewalk flags and pavers, alongside fire hydrants, parking meters and kiosks, trash receptacles, trees, or decorative inlays.
- Traffic lights and signals, streetlights, wires, telecommunications, cameras, or other technologies.
- An unseen cavity of water and energy pipes, fiber optics, and electric wires under the street.

In concept, the catalog of services relates each thing the city delivers to a broader purpose or strategy, and to success metrics. Exhibit 2 shows Fire Department services, what appropriation funds them, and to what ends. This can be a budget development tool as well as a policy tool. It keeps government thinking like a customer. What matters to the customer is not just "roads" or "police," but whether police patrol the neighborhood, with residents, or monitor the area using surveillance technologies.[2] It's also whether roads have only vehicle lane markings, or curbs, curb cuts, medians, traffic signals and bike lanes too—these tangible offerings present very different experiences.

The service categorization needs to be sufficiently broad so that budget staff don't drown in detail while still circumscribing activities that have unique cost drivers. The unique cost and revenue profiles of each of these assets require close tracking of their operating costs and revenues, against benefits they provide for Detroit residents.

Citizens will see blight in the forest of hardware on their streets if the assets aren't well-stewarded. Also, something can be operable and still hazardous. A pole foundation may have damaged the sidewalk or be carrying banners and telecommunications beyond its design specification. The city can navigate its budget better, and can coordinate strategically across agencies, by measuring the services these assets deliver.

It is only possible to get what you pay for if you know what you're paying for

We can't assure that we got what we paid for if we don't in fact know the full cost of the service. What exactly are agencies spending appropriations on? How does it relate to larger city goals? What benefits came from the spending, especially to the public? How much money will be needed later for the assets? A city's budget process must facilitate all these conversations.

Performance dashboards built from a service catalog could link spending directly to policy outcomes and make the service delivery model, or "theory of change,"[3] explicit. Even without strategic plans, the service catalog would be beneficial to a public trying to understand what the budget

EXHIBIT 2 | CATALOG CONNECTING FIRE DEPARTMENT SERVICES TO THE BUDGET AND BUDGET METRICS

Dept, No.	Citywide Outcome	Outcome Strategy	Budget Approp.	Service	Component Service	Expenses Included	Units of Service or Efficiency Metrics
DFD 24	Efficient and innovative operations	Effective department admin	29240	Administrative overhead	N/A	Planning, managing, training, apparatus and inventory stores	Administration costs as % of department budget
DFD 24	Safer neighborhoods	Reduced danger in environment	25242	Emergency response	Fire suppression	Including 32 firehouses, 13 ladder companies, 6, including response to gas leaks, hazards and rescues	Runs per company
DFD 24	Safer neighborhoods	Contain health emergencies	25242	Emergency response	EMT ambulance service	27 ambulances, 5 with advanced life support capability, dispatched through 911 calls	Runs per ambulance
DFD 24	Efficient and innovative operations	Effective department admin	29241	Emergency response	911 dispatch	24/7 call intake to deploy response vehicles for fire, medical or other hazards per caller requests	Peak call volumes per operator
DFD 24	Safer neighborhoods	Reduced danger in environment	25242	Emergency response	Confined space rescue	Specialized tools for emergencies	Cost per participant
DFD 24	Safer neighborhoods	Crime control	25240	Criminal investigation	Arson investigation	Criminal casework, fire reports	Cost per plans reviewed; average time for review
DFD 24	Effective governance	Community engagement	28240	Community engagement	Fire safety education	Community presentations and events such as mobile safety house, CPR lessons, smoke detectors	No. of participants reached per FTE
DFD 24	Safer neighborhoods	Reduced danger in environment	25240	Code enforcement	Fire safety enforcement	Event, flammable storage, fireworks, industrial permits	No. of inspections per FTE; cost per inspection; no. of permits per inspector
DFD 24	Safer neighborhoods	Reduced danger in environment	25243	Hazard mitigation	Hazardous material mitigation	Response teams and equipment to contain chemical and other hazards	No. of incidents per team
DFD 24	Safer neighborhoods	Resiliency	20935	Homeland security	Port security	Grant-related staffing	Grant-specified
DFD 24	Safer neighborhoods	Resiliency	20936	Homeland security	FEMA wellness	Grant-related staffing	Grant-specified

EXHIBIT 3 | TOTAL CITY EFFORT TOWARD BROAD STRATEGY OF COMMUNITY ENGAGEMENT

Dept, No.	Outcome Strategy	Budget Approp.	Service	Component Service
DFD 24	Community Engagement	28240	Community Outreach	Fire safety education
DPD 37	Community Engagement	28370	Community Outreach	Violence Prevention
PDD 43	Community Engagement	*	Community Outreach	Data, analysis, meetings
Mayor 33	Community Engagement	28330	Community Outreach	Department of Neighborhoods
Mayor 33	Community Engagement	20901	Community Outreach	Volunteer coordinator
Mayor 33	Community Engagement	28330	Community Outreach	Public information
Elections 71	Community Engagement	28711	Community Outreach	Voter education
City Clerk 70	Community Engagement	28700	Community Outreach	public affairs information
Ombudsman 53	Community Engagement	28530	Community Outreach	complaint intake and analysis
NonDept 35	Community Engagement	28350	Special Public programs	World Trade Program
NonDept 35	Community Engagement	28350	Special Public programs	Special Parking Programs
NonDept 35	Community Engagement	28350	Special Public programs	Public Commemorations
NonDept 35	Community Engagement	28350	Special Public programs	Charter Commission
NonDept 35	Community Engagement	28353	Community Outreach	Cable TV
NonDept 35	Community Engagement	28352	Community Outreach	Media Services

*Service costs are not segregated in a single appropriation

As infrastructure requirements grow, the web of service providers needs closer communication.

is funding and what value it is bringing to whom. (See Exhibit 3 for a chart that catalogues Detroit's efforts in community engagement.)

Will there be enough money to assure that all regular maintenance and necessary repairs and replacements will be made? If not, what service levels will we give up? Protective bike lanes require unique pieces of snow removal equipment, and surveillance camera monitoring demands different staffing and equipment. That decision to stripe a road for bike lanes represents different goals than striping vehicle lanes, and commute times and traffic accident measures could be weighed against the investments.

The service catalog can weigh the value of street spending against dangerous tree removal and surveillance cameras or park facilities. It can document the benefits expected from an investment, as well as what other providers might provide these same services. The catalog can associate required assets to services so that asset management is not only funded but coordinated across agencies, so we don't break the same ground multiple times. As infrastructure requirements grow, the web of service providers needs closer communication.

The increasingly complex web of public service providers

Public-private partnerships and special-purpose authorities have brought welcomed resources to the table, but this has also made the web of service providers operating in the same space even more complex. This level of complexity can threaten proper configuration on the street as well as maintenance of what is built. Numerous signoffs are needed for permit approvals, but who is assuring that these external entities properly maintain what they build? Who is assuring the city's preparation to meet its responsibilities? (See Exhibit 4 for interagency involvement in code enforcement services.)

The amount of infrastructure present on streets of cities like Detroit (right) has steadily increased over the last two decades.

EXHIBIT 4 | A RANGE OF ORGANIZATIONS PROVIDING PUBLIC SERVICES

Type of Providing Government or Organization in Detroit	Public Physical Plant Located in Cities
Municipal, Regional	Water pipes and mains, sewers and trunklines, incinerator, transfer stations, landfill
Municipal, County, State, Federal, Regional, Private	Highways, bridges, tunnels, sea and airports, parking lots and structures; Rail lines, grade separations and crossings, shipping channels, shorelines; Convention centers and entertainment venues
Private	Telephone wires and poles, internet cabling and servers
Private	Gas mains, steam pipes, electric wires and transformers, generators
Municipal, County, Authority, State	Streets, sidewalks, curbs, alleys, signs, traffic lights, crosswalks, streetlights
County, Municipal	Jails, lockups, courtrooms
School Board, Nonprofit, Commission	Schools, libraries, museums
Municipal, Nonprofit, Private	Recreation centers, vacant land management, healthcare, stadiums
Commission, Federal, State, Municipal, Nonprofit	Public housing and affordable housing development, home repair

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EXHIBIT 5 | INTERAGENCY INVOLVEMENT IN CODE ENFORCEMENT SERVICES

Dept, No.	Outcome Strategy	Budget Approp.	Service	Component Service
BSEED 13	Neighborhood-based business	27131	Code enforcement	Residential building inspection
BSEED 13	Safe streets	25130	Code enforcement	Dangerous building inspection
BSEED 13	Safe streets	25130	Code enforcement	Demolition permits
BSEED 13	Safe streets	25130	Code enforcement	Property maintenance
DFD 24	Reduced danger in environment	25240	Code enforcement	Fire safety enforcement
DPD 37	Safe streets	25370	Code enforcement	Cabaret licensure
DPD 37	Safe streets	25370	Code enforcement	Overweight truck safety
DPD 37	Safe streets	25370	Code enforcement	Construction plan review
DAH 45	Crime deterrence	26450	Code enforcement	Blight codes adjudication
Zoning Board 51	Neighborhood-based business	27510	Code enforcement	Zoning appeals investigations
Health 25	Contain health emergencies	25251	Code enforcement	Food safety
Health 25	Safe streets	25252	Code enforcement	Animal care
LAW 32	Effective department admin	29320	Code enforcement	Prosecution

Providing clarity about what we do, and how we do it, will make a variety of best practices possible.

The range of organizations providing services is especially broad in some cities like Detroit, where there is significant overlap of jurisdictions. (See Exhibit 5.) Should one asset manager be assigned to make sure that Wayne County, the State of Michigan, Detroit Public Schools, and special-purpose authorities working side by side with the city on roads, safety, public space, and health services are in fact delivering well? Would it be more economical if all thoroughfare responsibilities were consolidated under the county, rather than the quilt of intertwined street maintenance operations?[4]

Universities and medical centers' development teams have added entirely new assets in Detroit, like the MoGo bike share system and Q-line streetcar. Philanthropy has boomed, but it can require matches or long-term operating commitments that should be included in a city's long-term capital plans. A catalog of public services can shine a light on returns on philanthropic investments, as well as identify opportunities for further partnerships. Once diligent Detroit neighborhood groups found a way into vacant lot improvements and neighborhood beautification, and businesses donated park amenities, city officials saw opportunities to nurture other community partnerships, and new resources followed.

All cities' staff are familiar with the ballet of approvals for each attachment of telecommunications to traffic or light poles, but the ballet of changing funding priorities is less visible. What happens when the smart sensors are deployed? How will we know what impact they have on city infrastructure, and what new processes are needed? How should local governments organize themselves to assure maintenance at the best cost to the city?

Conclusion

Providing clarity about what we do and how we do it will make a variety of best practices possible: meaningful public engagement in priority setting; total cost of ownership analysis for outcome-based budget decisions; and strategic planning. We must double down on planning and managing these assets if we are to be sure they transform our cities as we hope, rather than create the next infrastructure crisis.

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[1] For a deeper dive on the smart city vision, see Forrest Senti, "5 Ways Smart Infrastructure Shapes Communities for the Better," Smart Cities Dive, December 18,2020; or Johnathan Woetzel et al, "Smart Cities: Digital Solutions for a more livable future," McKinsey Global Institute, June 2018.

[2] The array of police services changed by technology is discussed in Jon Fasman's *We See It All: Liberty and Justice in the Age of Perpetual Surveillance* (AK Press, 2021). The book was discussed on National Public Radio in 2021 (Surveillance and Local Police: "How Technology Is Evolving Faster than Regulation," January 27, 2021).

[3] A concept that comprehensively describes how and why a desired change will happen from the resource investments made, in "What Is Theory of Change," Center for Theory of Change.

[4] GFOA best practices call for evaluation of service delivery methods; see "Evaluating Service Delivery Alternitives" at gfoa.org.