



EDEN: NYC Digital Equity Index and Provider Accreditation

IMPLEMENTATION PLAN

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The Tech Executive Leadership Initiative (TELI) is a skills-building initiative to prepare experienced technology leaders to engage effectively with public sector challenges.




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Background and Concept


In order for the CTO's office to incentivize vendors to provide more equitable access to broadband in the City, the New York City Mayor's Office of the Chief Technology Officer (MOCTO) should:

- ▶ Implement the **Expanding Digital Equity in New York City (EDEN) Index** in two different stages—a Core and a Complete stage. The EDEN Index is a comprehensive index of digital equity indicators that can be created and used to map digital equity at the zip code level. The Index will enable the City to understand how digital equity changes as a result of current policies and provider behavior.
- ▶ Establish an **accreditation process**, which uses scores derived from the EDEN Index to brand providers as 'Digital Equity Champions' when their contribution to digital equity meets or exceeds predetermined levels. The accreditation process will influence provider behavior tracked by the EDEN Index by providing branding incentives to transform digital equity into a competitive advantage in a market where incumbents and new entrants have little differentiation.
- ▶ Create a **public dashboard** that communicates the EDEN Index and accreditation status of providers in real time to the public. This dashboard will allow MOCTO and partner agencies, community organizations, and individual customers to actively exert pressure on providers to meet digital equity targets.



For MOCTO to actualize this solution, it will need to implement the following 6 steps:

- ▶ Step 1: Establish the program and logistics.
- ▶ Step 2: Construct the Core EDEN Index.
- ▶ Step 3: Define the accreditation process.
- ▶ Step 4: Create the public dashboard.
- ▶ Step 5: Launch and sustain the program.
- ▶ Step 6: Transition from Core to Complete EDEN Index.

For the purpose of this implementation plan, we also note that MOCTO should begin with the Core EDEN Index (~20  measures) rather than the Complete EDEN Index (~70 measures). We believe the Complete Index offers a more comprehensive and nuanced overview of Digital Equity in NYC, but it is also more expensive and may take longer to implement.

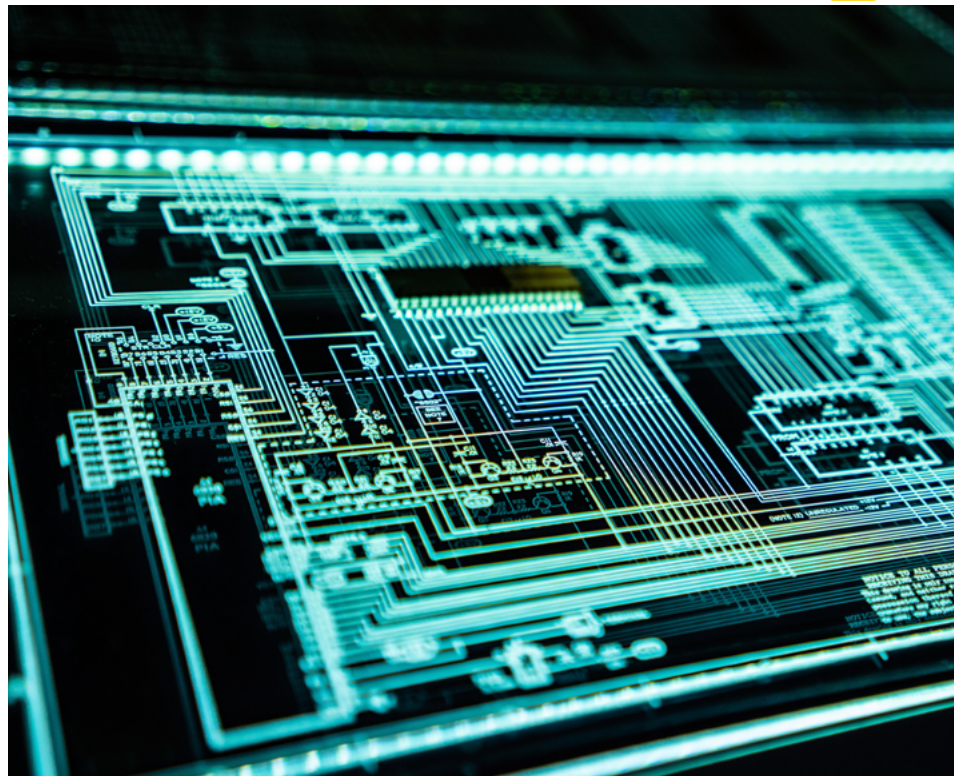
Step 1: Establish the Program and Logistics

MOCTO should identify staff role(s) that will be responsible for assessing, tracking, and certifying the measurement of digital equity. While contractors may build the code to calculate EDEN Index scores, ownership of the product, its operation, and communication with vendors should reside within MOCTO. MOCTO should also identify where to host the Index. We suggest that the Index datasets, algorithms, and visualization dashboard live on the NYC Open Data platform with a proposed address at: <https://eden.data.cityofnewyork.us>.

In addition, MOCTO will need to build a timeline for maintaining the Index. The Core EDEN Index lists the frequency of updates for referenced data sources. These update schedules should guide MOCTO's schedule for updating the portions of the Index not supplied by broadband or digital service providers.

If the Index scores might be used to decide or affect outcomes of procurement, MOCTO should also strategize with City procurement officers on approaches and potential constraints of including those in future contracts and vehicles. For example, the City might offer discounted use of City access cables as a reward for high digital equity scores, or reduce future contract opportunities for companies with low scores. Defining how and when the City will measure success of these approaches and incentives, and iterate on them as needed, is important before beginning their use.

Image by Li Goldstein



Step 2: Construct the EDEN Index

A. EDEN Overview

The [EDEN Index](#) is a digital index primarily tailored for New York City. The Core EDEN Index of ~20 measures is constructed using 5 groups of indicators. The data mostly comes from publicly available sources such as: NYC Open Data, the Federal Communications Commission, the US Census Bureau, and the National Telecommunications and Information Administration.

Our Index was based on two overarching insights:

1. That closing the digital divide needs more than fundamental broadband infrastructure access and subscription rates; and
2. That filling specific, unique gaps in a community's technical skills and how much a community values broadband internet at home is the key to getting closer to digital equity.

In 2019–2020, the US Census Bureau conducted a study to identify counties where internet supply was particularly low and high, and to assess the impact of internet access in driving digital equity and overall broadband uptake.² Using a geographically weighted regression model, the study demonstrated that while investments in infrastructure are fundamental and important to improving digital equity and broadband subscription rates, it is impossible to close the digital divide without attention to cost concerns, gaps in community technical skills, and differences in judgements regarding the value of having broadband internet at home. This was corroborated via a broad set of stakeholders from NYC with whom we spoke.

Based on the stakeholder conversations, a model for 'best practices' emerged that included providers of digital products and services beyond the Internet Service Providers (ISPs). Some of these players include non-ISP providers such as Capital One, with its initial \$200 million, multi-year commitment to advance socioeconomic mobility through the [Capital One Impact Initiative](#) and [Capital One Digital Access](#) (CODA) program. CODA's mission of community finance to support well-being by providing capital to build and preserve housing was served by providing digital access using infrastructure, equipment, and more importantly, services unique to the community they operated in. With deep expertise in affordable housing, CODA was able to leverage its IT staff to provide services—such as training for their potential customers—to develop familiarity with accessing and using the internet effectively, including financial products and services.³

Whether it is to improve community health, advance economic mobility, reduce persistent poverty, or achieve digital equity, tackling ambitious goals like these requires data. But not everyone has access to data or the skills and resources to use such data to advocate for change. The Complete EDEN Index provides an in-depth way to measure digital equity and is constructed using vetted, robust data sets, many of which are publicly available. The EDEN Index is constructed using 5 groups of indicators: access, skills, use, supportive environment, and historical disenfranchisement.

Summary of EDEN’s measures

Dimension	Measurements
Access	
Access includes general access to fixed or mobile internet and telephone, and other dimensions that build on top of these services.	Access includes access to internet, tele-phones, device, connectivity and point of access. These indicators measure access to electricity, the internet, and devices as well as the quality of that access.
Skills	
Digital skills include basic skills like reading, writing, and numeracy, and more advanced skills like critical thinking, problem solving, and creativity. Digital skills vary greatly by demographics, and directly impact one’s ability to both afford and benefit from digital tools.	Skills include 11 measurable indicators of literacy, academic expectancy, critical thinking, and entrepreneurship.
Use	
Traditionally, there is a limited focus on the value created from the actual use of digital skills. Use measures the use of technology and digital services.	Use includes 14 measurable indicators such as the use of internet for search engines, AV, e-banking, social media content creation, e-work, and e-participation (e.g., engaging in public discussion, petition, voting, etc.).
Supportive Environment	
A supportive environment must be measured to get a full picture of a given region. Supportive elements include affordability, access to financial services, trust in technology, safety, and security in access.	Supportive environment includes 11 indicators including affordability, trust & security (measured by confidence in privacy of online activities, cybercrime incidents including malware, and more), access to bank accounts, and access to alternative financial services (such as Stripe, Zelle, and Coinbase).
Historical Disenfranchisement	
Historical disenfranchisement is important to measure since historical disenfranchisement may alter the supports that communities need. ⁴ These indicators include measures of income, access to education, and housing instability.	Historical disenfranchisement measures the digital skills and academic life expectancy of those who have historically been disenfranchised, such as communities of color, women, and minors. ⁵ Historical disenfranchisement includes 18 NYC-specific indicators that measure housing, income, demographics, disability, median income, access to support services, access to primary and secondary education, truancy rates in K-12 public education, and more.



Image by Carl Soler

The Complete EDEN Index includes ~70 measures across these 5 dimensions. Many of the measures can be constructed from the primary and secondary data sources identified in this model. However, some nuanced data specific to the “value” that users see in having broadband access may need to be surveyed independently for robustness. The Complete EDEN Index may require significant time investment and resources into technical data ingestion methodologies (such as accessing APIs, normalizing the data pipeline, and data normalization). Because of the Complete EDEN Index’s complexity, we suggest that MOCTO should begin utilizing EDEN with the Core Index.

B. Estimated Time & Effort for Accessing Datasets

We estimate that it will take 1 full-time equivalent (e.g., a data engineer) 20 weeks of time to build the Core EDEN Index. Ideally, the data engineer would already been familiar with NYC’s Open Data infrastructure, since much of the Index pulls from this data source.

Timeline for Building the Core EDEN Index

Work Item	Weeks Required
Integrating data sources (estimate assumes that it will take 2 weeks per source, and there are 8 sources in total).	16
Building a common data source repository.	2
Building the dashboard.	2
Total Time	20 weeks



Image by Taylor 

C. Steps for Operational Stand Up

To stand up the Core EDEN Index, the MOCTO team will need to:

1. Align on big picture goals and metrics for closing the digital divide. The team should recall that the EDEN Index needs to:
 - a. Include more than fundamental broadband infrastructure access and subscription rates; and
 - b. Fill unique gaps in a community's technical skills and value that broadband would enable.
2. Decide on a specific version of EDEN to be implemented—Core, Complete, or possibly a third version customized by MOCTO staff. Based on our work, we recommended starting with the Core EDEN Index.
3. Decide on the long-term plan for the EDEN Index (including the plan for procurement contractors) and how it will fit with existing and planned monitoring and evaluation mechanisms for New York City's [Internet Master Plan](#) programs.
 - a. Partner agencies may have preferences on particular Index metrics used in contracts for regulatory, legal, or other reasons.
 - b. Some agencies may wish to include their own public or proprietary datasets in the Index for regulatory or policy reasons.
4. Add additional providers of digital products and service categories for NYC as necessary.
5. Adopt the weights assigned in the model ([see guidance on weights](#)).
6. Create an EDEN Index specifications document to be shared with internal IT staff and potential contractors. This specifications document should include:
 - a. Technology requirements;
 - b. Datasets;
 - c. Implementation timeframes;
 - d. A list of approvals and reviews that are necessary; and
 - e. A list of contract conditions, along with the responsible agencies and staff for contracting.
7. Secure access to the selected datasets and begin by accessing sample data sets from the data sources identified.
8. Run a sample end-to-end data pipeline integration including data ingestion, data normalization, and working with the data model to generate the final composite EDEN Index score.
9. Schedule detailed sprints with the data engineers to build the Index, along with product increments (PIs) and other agile development tactics.
10. Complete code implementation for the Index and commence a test for the Index's minimal viable product (MVP).
11. Iterate on the Index as necessary, including code adjustments, until it is ready to launch.
12. Create maintenance and update schedules for the EDEN data sources, the platform, and the user interface.
13. Embed a feedback process (such as a survey form or feedback panel sessions) for incorporating usability feedback in the final product. Ensure the feedback process is followed regularly, and that the suggestions from the feedback process reach the developer and contracting teams.
14. Create detailed plans for collecting primary data for the Index that is not available in existing structured datasets (such as surveys).

Step 3: Define the Process for Accreditation

Once the Index is built, MOCTO should establish and implement its accreditation process to brand broadband providers as ‘Digital Equity Champions’ when their contribution to digital equity meets or exceeds predetermined levels. The accreditation process cycle for providers should include 5 stages: outreach, application, evaluation, adjudication of status, and appeals. The accreditation status itself should have 4 tiers—Platinum, Gold, Silver, and Bronze—which signal that the providers have met or exceeded specific thresholds based on the aggregated assessment metrics.

Accreditation Tiers



EDEN Bronze recognizes organizations that achieve a digital equity score of over 25.



EDEN Silver recognizes organizations that achieve a digital equity score of over 50.



EDEN Gold recognizes organizations that achieve a digital equity score of over 75.



EDEN Platinum recognizes organizations that achieve a digital equity score of over 90.

EDEN Score			
>25	>50	>75	>90

Provider Opportunities

Opportunities to work with community partners and NGOs to improve scores.

Opportunities to obtain additional points and receive priority status in Requests for Proposals (RFPs).

Opportunities to the market badge; and opportunities to obtain additional points and priority in RFPs.

Opportunities to the market badge; and opportunities to pay reduced carriage fees for using NYC fiber network.

A. Outreach

MOCTO staff, in collaboration with partner agencies supporting the IMP, should reach out to broadband providers and non-ISP digital service providers to explain the EDEN Index, the benefits of accreditation, the accreditation tiers, and the process of getting accredited. MOCTO can use this sample information sheet to explain the process to partner agencies.

B. Applications

MOCTO staff should set up an application portal where providers can respond to the specific application questions based on metrics from the Core EDEN Index. There are at least two options for the application portal:

1. MOCTO can develop a dedicated portal maintained by its staff. This should be a straightforward task, especially since the Index is largely based on the NYC Open Data platform;
2. MOCTO can use and slightly modify the [HireNYC: Goods and Services](#) portal run by [Small Business Services](#), since it is already used for certifying vendors that receive city funding.

MOCTO can obtain much of the information necessary to run the Core EDEN Index for each provider using public data sources. This will reduce the effort for ISPs and online service delivery organizations to apply for certification. The application questionnaire will gather information such as:

- ▶ Organization name;
- ▶ Service(s) provided to New Yorkers: (e.g., types of internet service packages including bundles, pricing, and specific contractual terms (such as lock in, credit checks, late payment fees, etc.);
- ▶ Number of customers served in total, and broken down by zip code;
- ▶ Percentage of customers using the service packages described above; percentage of customers declared or self-identified as low-income; percentage of customers self-identified as racial or ethnic minorities; and percentage change in each preceding category over the preceding 4 quarters; and
- ▶ What their organization is doing to promote digital equity (with examples available), including specific programs targeted to low-income and minority customers.

Once the portal is live, providers who register interest will be invited to apply.

C. Evaluation

Evaluation of the submitted applications should be conducted by MOCTO staff. MOCTO should check the applications for completeness based on the Core EDEN Index, review the automatically generated digital equity scores, and follow up with applicants for any missing information or questions. Applicants will also be allowed to provide optional data relevant to the Complete EDEN Index to improve the probability of successful accreditation.

D. Adjudication of Status

The formal adjudication of status will be done by a standing committee chaired by a MOCTO representative and comprising staff from relevant partner agencies (e.g., [NYC Small Business Services](#), [NYC Economic Development Corporation](#), [NYC Housing Authority](#)). The specific criteria for determining accreditation status (Platinum, Gold, Silver, Bronze or none) will be developed by the standing committee, but should include at minimum:

- ▶ digital equity score trends,
- ▶ disparity of scores by zip codes, and
- ▶ specific initiatives by the applicant (provider) undertaken to address digital equity issues.

Successful applicants will be given the non-exclusive rights to use a ‘Digital Equity Champion’ badge corresponding to their awarded tier in print and digital communications for as long as their accreditation remains valid. The City will also promote the EDEN Index and the accredited providers in public materials pertaining to the IMP and digital equity initiatives. The certification badges will provide incentives for companies to use digital equity accreditation as a competitive advantage in the New York City market where both incumbents and new entrants are largely undifferentiated in the eyes of individual consumers. Younger consumers, in particular, are increasingly making buying choices based on social and environmental justice factors; they are also highly adept at exerting pressure on companies via social media. Furthermore, the City may choose to utilize EDEN scores to decide or impact outcomes of future procurement contracts and vehicles.



Image by To ick

E. Appeals

Applicants may be given the opportunity to appeal their adjudication of status if they can demonstrate the adjudication process involved procedural errors. Appeals should be reviewed by MOCTO’s internal counsel, whose decision will be final.

Provider accreditation should also be reviewed at least once every 12 months. Each new accreditation cycle will follow the same 5 stages outlined above.

F. Challenges and Opportunities

A key challenge of the accreditation process is that providers will likely be able to estimate their EDEN score before submitting their application. They may choose not to submit data to avoid being branded as ‘underperforming.’ In practice, this won’t likely matter; even if MOCTO ends up only awarding Platinum and Gold badges, the very fact that certain providers don’t participate in the accreditation program will be sending a strong signal that they are not meeting the criteria.

A key opportunity for MOCTO is mobilizing the young, high-growth segments of socially conscious consumers to pressure the large broadband incumbents into adopting more socially and environmentally responsible practices, thus creating incentives for companies to brand themselves as Digital Equality Champions. This has been a highly successful strategy used by movements to use certification and accreditation practices such as [Fair Trade](#), [Organic](#), [B Corp](#) and others to change corporate behavior.⁵



Image by Pawel Kowalik

Step 4: Create a Public Dashboard

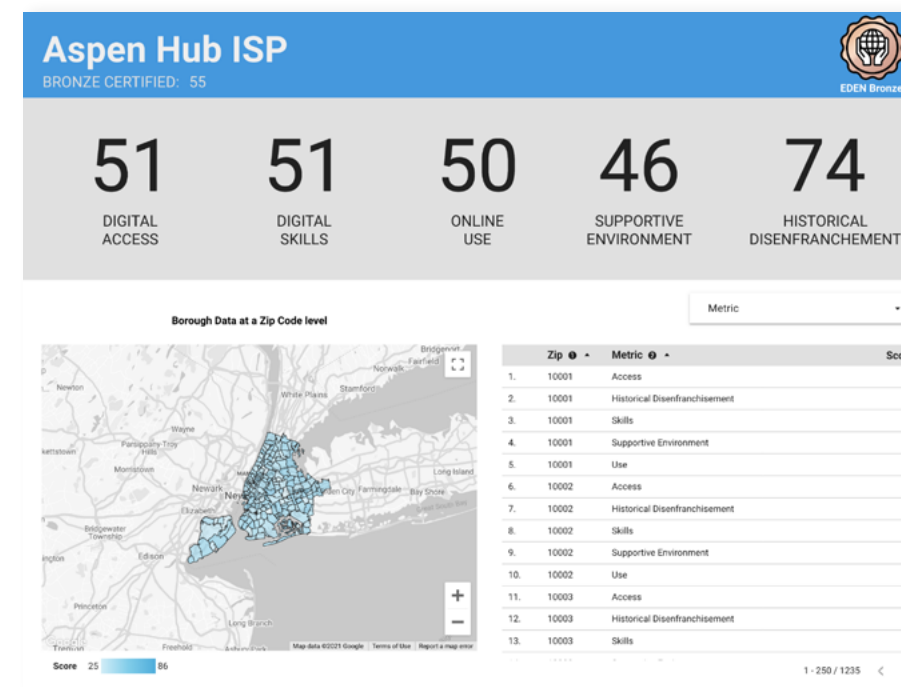
A key challenge of the EDEN Index is that the model itself and disparate data-sets used can be difficult to interpret. Creating a public dashboard that communicates the Index and accreditation status for providers in a simple way is an opportunity to transparently share the most important information to all stakeholders: ISPs, other digital services providers, city officials, community organizations, and the general public.

There are many approaches to implement a dashboard; choosing which one will depend on variables such as MOCTO in-house tools and expertise as well as data quality. Our plan will lay out the core options for successful implementation.

A. Research the Appropriate Level of Detail

The public dashboard should be a simplified view of the EDEN Index that provides a high-level understanding of an internet provider's (or other digital services provider's) contributions to digital equity. MOCTO should conduct research with stakeholder groups to understand what information is most useful for community members, nonprofits, and ISPs and other digital service providers. This research will help define the scope and technical requirements of the dashboard, and greatly clarify the following steps. There may be viewing options that prioritize different users' needs, such as showing ISP options by neighborhood for community members, or showing organizations with the highest certifications for nonprofits looking for industry partners.

Sample EDEN Dashboard



For example, the sample dashboard above ([also linked here](#)) was created in Google Data Studio and shares data on several levels:

1. The overall EDEN Index score and provider accreditation level (as shown by the Bronze badge);
2. Scores for each of the 5 index areas (as shown by the scores in the header); and
3. Detailed data by zip code for each of the 5 areas (as shown by the map and table).

In order to get from the EDEN model to the dashboard, we simply used the scores for each category (see column E of the model) normalized to a 100 point scale.

The level of detail in this sample dashboard may or may not be appropriate to meet stakeholder needs but helps MOCTO understand what is possible. Ultimately, the level of detail should be informed by (1) user needs of community members, nonprofits, and ISPs and other digital service providers; (2) EDEN Index model details, and (3) technical feasibility.

B. Make the EDEN Index Results Available

Much of the work to gather and normalize the data needed to power the dashboard will be done as part of constructing the EDEN Index (see Constructing the EDEN Index section), but the dashboard will need this data to be accessible and machine-readable.

New York City already uses Socrata, an open data platform, to share access to the City's open data. This is a logical home for the EDEN Index results because NYC's open data platform could become the City's one-stop-shop for open data. The existing open data platform also provides download access to the raw data and makes API queries available. This interface may be able to power the dashboard but can also give local technologists (like [BetaNYC](#)) the opportunity to create new and useful visualizations and analyses.

Image by Luis Gomes



Image by en o'bro

C. Build the Dashboard

Having decided on the appropriate level of detail and made the EDEN Index results available, MOCTO can now build out the dashboard. Here are 3 options that MOCTO could consider in how to build the dashboard:

- 1. Build a Socrata dashboard.** Socrata has built-in functionality to support dashboards. This could be a simple option if the EDEN Index results are already stored in Socrata.
- 2. Use Google Data Studio.** Data Studio is a simple yet powerful dashboard creation tool. It is designed to work very well with other Google products, so the EDEN Index results could be imported into a Google Sheet to power the Data Studio dashboard. This is the approach taken with the example dashboard.
- 3. Build a custom dashboard.** Building a dashboard with custom code is the most flexible option available. MOCTO can guarantee that it will look and feel exactly the way the agency wants. However, there will likely be more maintenance in the long run versus using a mature dashboard tool like Socrata or Google Data Studio.



Image by Niv Roz

Step 5: Launch and Sustain the Program

Well in advance of the program launch, MOCTO should contact broadband providers with information sheets about the program plan, the Index's measurements, and how scores might impact providers. This will enable interested providers to help test the measurements as they're built and launch the public dashboard with partner-providers to demonstrate certifications. Organizations and community groups interested in digital equity should also be contacted to consider their involvement in the launch and publicity of the tool.

To evaluate the program's success, MOCTO should consider these questions:

- ▶ Are broadband and digital service providers participating in certification?
- ▶ Are broadband and digital service providers' digital equity scores increasing over time?
- ▶ Are NYC residents using the public portal?
 - ▶ Is there evidence that they have considered EDEN certification when choosing broadband providers?

To sustain the program, MOCTO should assess whether the Index, data, and public portal updates can be completed by a team member, or whether recurring contractor time may be needed. Contractors should provide sufficient documentation to avoid vendor lock-in.

Step 6: Transition From Core to Complete EDEN Index

The Complete EDEN Index is a scaled-up version of the Core EDEN Index, which offers more comprehensive, varied, and sensitive measures to track and assess changes in digital equity in the areas covered by the data. After MOCTO has launched and sustained the Core EDEN Index for at least 12 months, it should consider transitioning to Complete EDEN. The following questions should be considered before embarking on such expansion:

- ▶ What is the current and potential future budget for EDEN activities (excluding one-off transition costs)?
- ▶ What is the estimated budget for the transition, including costs for adapting the technology infrastructure, dashboard, dataset acquisitions, and full-time equivalent hours?
- ▶ What are the technical requirements for user interface and infrastructure upgrades? Specifications must be made before a budget can be estimated.
- ▶ Does the additional detail provided by Complete EDEN offer incremental value to MOCTO in terms of tracking and assessing digital equity in the City? Will it help inform and calibrate policy beyond digital equity?
- ▶ Do internal (City agencies) and external (all other stakeholders) users of EDEN find additional value in Complete EDEN Index? Conducting user-feedback sessions with a basic Complete EDEN prototype may offer useful insights at little extra cost.
- ▶ Can the City acquire the primary data required of the Complete EDEN

Index that is not otherwise available: i.e., direct surveys and feedback from key communities?

If the questions above are successfully resolved and MOCTO decides to proceed with transition to Complete EDEN, MOCTO should:

- ▶ Assign the same MOCTO staff and contractors from Core EDEN implementation on the transition to the Complete EDEN Index, if possible, to reduce the learning curve and downtime.
- ▶ Thoroughly assess the technical transition needs before building the Complete EDEN Index, such as availability of additional data, and any needed technology or infrastructure changes.
- ▶ Construct the Complete EDEN Index and test it before launching.
- ▶ Update both internal and public documentation and communication for the Complete Index.

Constructing the Complete EDEN Index will be straightforward, since the methodology for deriving the inputs is the same for both Core and Complete EDEN Indices. Including preparation, the transition to the Complete EDEN Index should take 12 to 18 weeks.

Image by NASA



Endnotes

- 1 A ReadMe file of how to use and access the Core and Complete EDEN Index, and what data sources it pulls from, can be found on our website. See: "EDEN Index ReadMe File," *Project Page*, *Aspen Tech Policy Hub*, <https://www.aspentechpolicyhub.org/wp-content/uploads/2021/10/team-e-read-me.pdf>.
- 2 Michael J. R. Martin, "Deconstructing the Digital Divide: Identifying the Supply and Demand Factors That Drive Internet Subscription Rates," *United States Census Bureau*, 2019, <https://www.census.gov/content/dam/Census/library/working-papers/2019/demo/sehsd-wp2019-15.pdf>.
- 3 "Building Digital Connections in the Bronx," *Capital One*, February 16, 2021, <https://www.capital-one.com/about/newsroom/bronx-digital-access/>.
- 4 See Martin, *supra* note 2.
- 5 Don Passey et al., "Digital Agency: Empowering Equity In and Through Education," *Technology, Knowledge and Learning* 23 (August 2018), 425-439, <https://doi.org/10.1007/s10758-018-9384-x>.
- 5 Shelley Marshall and Kate Macdonald, *Fair Trade, Corporate Accountability and Beyond: Experiments in Globalizing Justice* (London: Routledge, 2016), <https://doi.org/10.4324/9781315581842>.





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