

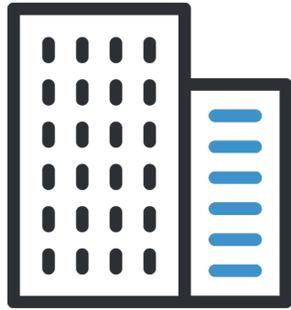
An aerial night view of a city, likely Copenhagen, with a digital fabric overlay in teal. The fabric consists of interconnected lines and nodes, suggesting a network or data flow. The city lights are visible in the background, and a body of water with a bridge is in the foreground.

# niolabs

digital fabric for smart cities

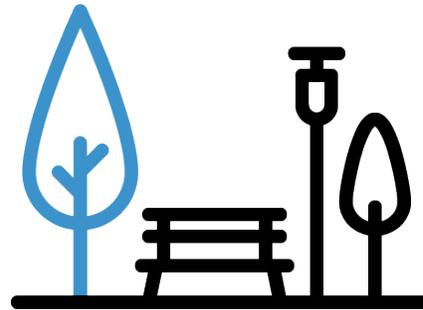
# Smart cities normalize *Environment* through *Infrastructure*.

We Create and Control  
Infrastructure



Shelter  
Safety  
Opportunity  
Information

We Experience (and Endure)  
Environment



Physical  
Social  
Economic  
Political

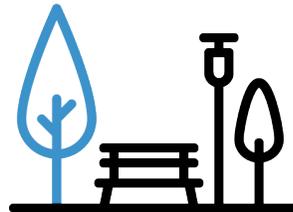
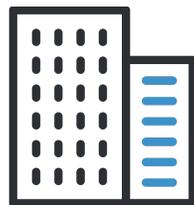
We Provide Value To  
People Who Want to Feel



Safe  
Comfortable  
Productive  
Stable

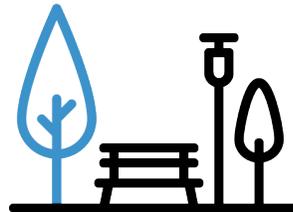
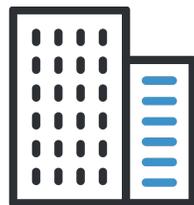
## Smart cities benefit from:

- Increased operational efficiency
- Improved productivity
- Increased profitability
- Happier, more engaged constituents



# Smart cities normalize *Environment* through *Infrastructure* by:

- Sensorizing infrastructure and collecting real-time data
- Sourcing, ingesting, and analyzing environmental data
- Soliciting and analyzing feedback
- Continually adapting infrastructure based on intelligent analysis





**how do we start?**

# Identifying and sensorizing our infrastructure

- Smart devices that join our network
  - Climate, network, and security systems
- Dumb devices augmented with communication
  - Boilers, water valves, light switches
- Ambient sensors not tied to physical infrastructure
  - Light, temperature, noise, airflow

GOOSE NECK HOOD  
HYDRONIC EQUIPMENT  
SUPPLY AIR DUCTING  
RELIEF AIR FAN  
AIR HANDLING UNITS

ROOF DRAINS

RADIANT HEATING PANEL

VENT PIPING

VARIABLE AIR VOLUME BOX

SOUND LINED TRANSFER AIR

RETURN AIR GRILLE

SUPPLY AIR GRILLE

OUTSIDE AIR LOUVER

SHOP EXHAUST

# infrastructure data

## power

quantity  
cost  
source  
reliability

## shelter

occupancy  
density  
movement  
environment

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## safety

personal  
environmental  
technological

## transport

public  
individual  
internal

## communication

systems  
internal  
external

# Sourcing and ingesting environmental data

- Environmental sensors
  - Wind, temp, humidity, air quality
- External data sources
  - Weather APIs, public transportation, news and events
- Machine Learning / AI
  - Integrate established climate and weather models

# environmental data

## physical

weather  
water  
wind

## social

culture  
sentiment  
behavior

## economic

immediate  
local  
regional

## political

policy  
incentives  
engagement

nio

# Soliciting and analyzing feedback

- Tenant feedback
  - Email surveys, elevator touchpads, mobile app
- User interactions with systems
  - Are user-driven actions overriding our optimized settings?
- Operating costs
  - Are optimizations reducing utility and maintenance costs?

# feedback

## tenant

occupancy  
behavior  
engagement

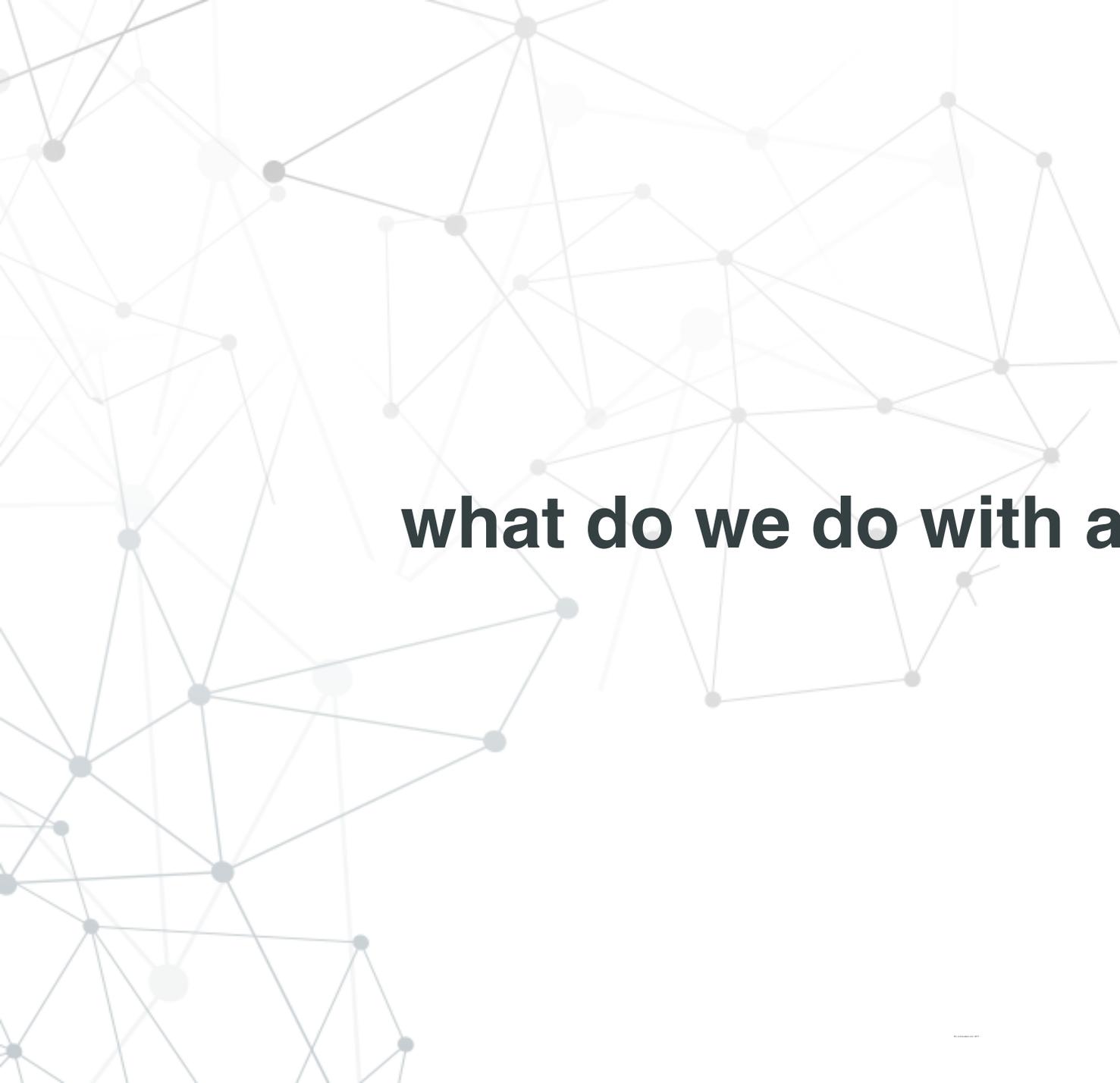
## systems

temperature  
light  
noise

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## operations

utility costs  
maintenance

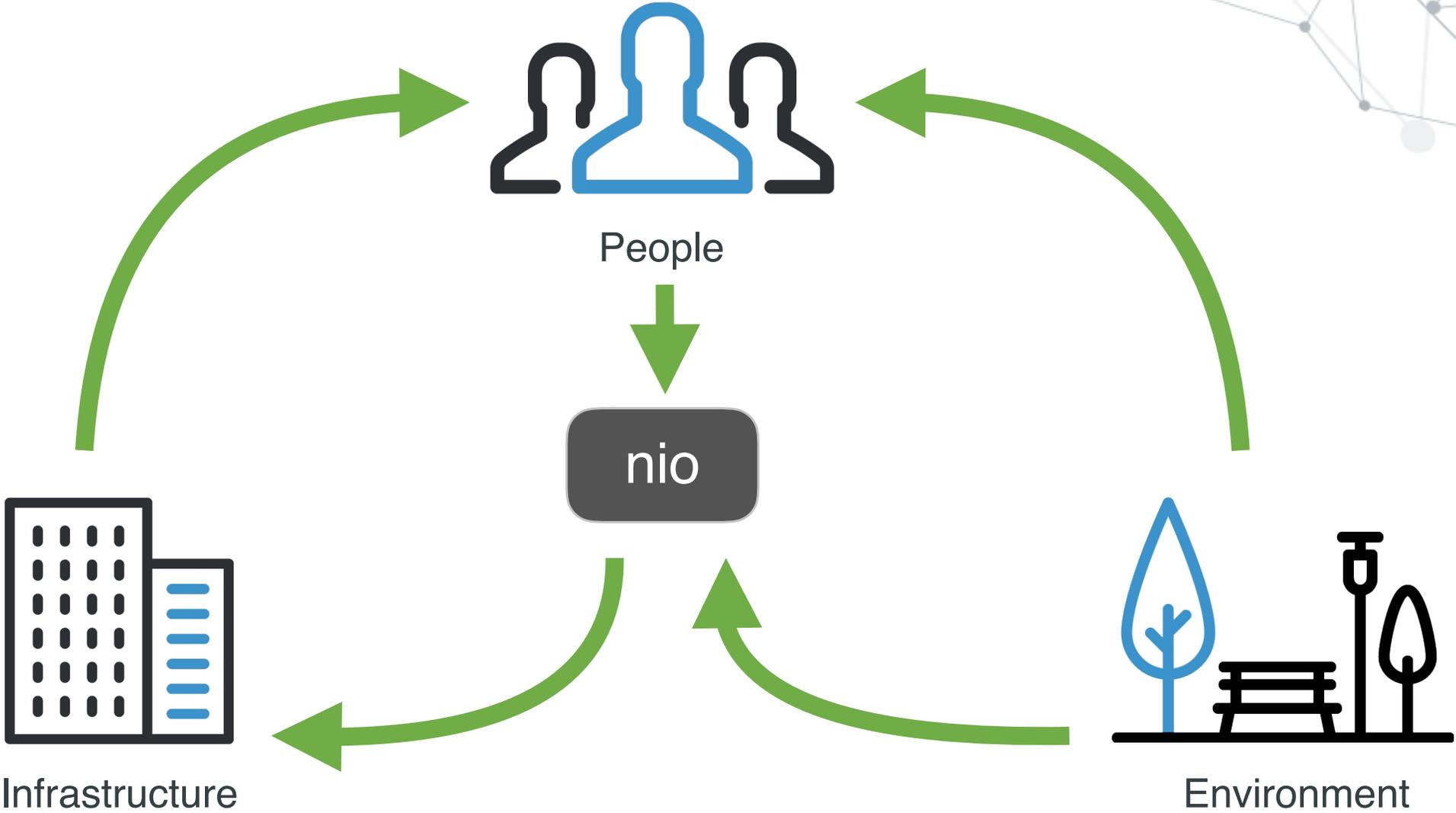


**what do we do with all that data?**

# nio creates real-time actionable intelligence



# Continually adapt infrastructure based on intelligent analysis



A background graphic consisting of a network of interconnected nodes and lines, resembling a molecular or data network structure. The nodes are represented by small grey circles, and the lines are thin grey lines connecting them. The overall style is clean and modern.

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thank you

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