4th Annual

DATA ANALYTICS
FOR THE PUBLIC SECTOR
SUMMIT

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Toronto, ON

DRIVING DATA IMPERATIVES WITH DATA SERVICE TEAMS: FIELD GUIDE INSIGHTS

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Design Lead and Information Designer
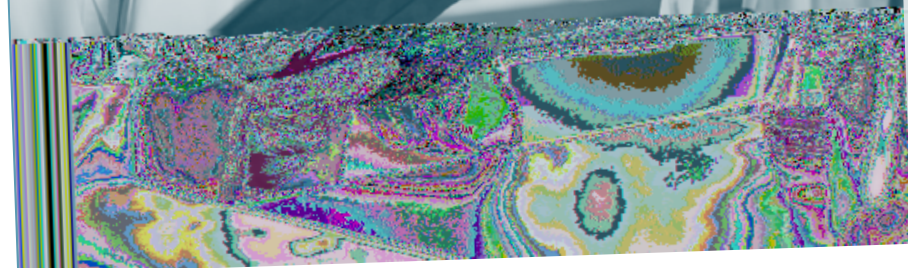**Public Health Agency of Canada**

DATA SERVICE TEAMS FIELD GUIDE

Public Health Agency of Canada
Agence de la santé publique du Canada

Canada

2
VERSIONS

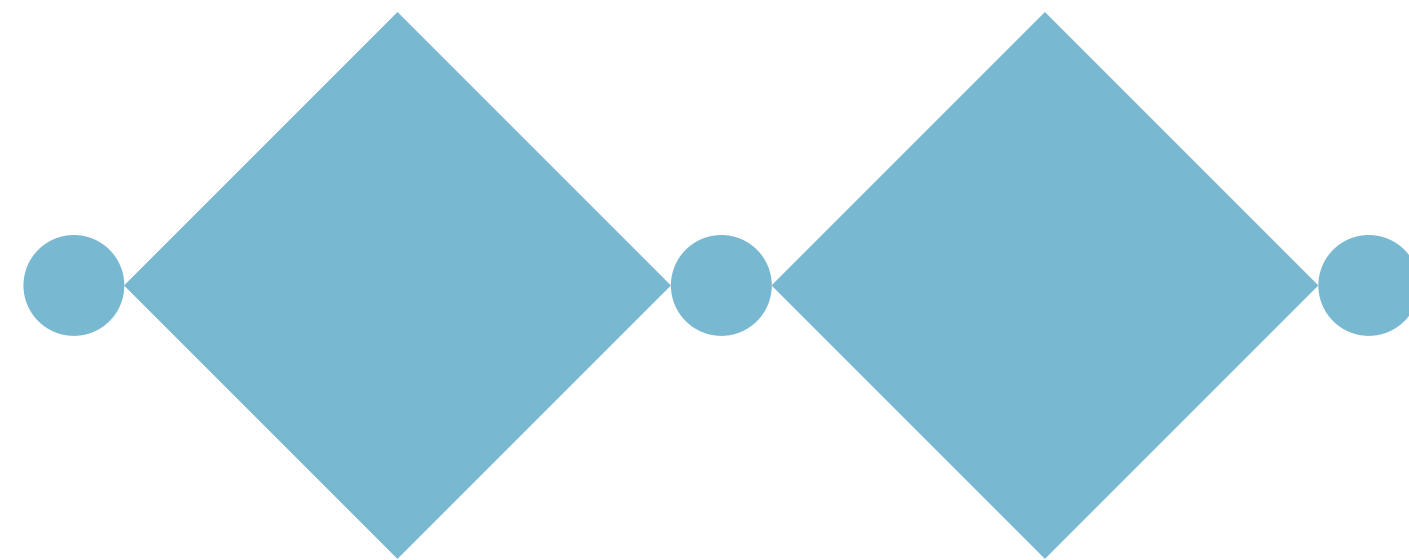1. *in brief*
2. *in depth*

FRAMEWORKS

This session introduces three frameworks about running data-service teams
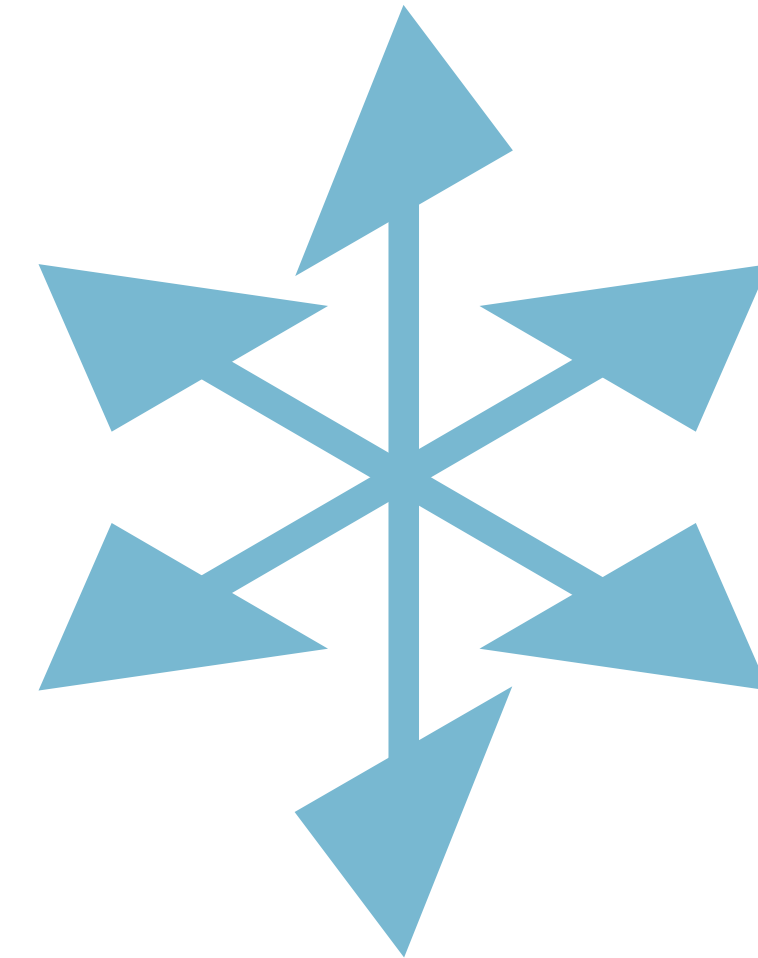
4 STEPS

CLIENT-CENTRED DESIGN

2 DIAMONDS

SERVICE DESIGN AND DEVELOPMENT

3 AXES

DATA SERVICE INFRASTRUCTURE

1 | WHAT IS A
DATA SERVICE ?

DATA SERVICE TYPES

Data can be applied in many ways to serve client needs and policy goals
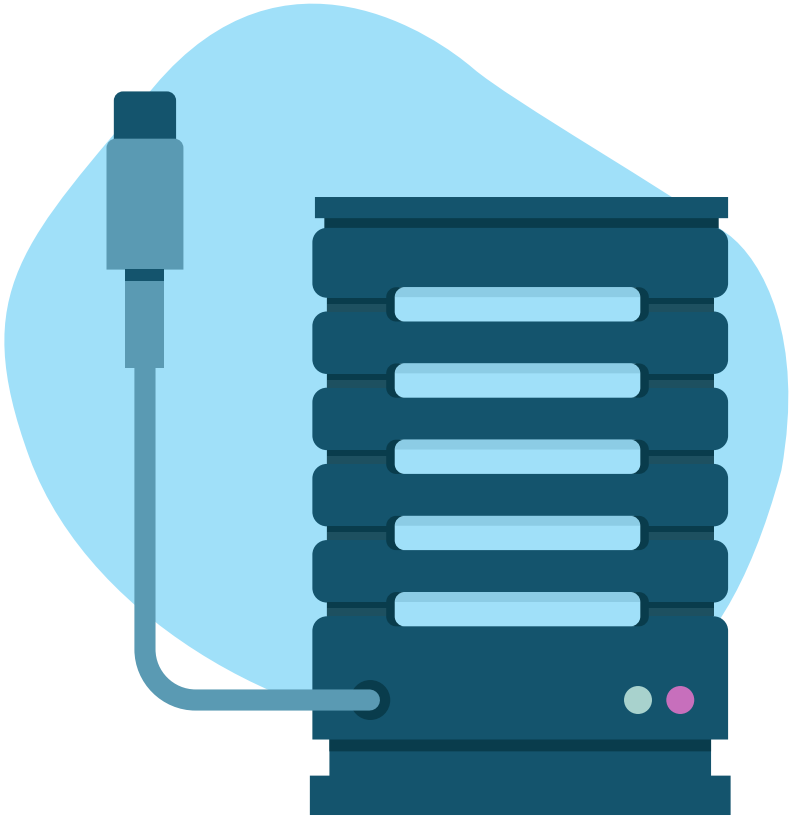
ANALYSIS

REFERENTIAL

MONITORING

CONTEXTUAL

VERIFICATORY

DATA ACCESS

COMMON DIFFICULTIES

Data usage falls short of expectations because of avoidable shortcomings in system design

Data **too stale** to get ahead of urgent challenges

Substance and form **not relevant** to actual work tasks

The data service experience is **frustrating**

Doubts about data **trustworthiness**, **privacy**, and **ethics**

2 WHAT IS A **DATA SERVICE TEAM** ?

FAULTY ASSUMPTIONS
It is common to harbour simplistic assumptions about clients and how data can help them

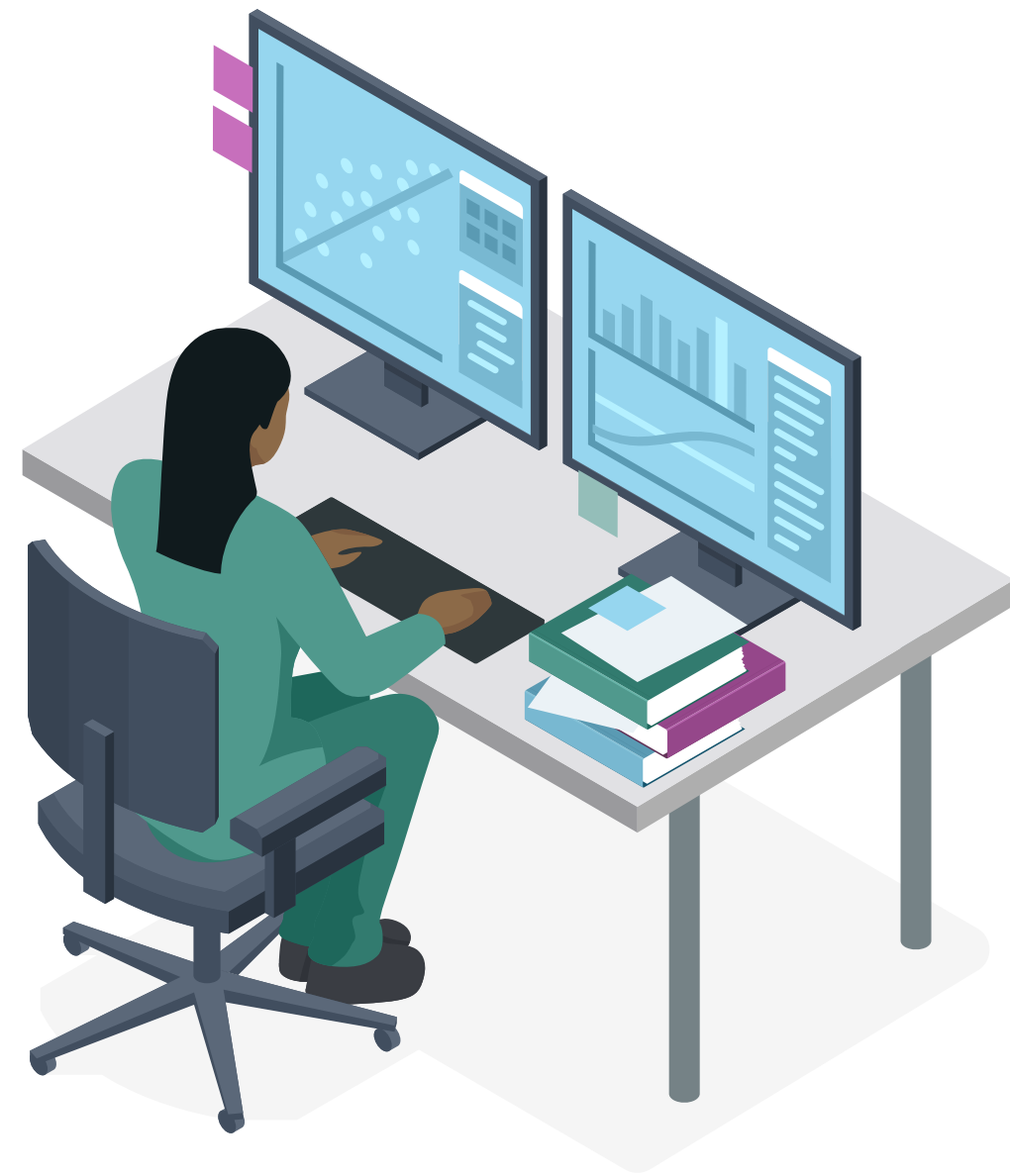# CLIENT-CENTRED FOUR-STEP

How can the data be put to use by real clients to do great things and further larger goals?
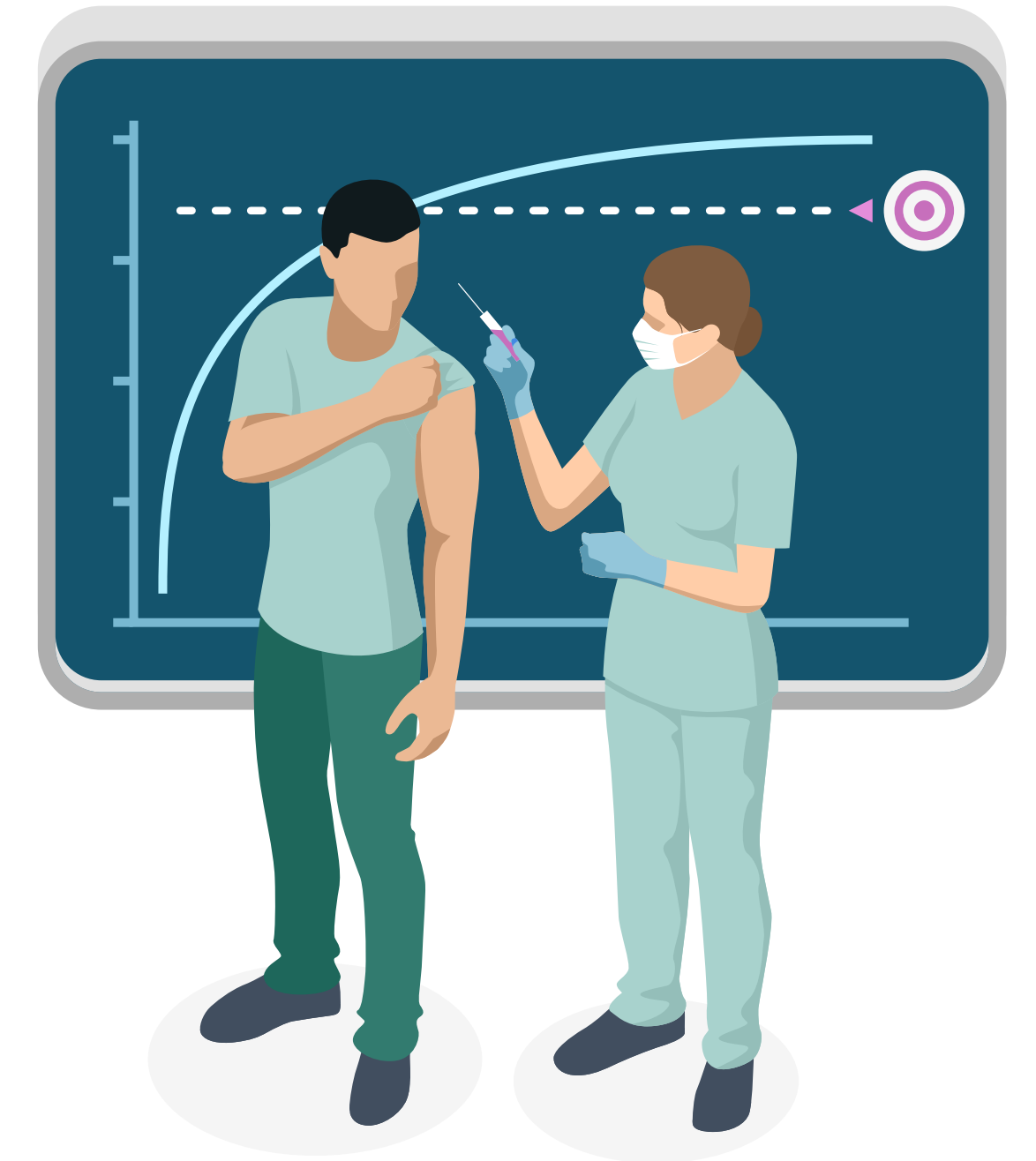
1.

WHO ARE THE DIRECT CLIENTS?

2.

WHAT IS THE USAGE SCENARIO?

3.

WHO ARE THE CLIENT'S CLIENTS?

4.

WHAT IS THE END GAME?

DOWNSTREAM REACH

Seek out potential users both near and far to maximize the value of data

ANALYSTS

POLICY-MAKERS

FRONT-LINE SERVERS

THE PUBLIC

OPERATIONS

OUTSIDE RESEARCHERS

ENTREPRENEURS

DIALOGUE-BASED PARTICIPATORY DESIGN

Design deliberations take place through open exploration of the issues with clients and stakeholders

THE DESIGN CIRCLE

INVOLVEMENT MODEL

Data services are more likely to fulfill their potential when all relevant stakeholders have input

METHODS EXPERTS

SUBJECT EXPERTS

UPSTREAM PARTNERS

DATA OWNERS

DESIGN CIRCLE

DIRECT CLIENTS

DOWNSTREAM CLIENTS

PLATFORM BUILDERS

DEVELOPMENT SPECIALISTS

3 HOW DOES **THE PROCESS** WORK ?

INNOVATION OPPORTUNITIES

Before rushing to solutions, it is worth exploring the problem space and looking for ways to innovate

I'm here to get a new executive dashboard for my surveillance program. I was told that you can help.

I sure can. But let's not jump to solutions right away. This is an opportunity to explore the service options.

GENERATING POSSIBILITIES

Creative thinking involves rounds of idea generation and refinement, represented as a diamond

How many ideas can we come up with?

Which ones are doable and worth trying?

DIVERGENT THINKING
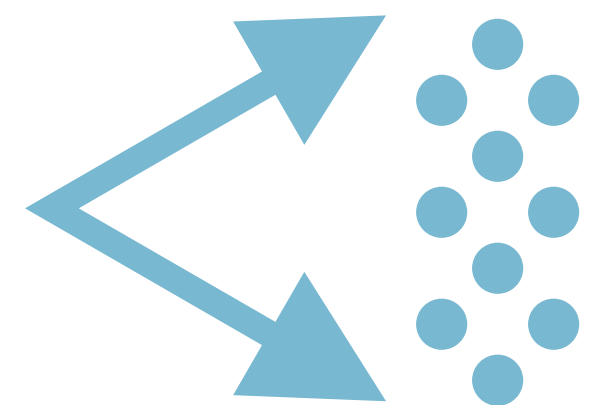
CONVERGENT THINKING
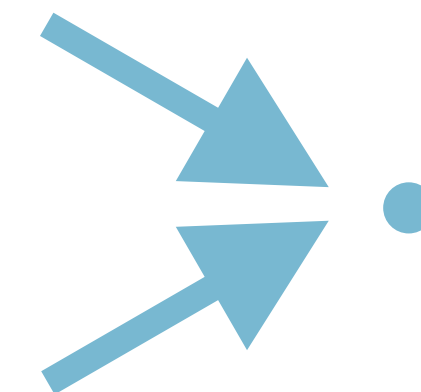
DOUBLE-DIAMOND PROCESS

The project proceeds according to successive rounds of divergent and convergent thinking

RETHINK
Do the right things

MAKE
Do things right

Project
Intake

DISCOVER   FRAME   DESIGN   DEVELOP

Ongoing
Improvement

Basic
Project
Parameters

"The Sandbox"

New
Problem
Framing

Clear Aims

Data
Service
Launch

"Going Live"

Divergent
Thinking

Convergent
Thinking

Divergent
Thinking

Convergent
Thinking

16

SPEED
RUN!
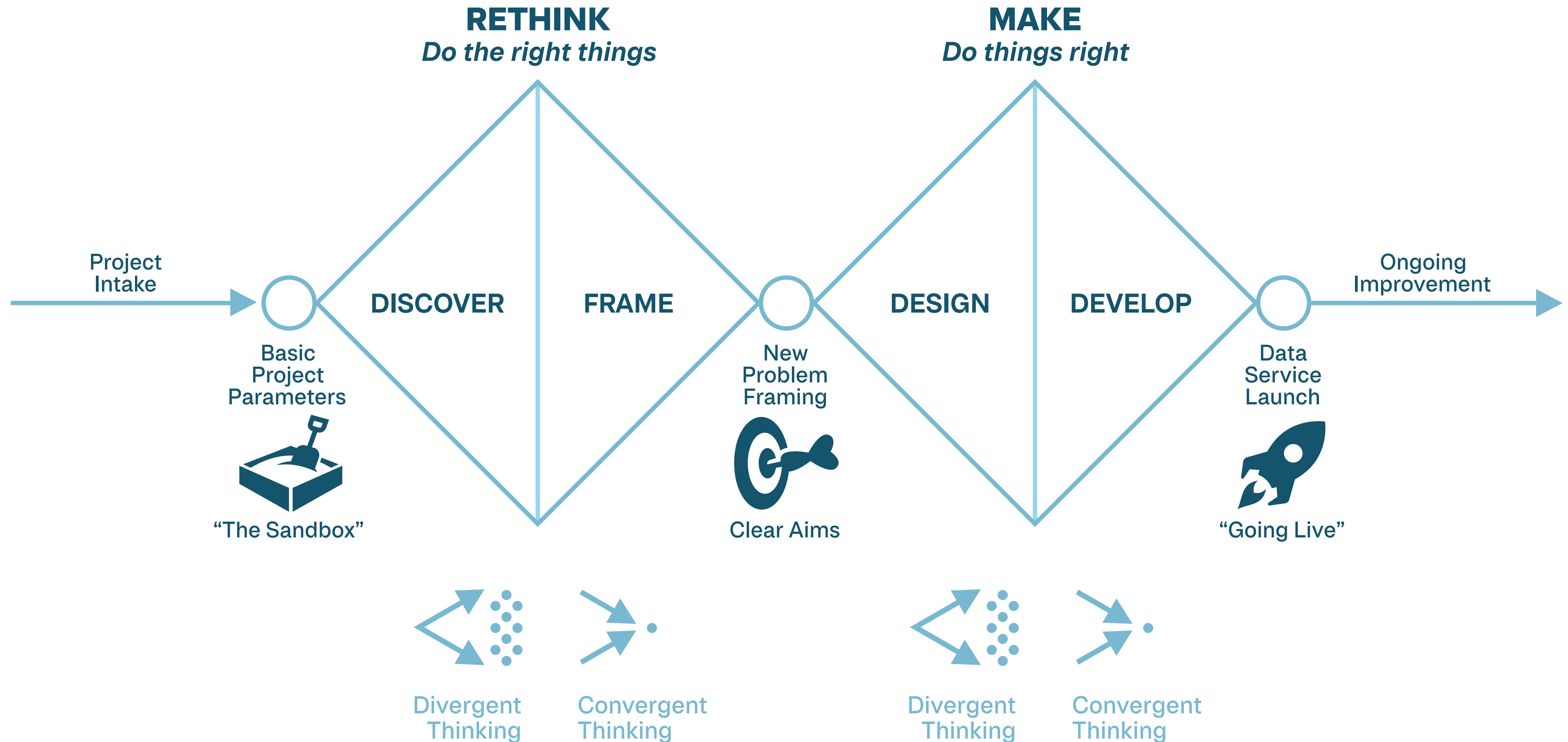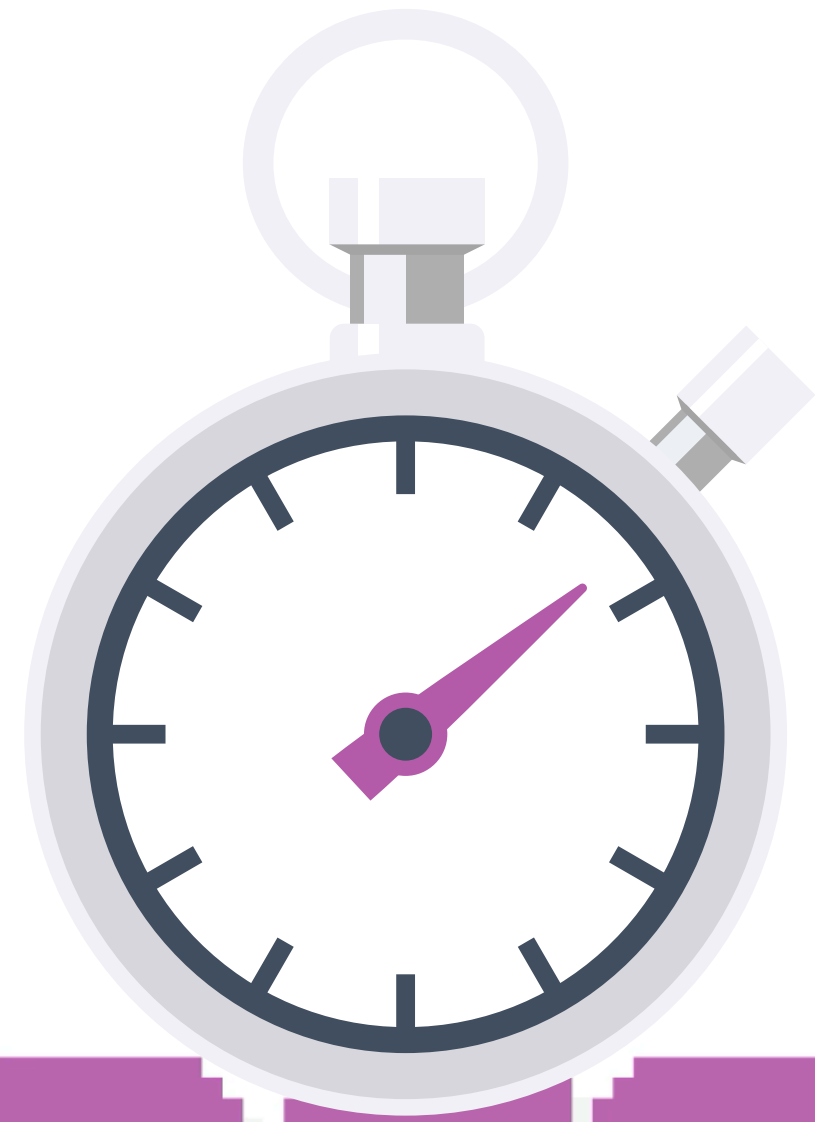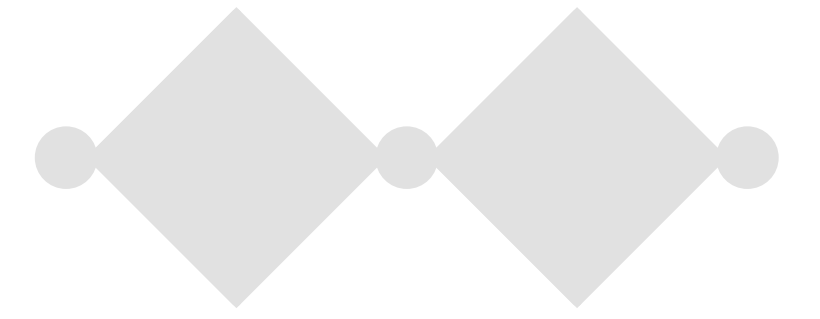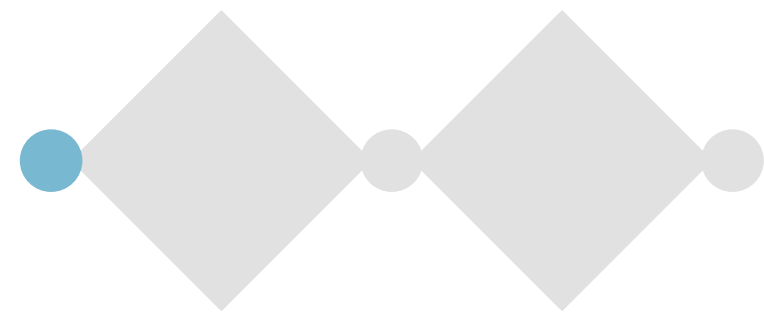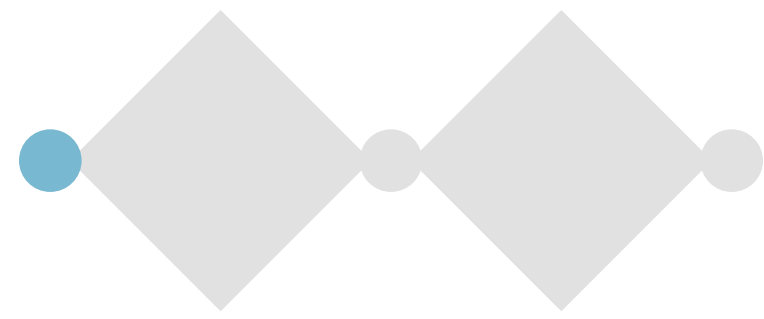
ON-BOARDING HAND-OFF

CORE TEAM ASSEMBLY
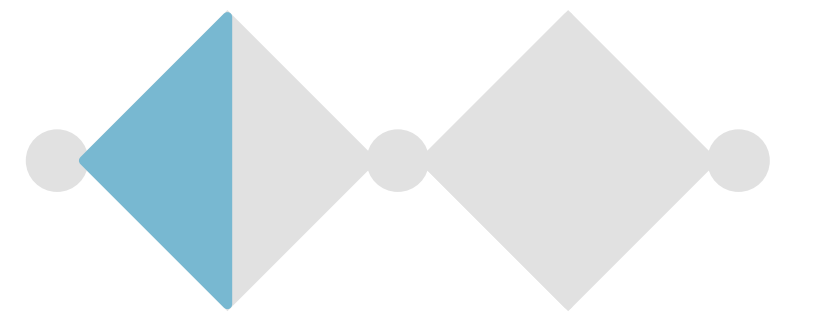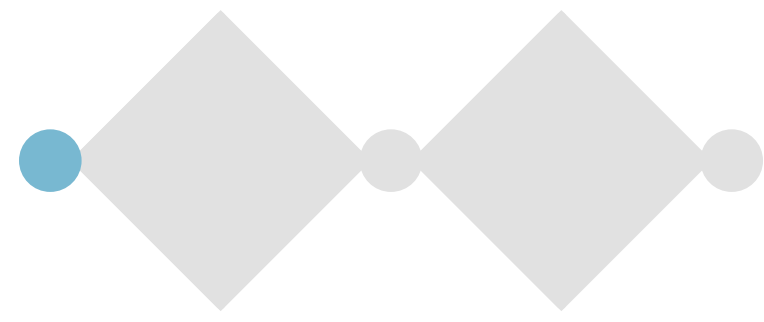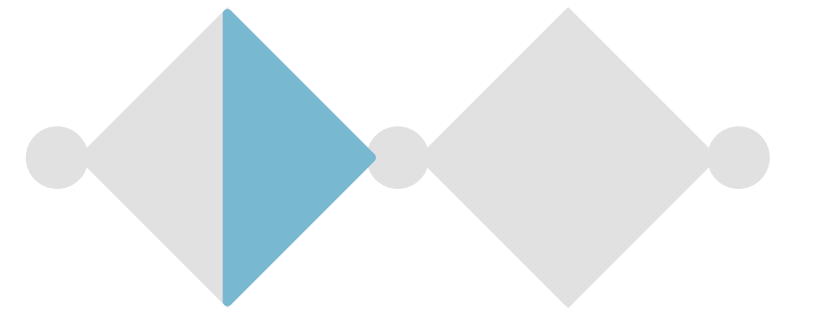
ORIENTATION

STOCK-TAKING
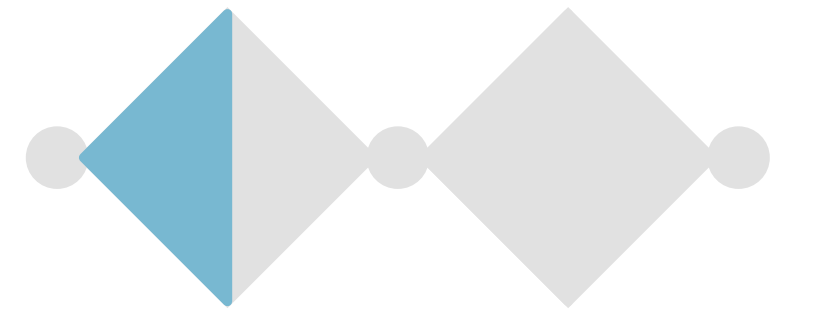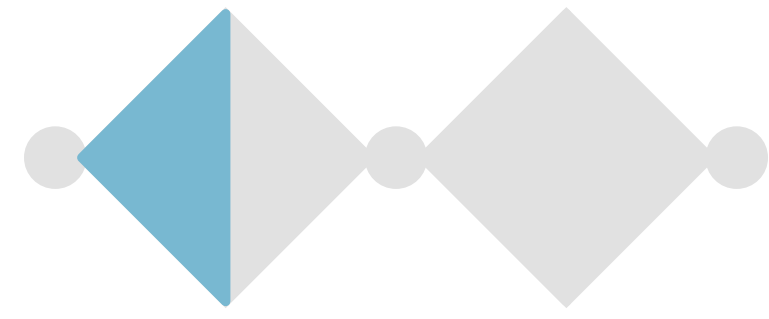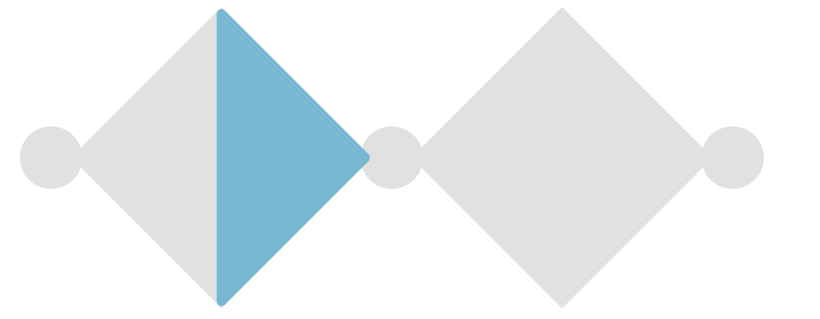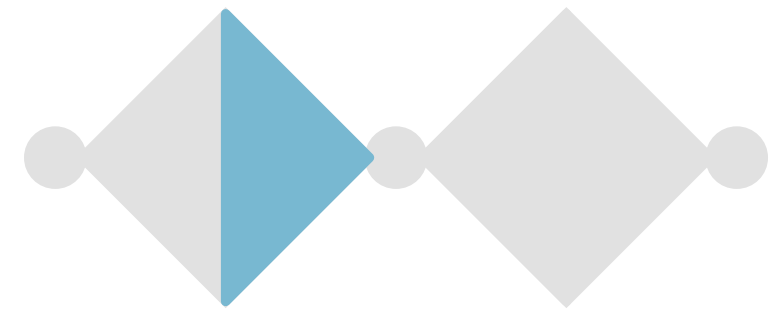
CLIENT AWARENESS

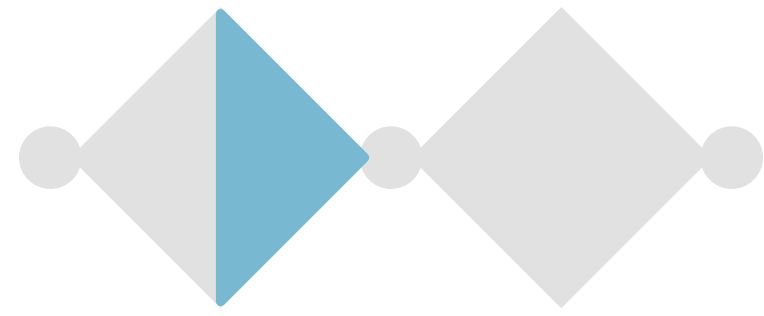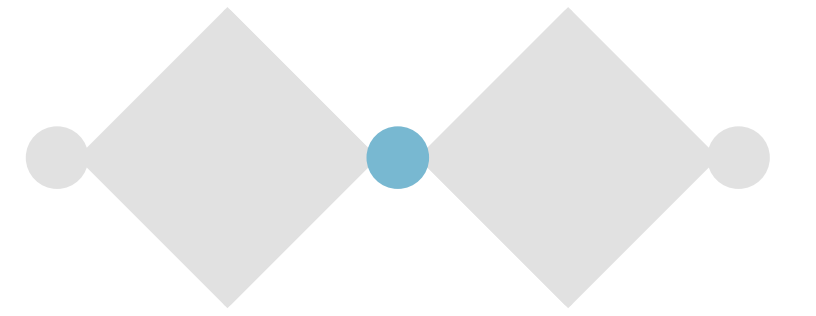CLIENT INVOLVEMENT
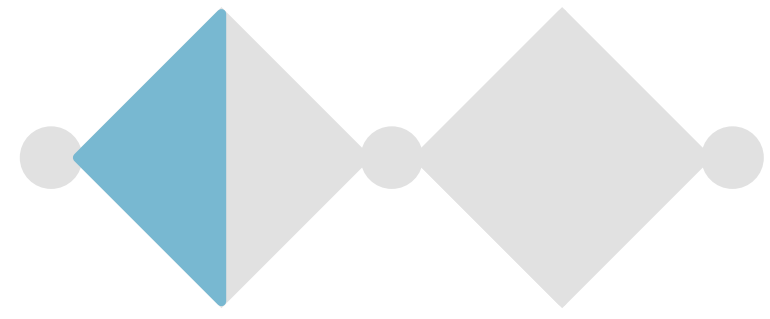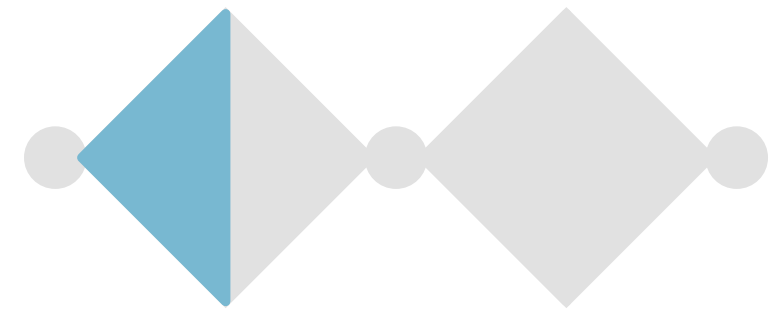
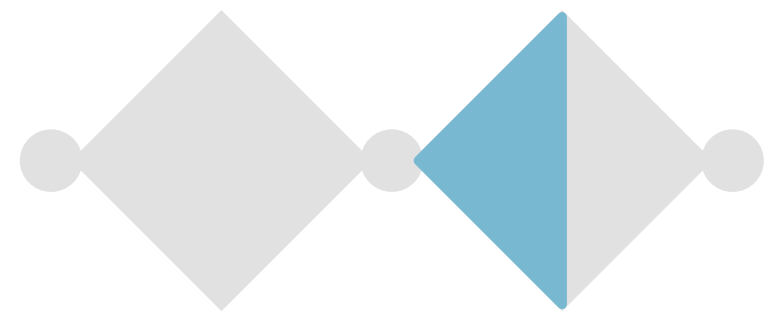# USAGE SCENARIOS
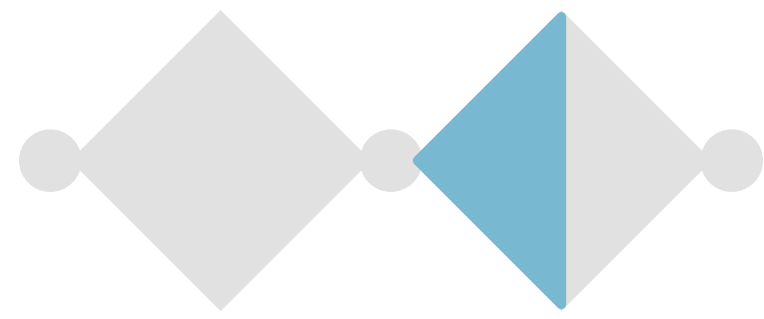
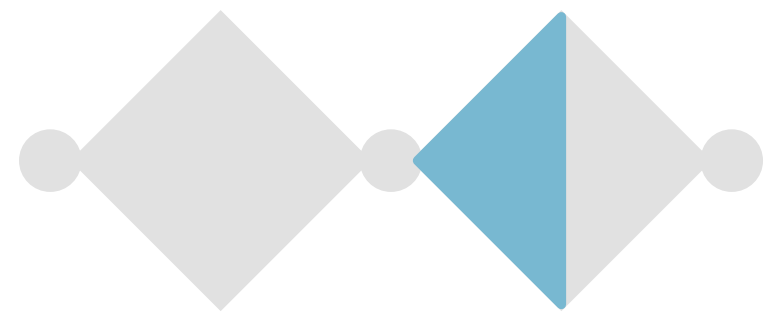# THE END-GAME
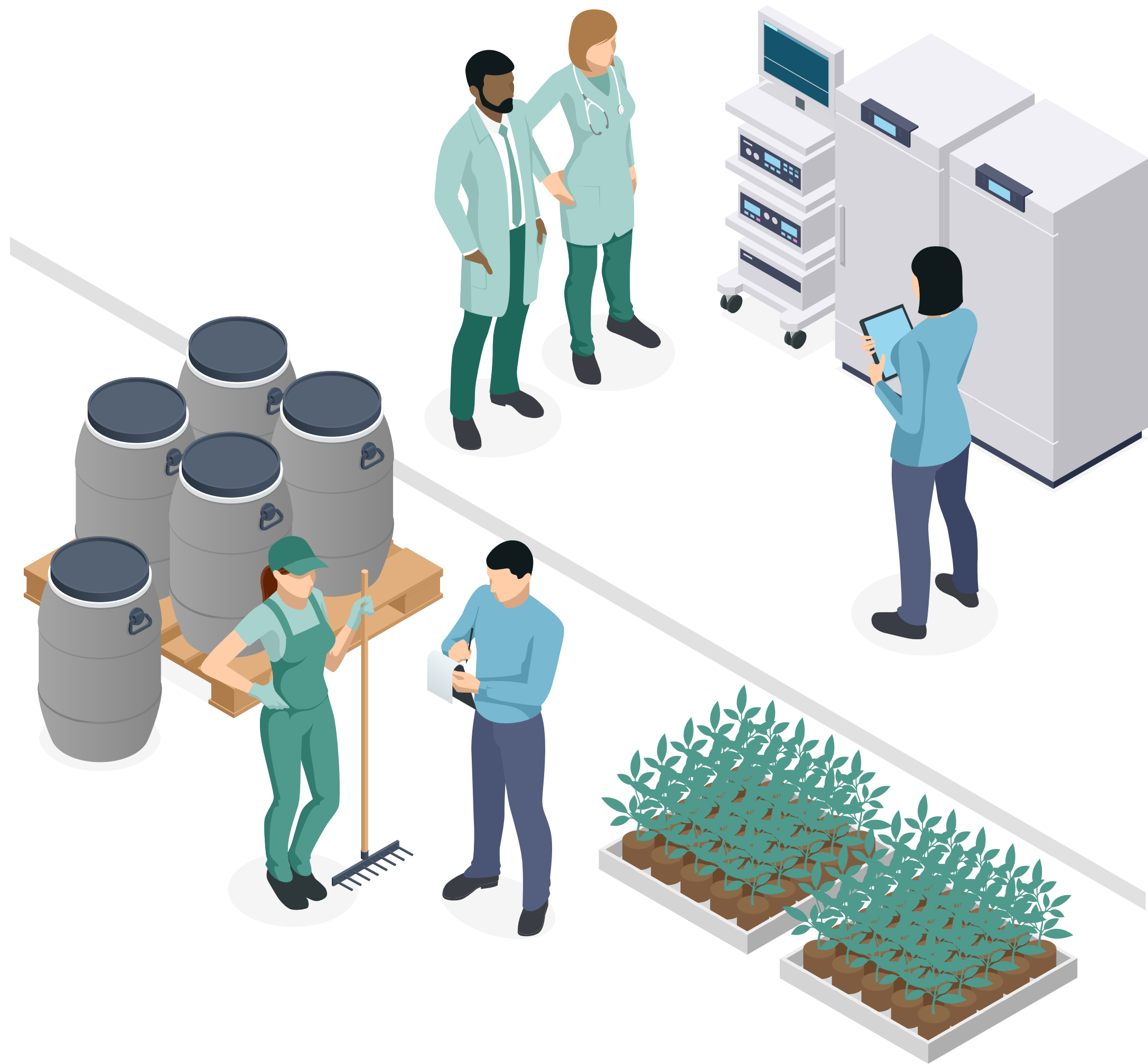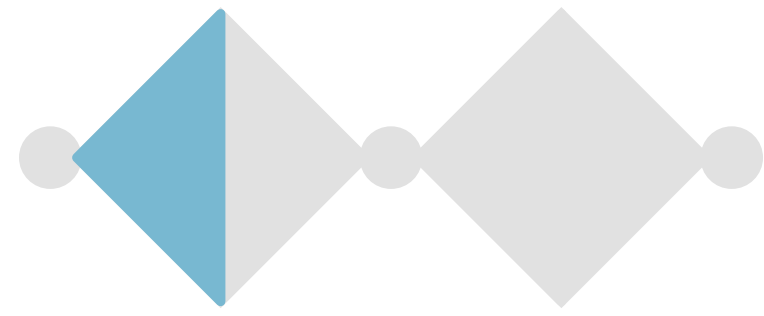
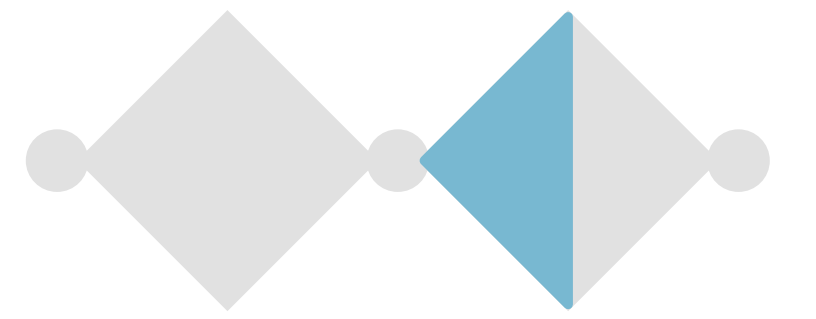FIELD WORK

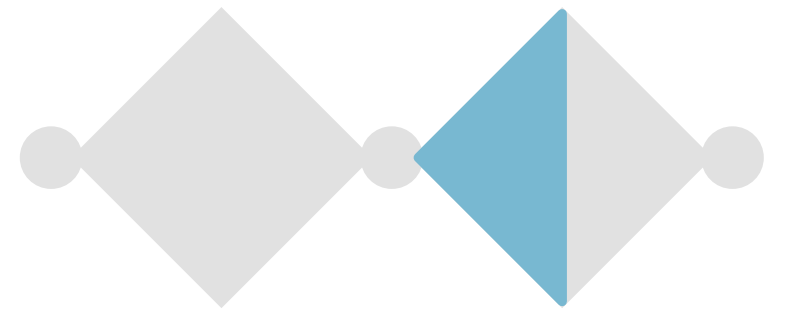CLIENT PROFILING
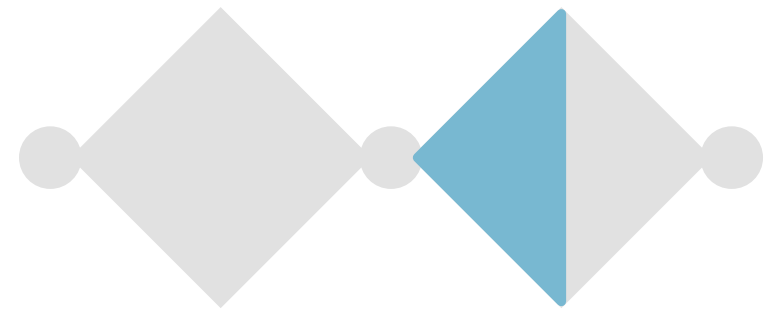
CLIENT JOURNEYS

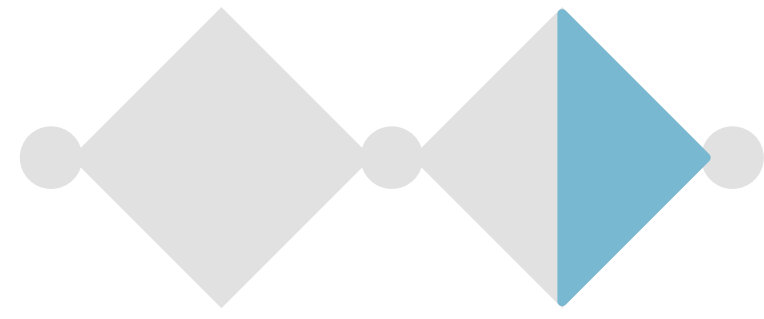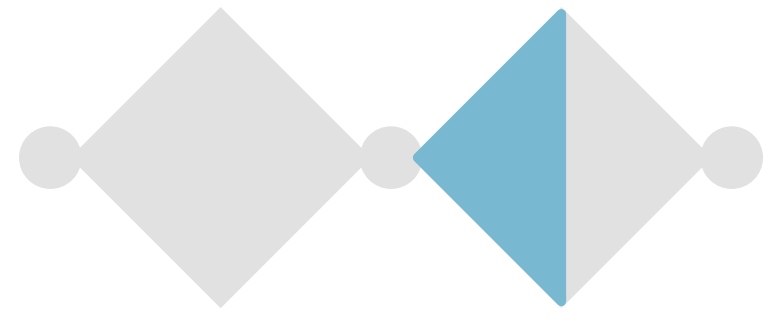REFRAMING

FORESIGHT

SYNTHESIS

IDEATION

CONSTRAINTS

HUMAN FACTORS ANALYSIS
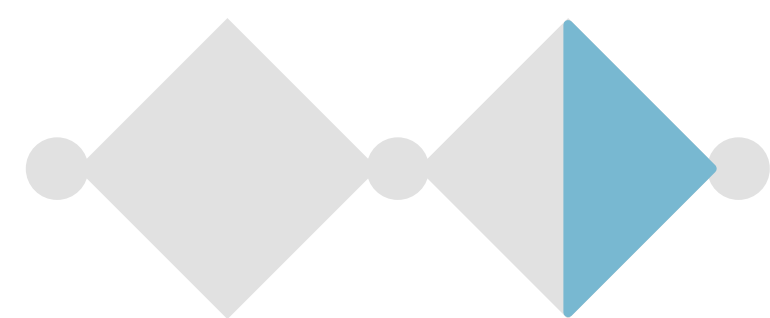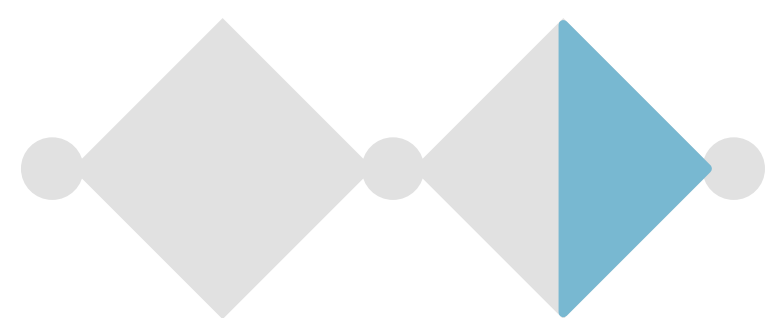
SERVICE CHANNELS

MOCK-UPS

PROTOTYPES

USER EXPERIENCE (UX)

ARCHITECTURE

OPENNESS & SECURITY

SHARING & REUSE
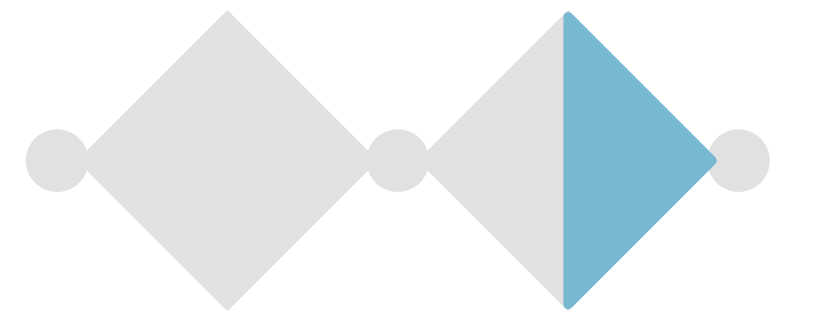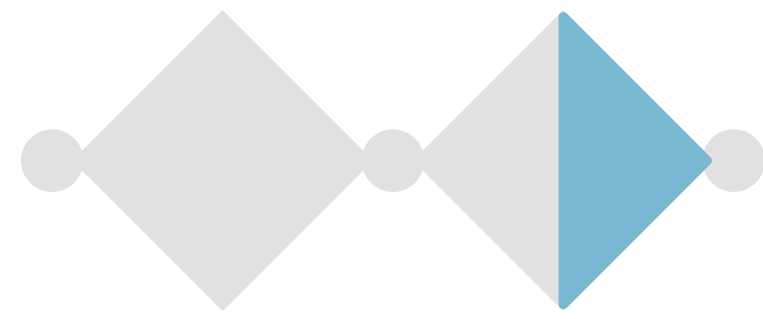
ALPHA BUILD

FIELD TESTING

BETA BUILD
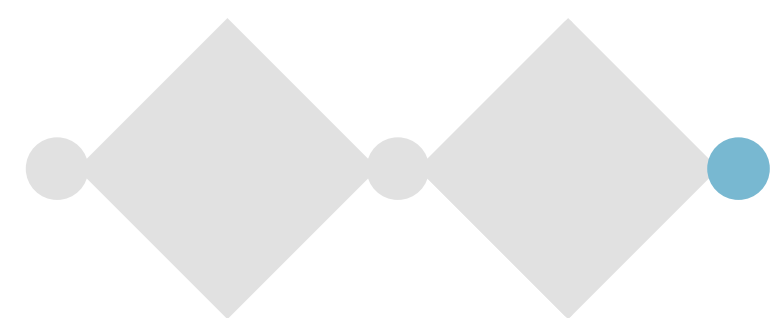
OFF-BOARDING HAND-OFF

LAUNCH

CONTINUOUS IMPROVEMENT

4 HOW ARE SERVICES BUILT **AS A SYSTEM** ?

LEAN PRODUCTION

The process of making happens through swift experimentation and iteration

THE DEVELOPMENT CIRCLE

THREE AXES OF DATA INFRASTRUCTURE

The technological infrastructure of data services has three major dimension worth considering
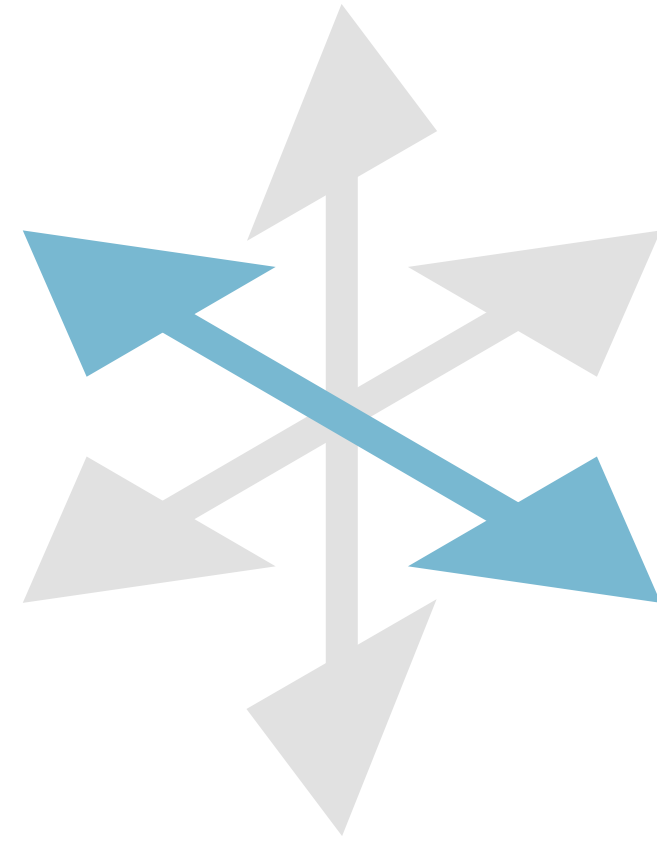
END TO
END
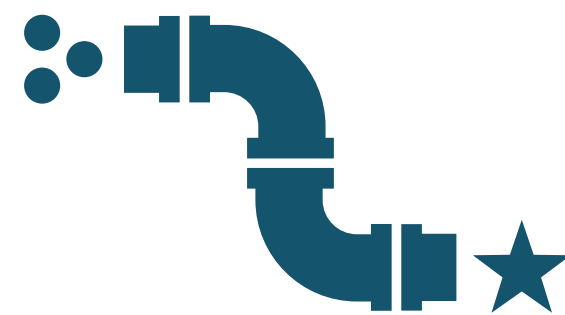
DATA
SUPPLY CHAINS
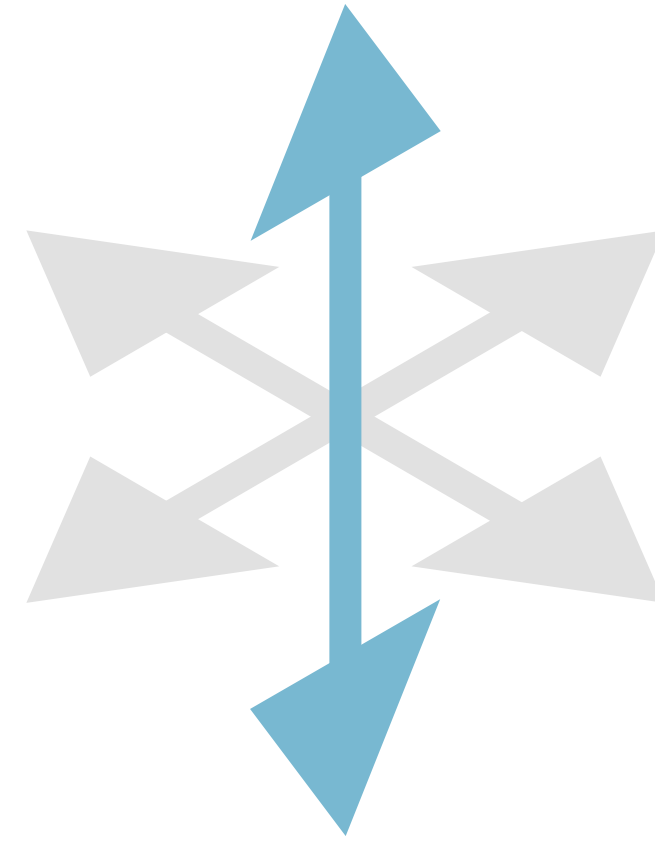
TOP TO
BOTTOM
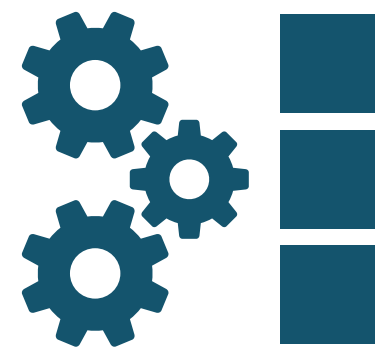
TECHNOLOGY
STACK
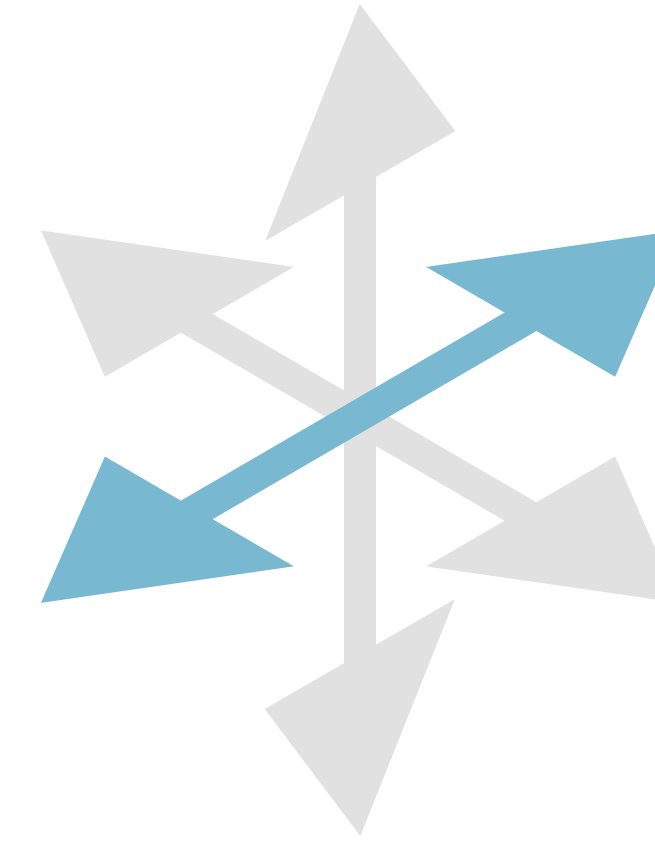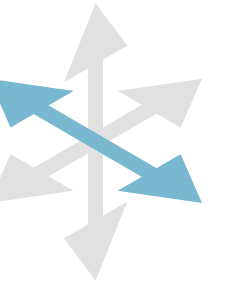
ACROSS
OPERATIONS

SERVICE
ECOSYSTEM

END-TO-END DATA SUPPLY CHAIN

Look at the whole data supply chain to rework broken processes and explore opportunities

UPSTREAM

DOWNSTREAM

Networked Database

API Gateway

Raw Data Processing Tasks

Refined Data Processing Tasks

DATA COLLECTION END

DATA ACCESS POINT

DATA SERVICE END
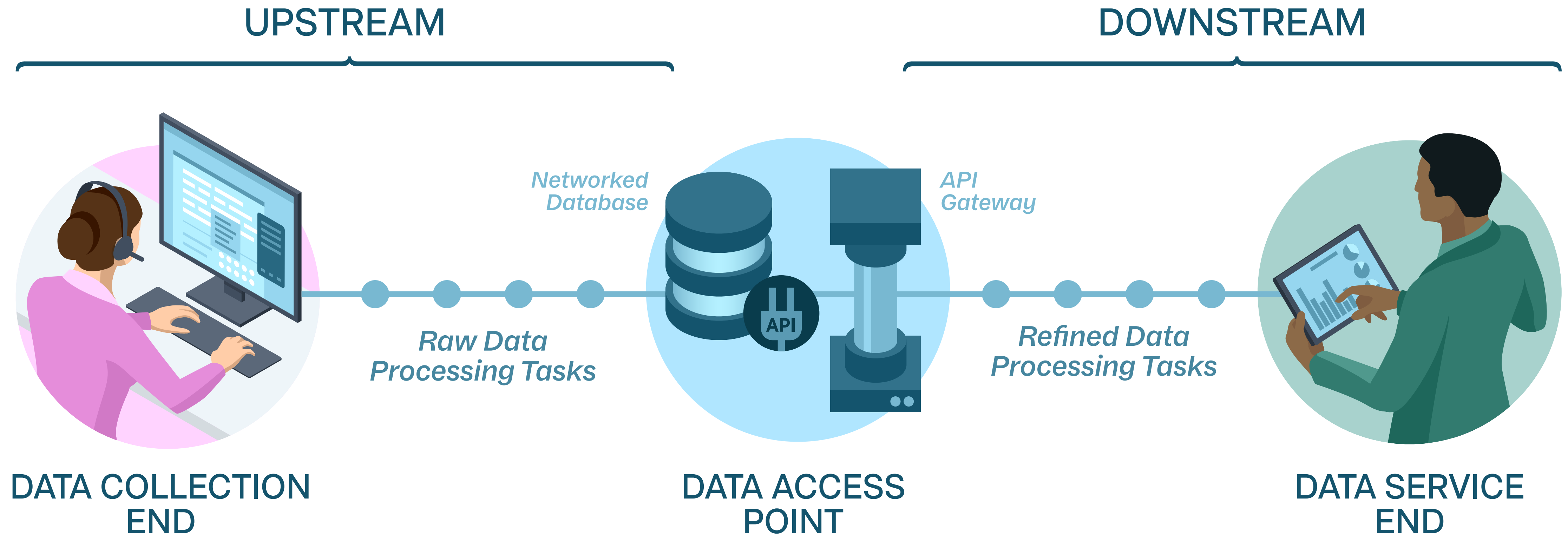
DATA COLLECTION

Public sector data is contained in a messy collection of document- and media types, such as ...
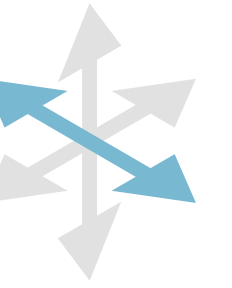
SAMPLES

SENSOR DATA

CREDENTIALS

FORMS

RECORDS

CASE REPORTS

FEEDS

APP DATA

SYNTHETIC DATA

TABLE FILES

GOOD DATA HYGIENE

To avoid data-quality and security problems, care is taken to organize raw-data handling
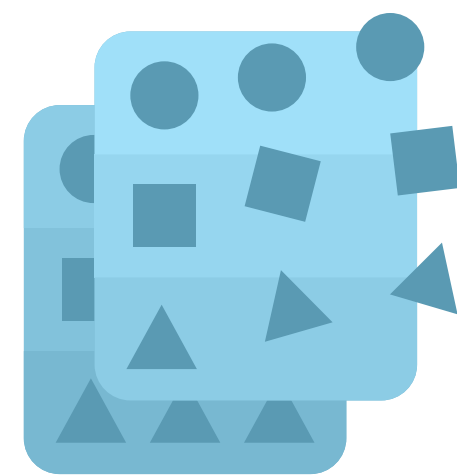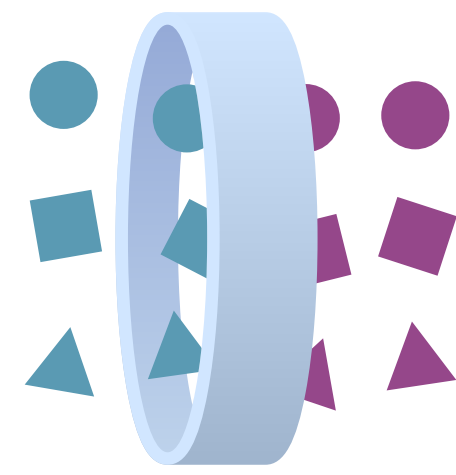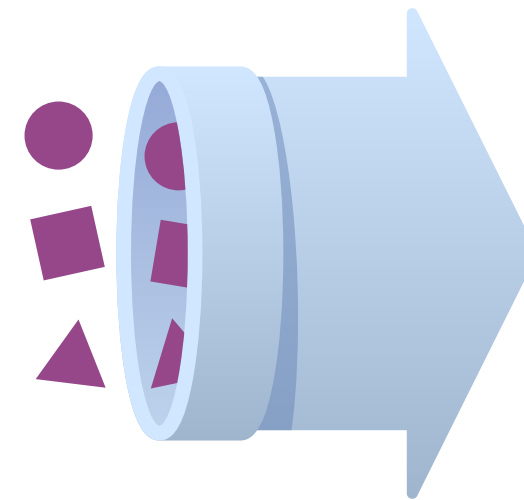
EXTRACT　**TRANSFORM**　**LOAD**

AUTOMATED INGESTION

Digitize Physical Media

Point-of-input Correction

Code Cleaning

No Manual Reentry

Digital Tracking of Samples & Cases

Process Automation

DATA AS A PRODUCT

Data owners retain decentralized control in exchange for making data available for others

Always-on
Cloud Database

Self-serve
Data Streams

Self-describing
Data (Meta Data)

Managed using
FAIR Principles

- Findability
- Accessibility
- Interoperability
- Reusability
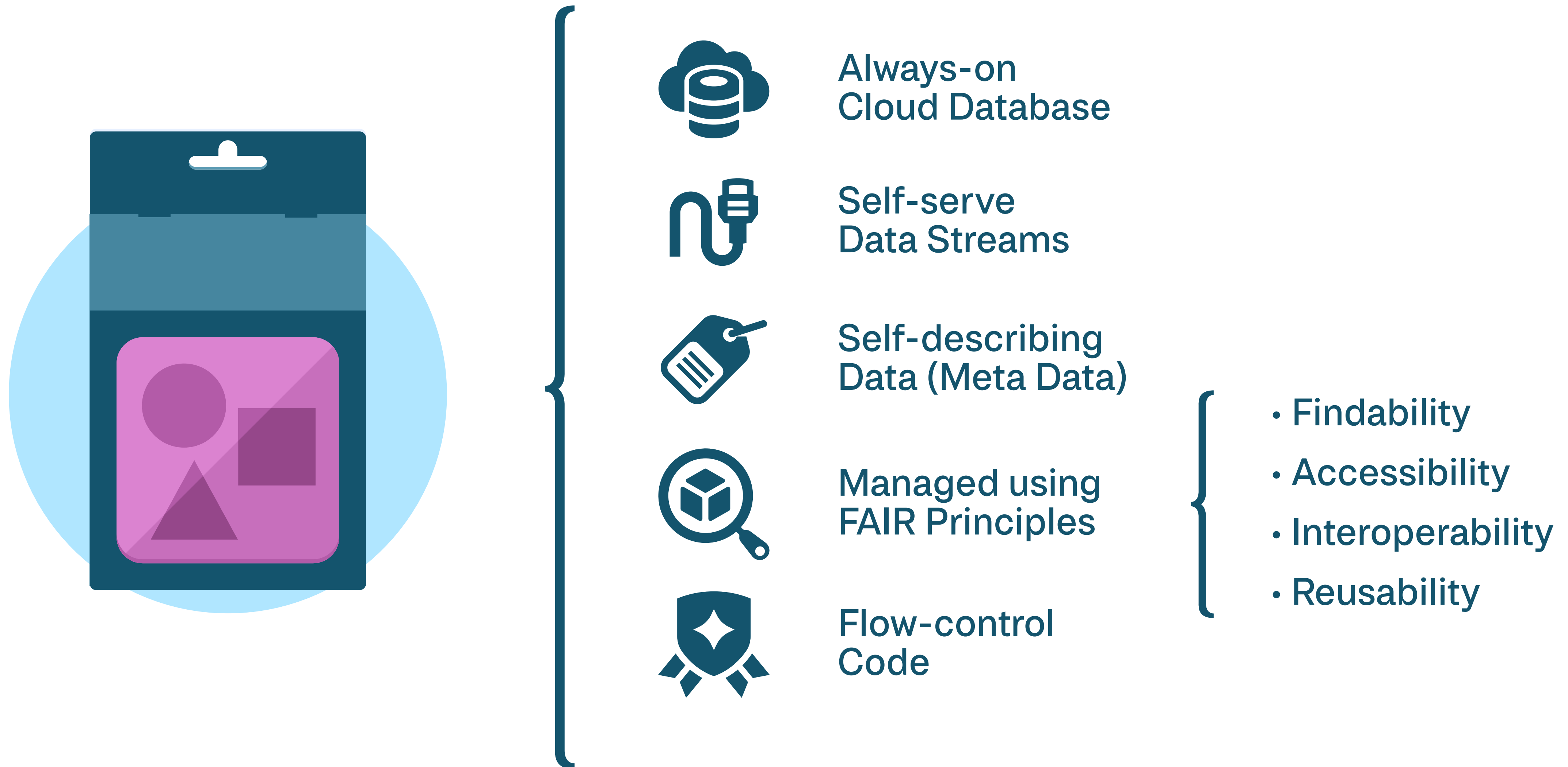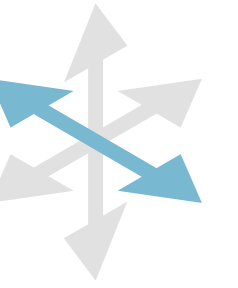
Flow-control
Code

FEDERATED DATA

Data owners retain control of their data but make streams available through a common gateway

A

B

C

DATA OWNERS

API GATEWAY

AUTOMATED SERVICES

MANUAL ACCESS

DATA USE

Local Control

Productized Data

Interoperable

No Dataset Transfer
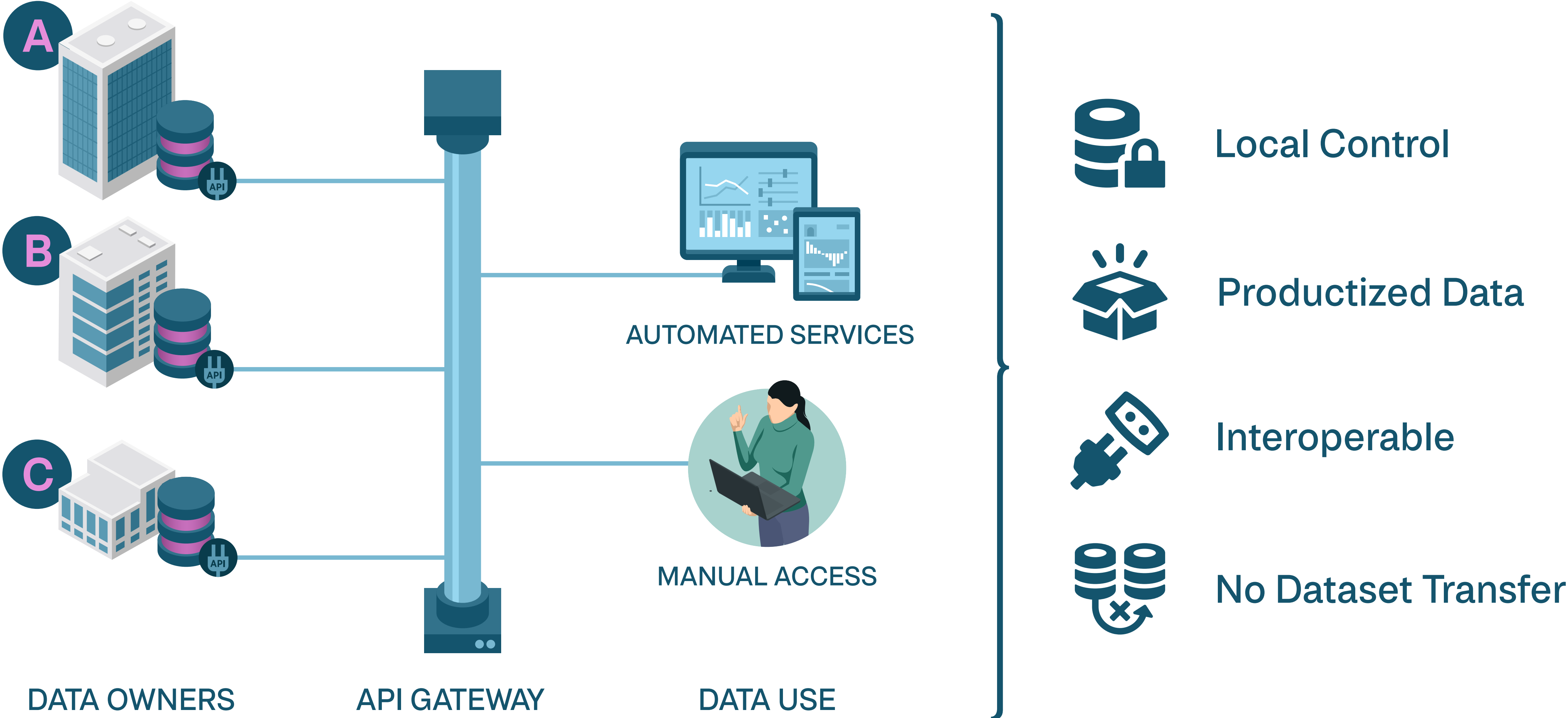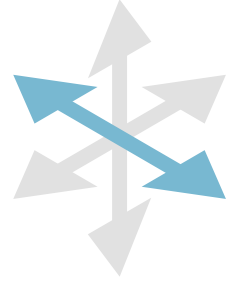
DATA ACCESS BY ANALYSTS

Advanced users can analyze up-to-date data with their preferred apps with few workflow changes

API gateway offers one-stop access without building pipelines to each database

Data is fetched by app-specific plug-in

Data manipulations are saved in app-specific format

Multiple cloud databases are made accessible at the same time

Analysts use their app of choice, either in the cloud or on the desktop

Ontologies and automated schema-management reconcile variables across databases

REAL-TIME DATA DISPLAYS

If data is automatically fed into the database, data displays can be updated immediately

The API gateway can push updates as data changes

Or data can be fetched periodically by front-end app

Database

Elaborate data-processing tasks can be automated with server-side micro-services

The front-end interface can turn data into compelling visual displays
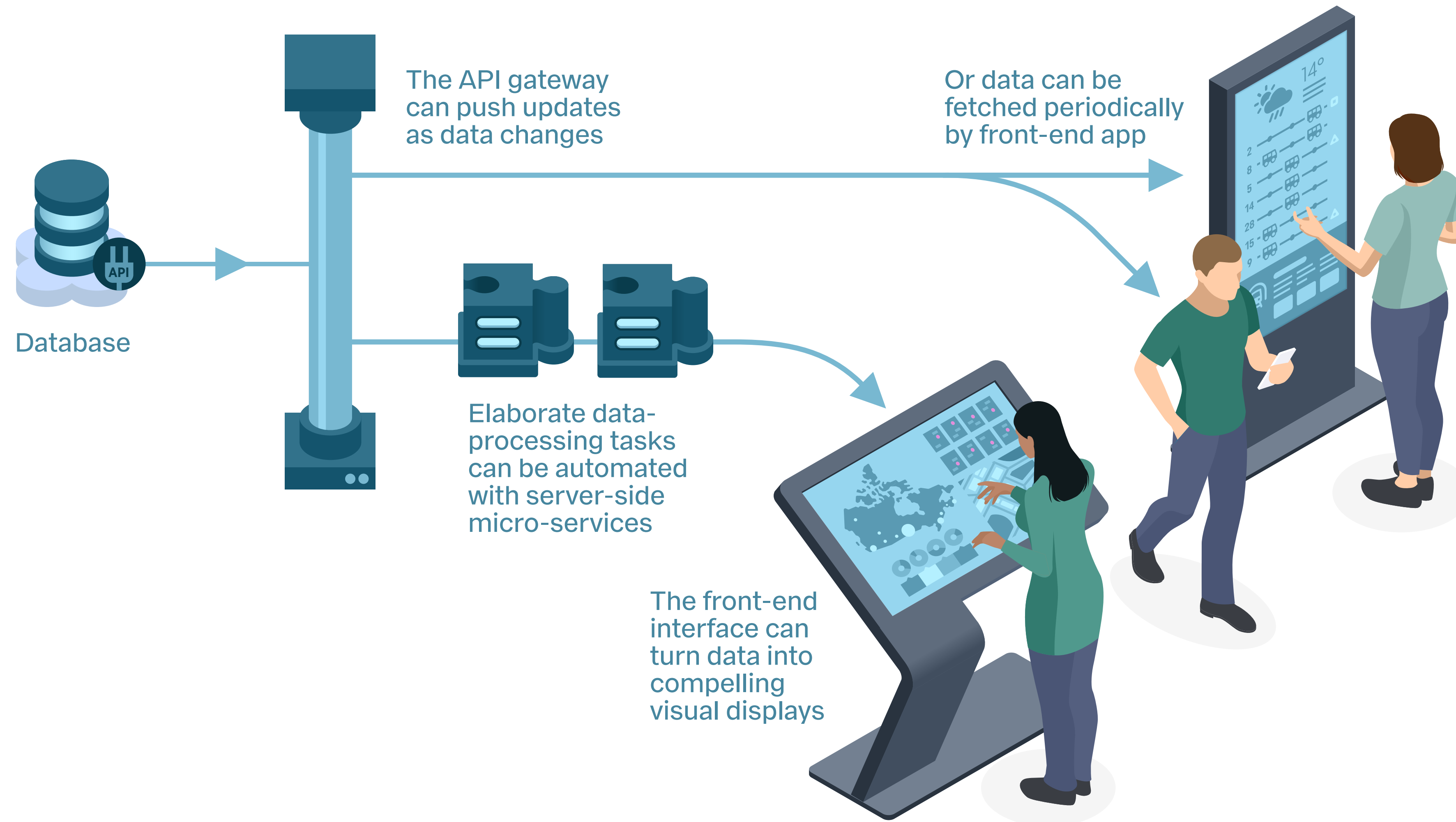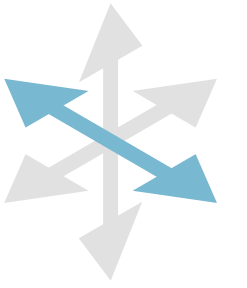
EXTENDED ACCESS

Outside researchers can work with real data without any risk to citizen privacy

Trusted Research Environment

No direct access to real records, only artificial ones

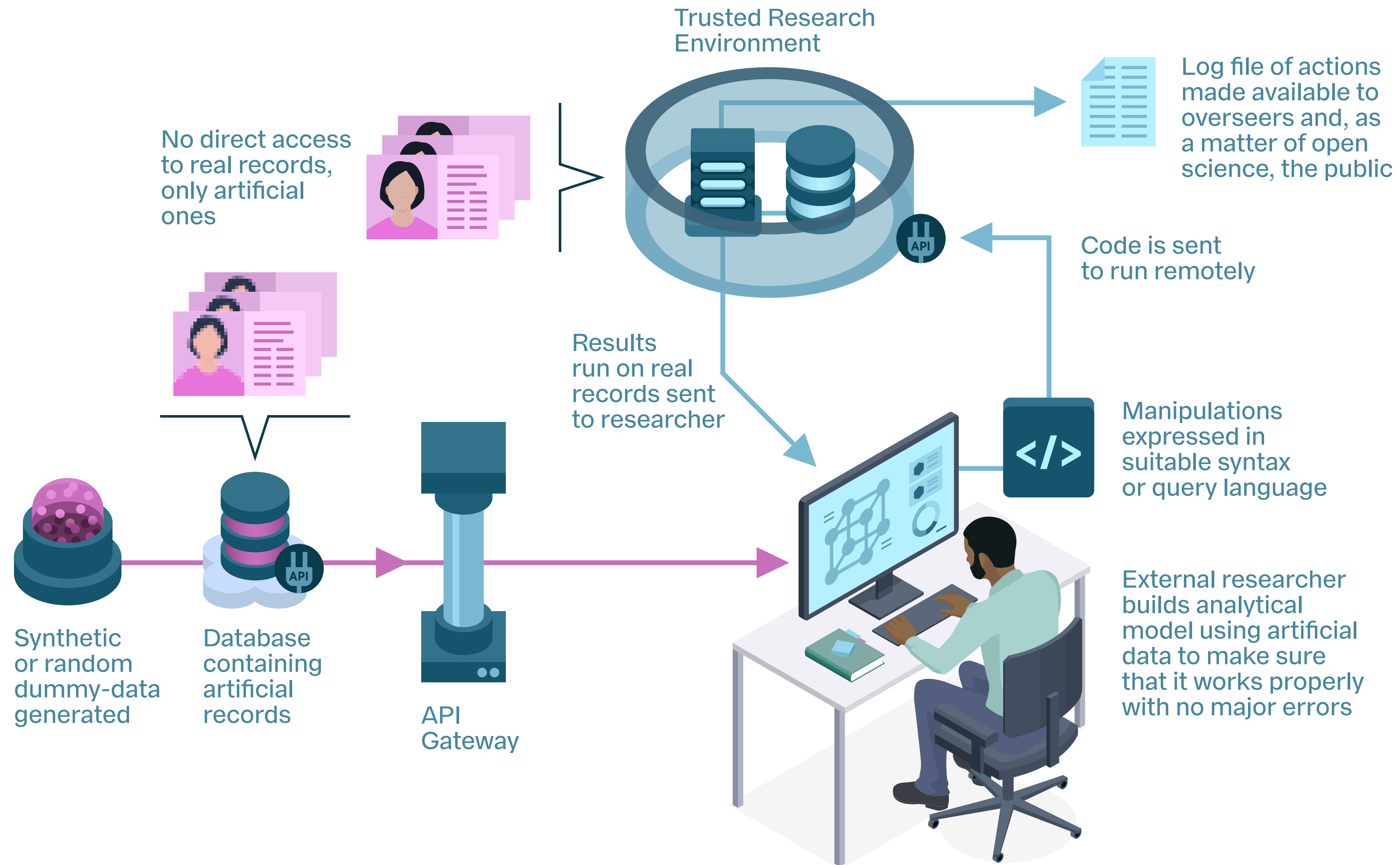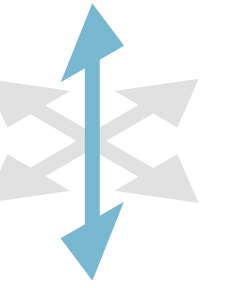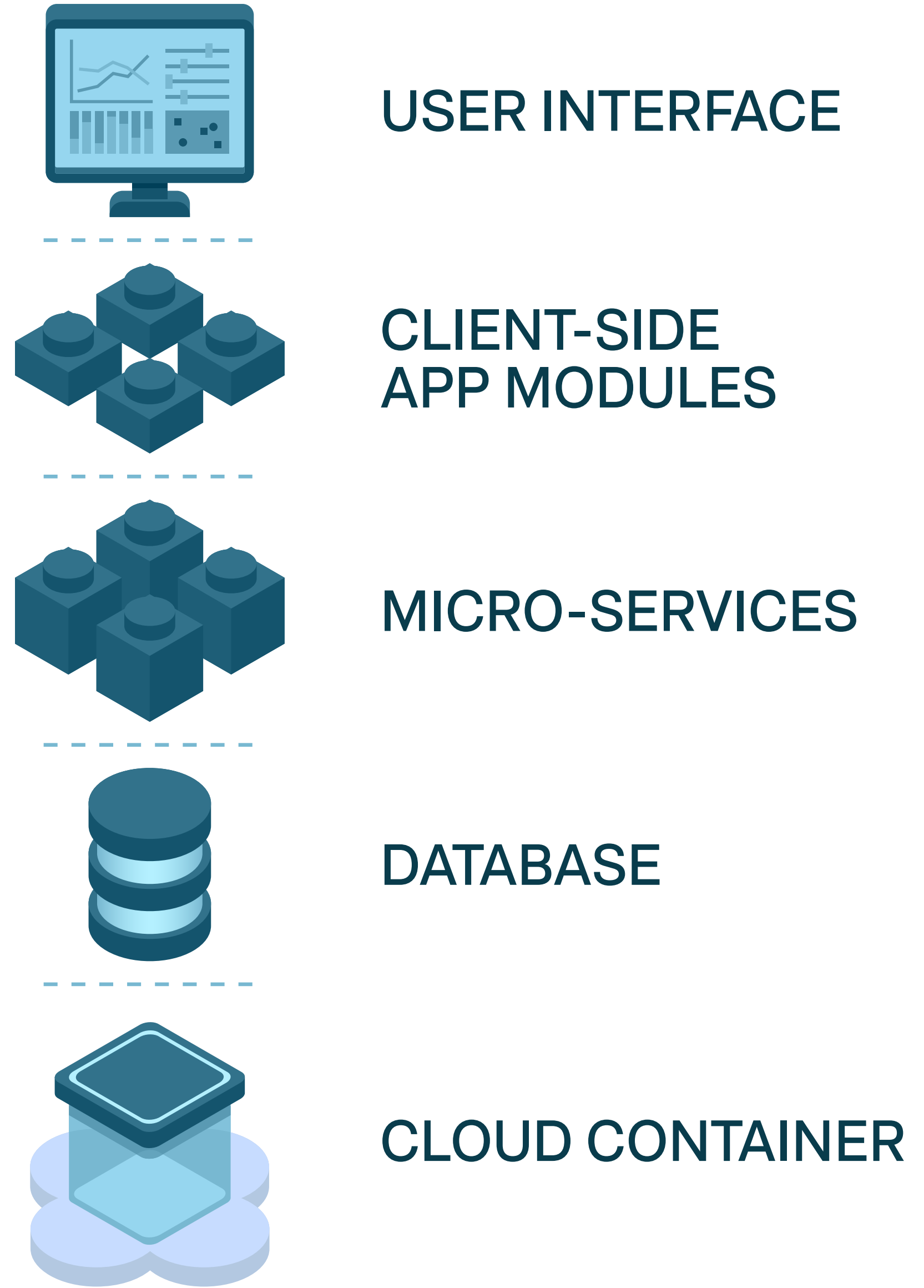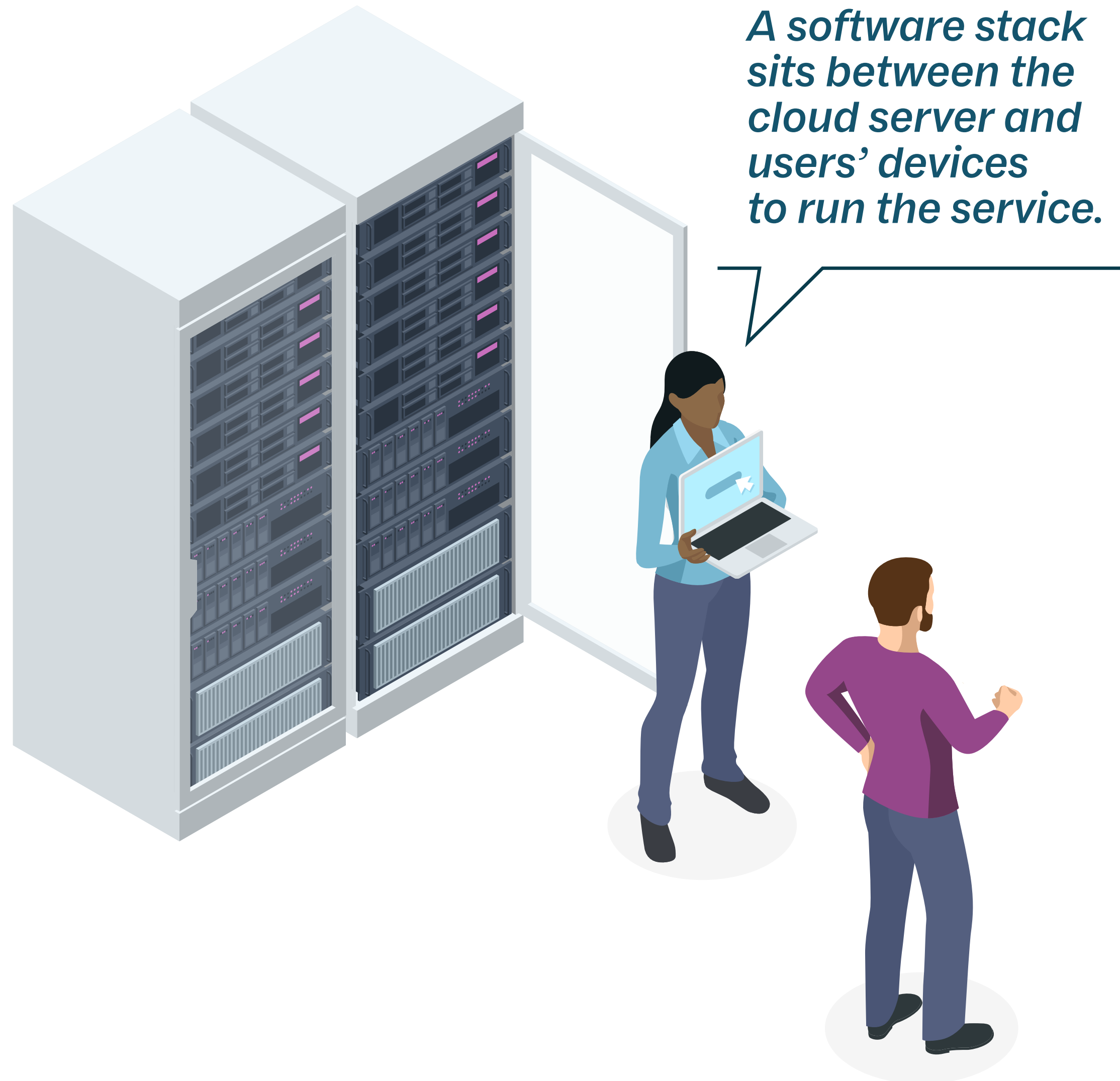Log file of actions made available to overseers and, as a matter of open science, the public

Code is sent to run remotely

Results run on real records sent to researcher

Manipulations expressed in suitable syntax or query language

Synthetic or random dummy-data generated

Database containing artificial records

API Gateway

External researcher builds analytical model using artificial data to make sure that it works properly with no major errors

43

SOFTWARE STACK

Application architectures will vary. The trend is towards flexible modularity.

A software stack sits between the cloud server and users' devices to run the service.

USER INTERFACE

CLIENT-SIDE
APP MODULES

MICRO-SERVICES

DATABASE

CLOUD CONTAINER
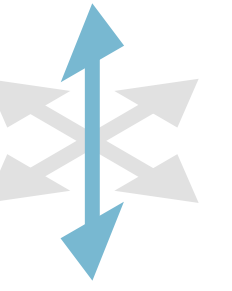
SOFTWARE FACTORY

Generating open-source, re-usable software assets allows new data services to launch quickly

Software is made available in a public repository for reuse; more consistency, less rework.
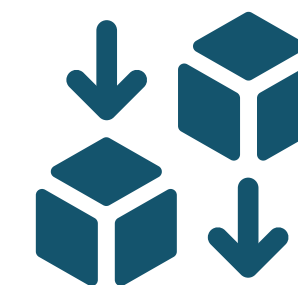
UNIFIED DESIGN LANGUAGE
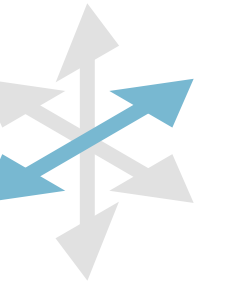
REUSABLE MODULES & SUBSYSTEMS

DEPLOYMENT AT SPEED

SWAPPABLE MODULES TO EVOLVE SYSTEM
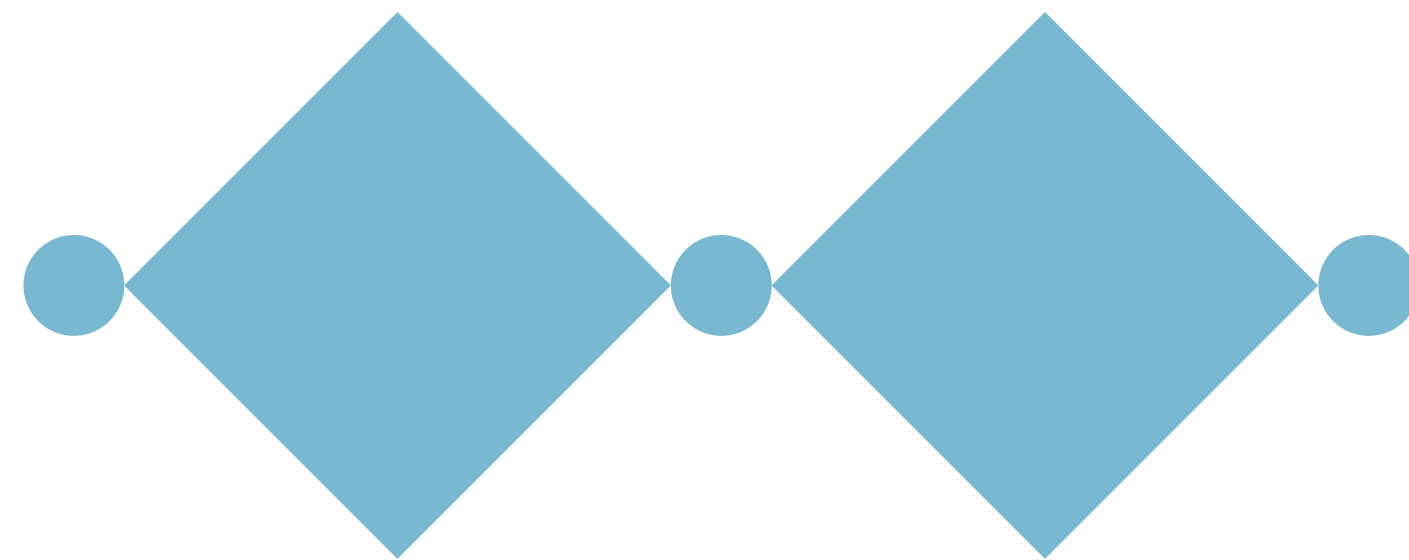
COMMUNITY-LED QUALITY CONTROL

FRAMEWORKS

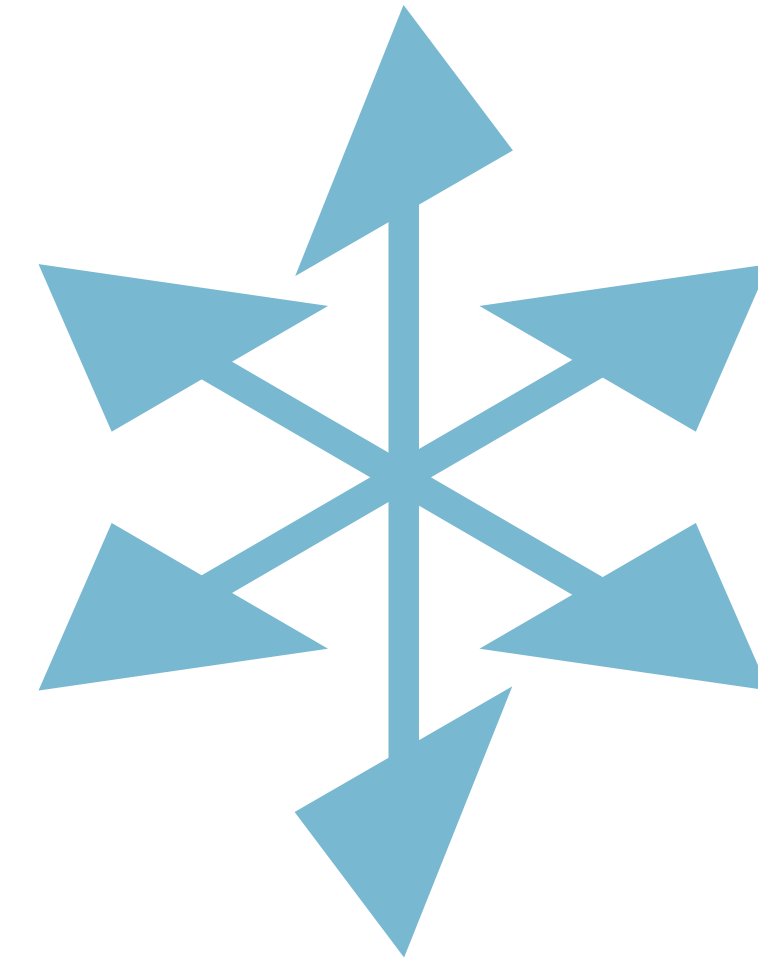*This session introduces three frameworks about running data-service teams*

4 STEPS

**CLIENT-CENTRED
DESIGN**

2 DIAMONDS

**SERVICE DESIGN
AND DEVELOPMENT**

3 AXES

**DATA SERVICE
INFRASTRUCTURE**