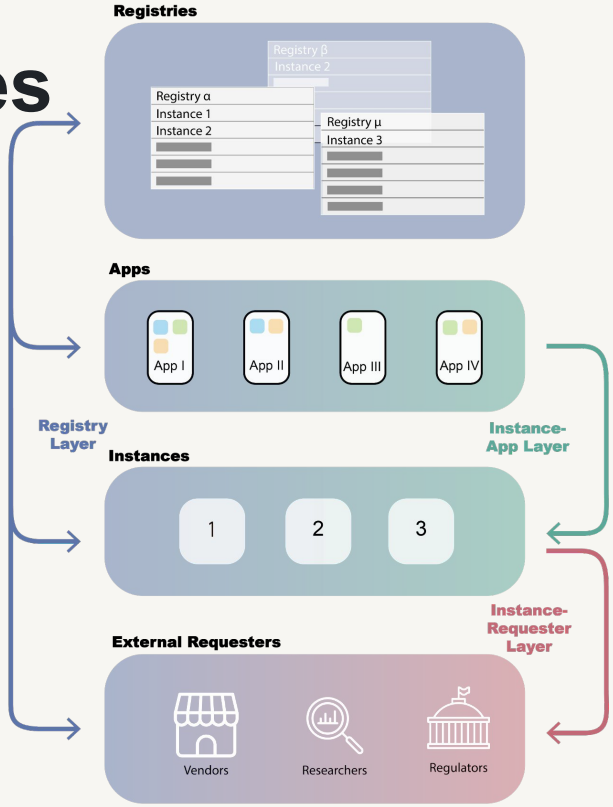
Envisioning Alternative Futures for Delivery Work

Toward a decentralized network built on the OpenCourier protocol

Yuhan Liu · Varun Nagaraj Rao · Sohyeon Hwang · Janet Vertesi · Andrés Monroy-Hernández



PRINCETON UNIVERSITY Princeton HCI

Liu et al., CHI EA 2026 · DOI 10.1145/3772363.3799319



Yuhan Liu
Final-year PhD student at
Princeton University

I work on Human-Computer Interaction, Social Computing and Computational Social Science with Dr. Andrés Monroy-Hernández

My research focused on

- Decentralized Sociotechnical System
- Gig Economy

Ongoing project:

- Understanding motivation and challenges in adoption in decentralized ecosystems: a case study of Beckn ecosystems

Have you ordered from any of these platforms? 🙋







Problems in Mainstream Food Delivery Platforms

Power Imbalance



- High commission fee
- List restaurants menu without consent
- Unfair deactivation

[Lampinen et al., 2018, Tkacik 2020, Zheng et al., 2021, Watkins 2023, Huang 2023]

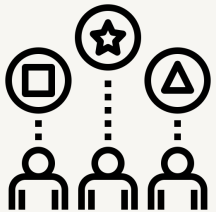
Information Asymmetry



- Black-boxed algorithms
- Lack of transparency inside algorithmic management

[Tomassett 2016, Shapiro 2018, Viljoen et al., 2021, Bommasani et al., 2023, Rao et al., 2024]

Value Misalignment



- Design reflects platforms value without integrating input from other stakeholders

[Duggan et al., 2020, Jarrah et al., 2021, Chen et al., 2022, Dedema & Rosenbaum, 2024]

Indies emerge as alternatives



495 Indie Platforms in the US

Liu et, al “Mapping the Landscape of Independent Food Delivery Service in the United States.” CSCW 2024

Case Study of an Indie Platform: Nosh

Nosh is an locally-owned and operated platform at Colorado.

It is found by a coalition of restaurants and has a collective way for decision-making and profit sharing.

They provide floor-pay to couriers, as well as a shift-based working mode.



Dalal et al,. “Understanding Human Intervention in the Platform Economy: A case study of an indie food delivery service.” CHI 2023

What makes Nosh work? — Human Intervention

Human intervention remains undervalued and unseen in centralized platforms

Centralized

Human intervention

↓

Deviation from algo directions

↓

Punished/Penalized

Nosh

Human intervention

↓

Supplements/supports algo directions

↓

Normalized

Dalal et al,. “Understanding Human Intervention in the Platform Economy: A case study of an indie food delivery service.” CHI 2023

Mapping the Landscape of Indie Food Delivery Service



1. What are the **motivations and values** of indie platforms?



2. What is the **size of their operation?**



3. What **technical infrastructure** do they rely on?



4. What **operational obstacles** they face?

Liu et, al “Mapping the Landscape of Independent Food Delivery Service in the United States.” CSCW 2024

Key findings

Indie platforms:

- A significant player in the United States food delivery service
- Widespread, have existed for many years, with hundreds actively operating
- **Rely on highly heterogeneous software infrastructure (78% from two white-label software vendors)**

Compared to mainstream platforms

- Fill the gaps unmet by mainstream platforms
- Commonly operate on a local scale, within a small geographical area
- **Adopt community-focused strategies**

Liu et, al “Mapping the Landscape of Independent Food Delivery Service in the United States.” CSCW 2024

Key findings

Opportunities:

- Alternative to mainstream platforms and provide better price and service
- Value human intervention
- Locally owned and operated and aim to serve local communities

Challenges:

- Patchwork systems bring obstacles for stakeholders due to infrastructure breakdowns
- One-size-fits-all does not cater to the human involvement aspect of indie platforms
- **Siloing of technology impedes indie platforms serving their local communities**

From independent platforms to an interoperable ecosystem

What the indie landscape study revealed

Local platforms pursue different community values
but they remain isolated.

Heterogeneous infrastructure makes reuse hard
even when platforms share similar needs.

Technology silos makes coordination, auditing, and adoption
limited the growth and development of indie platforms



Design opportunity

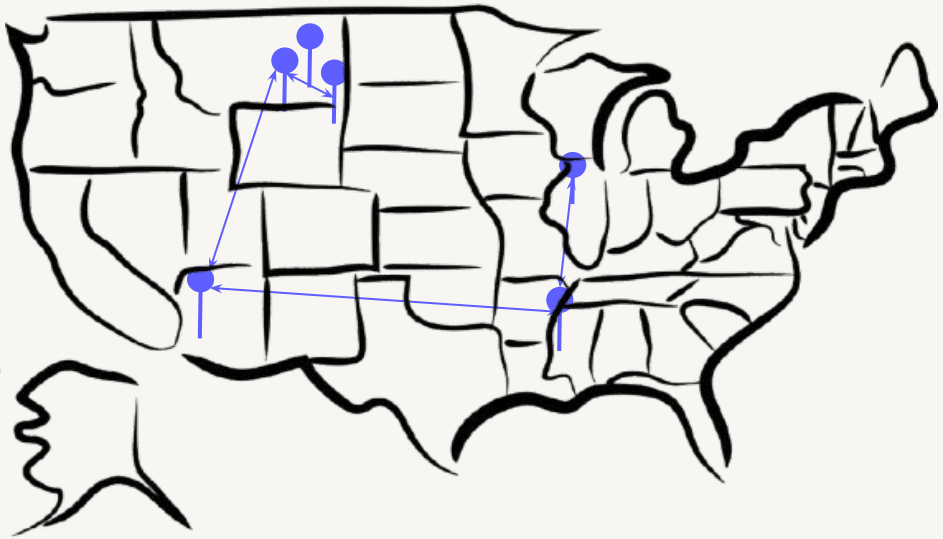
Connect independent platforms without turning them into another centralized marketplace.

What if local platforms could interoperate while remaining independently operated?

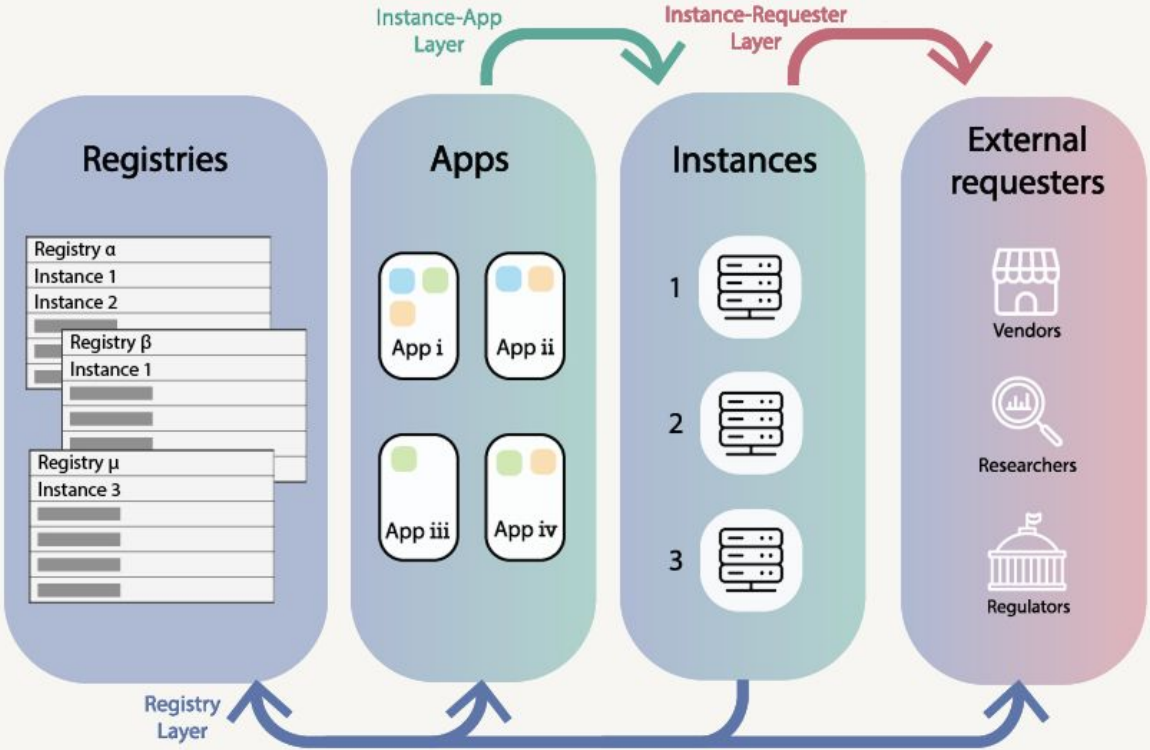
Gig platforms in a decentralized network?

We envision a gig platform network that

- Platforms are **connected**, but are operated and managed independently
- **Low-barrier** for entry - anyone can set up a new platform easily
- Restaurant owners, drivers and customers choose platforms whose **values match** theirs

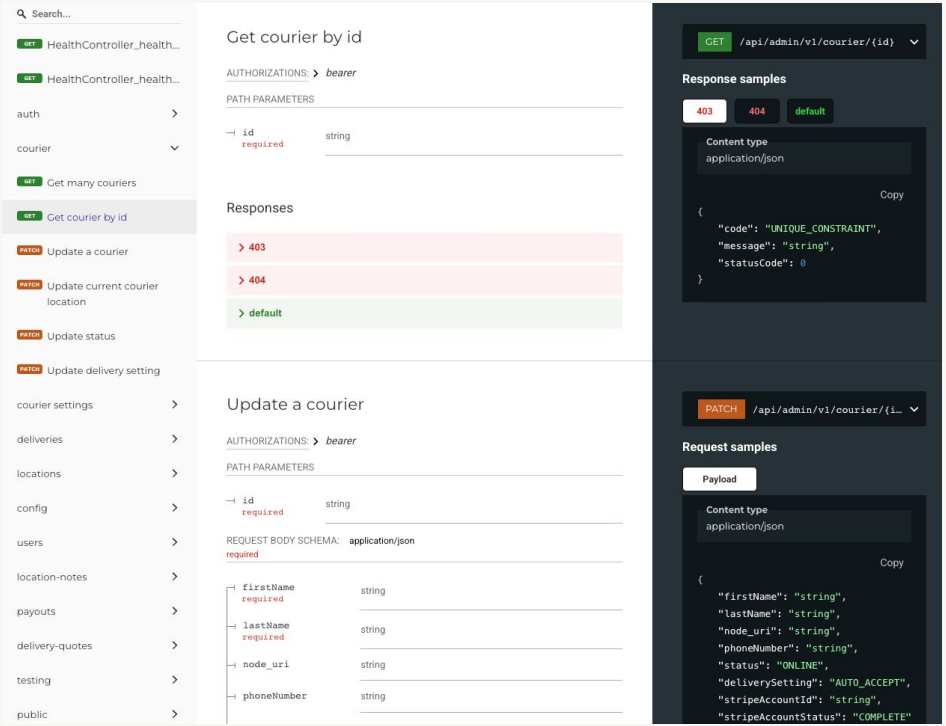


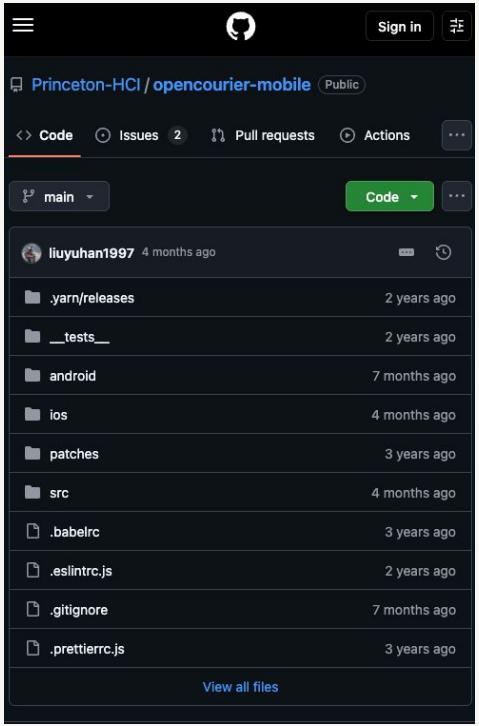
OpenCourier Protocol: Overview

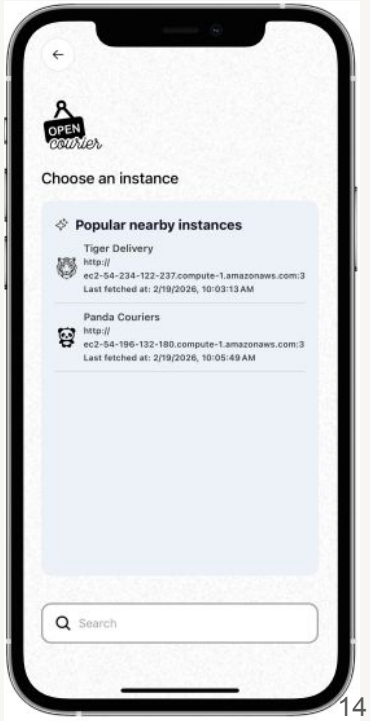


Open Courier is not just an IDEA

A fully specified protocol + functioning open-source software + working apps





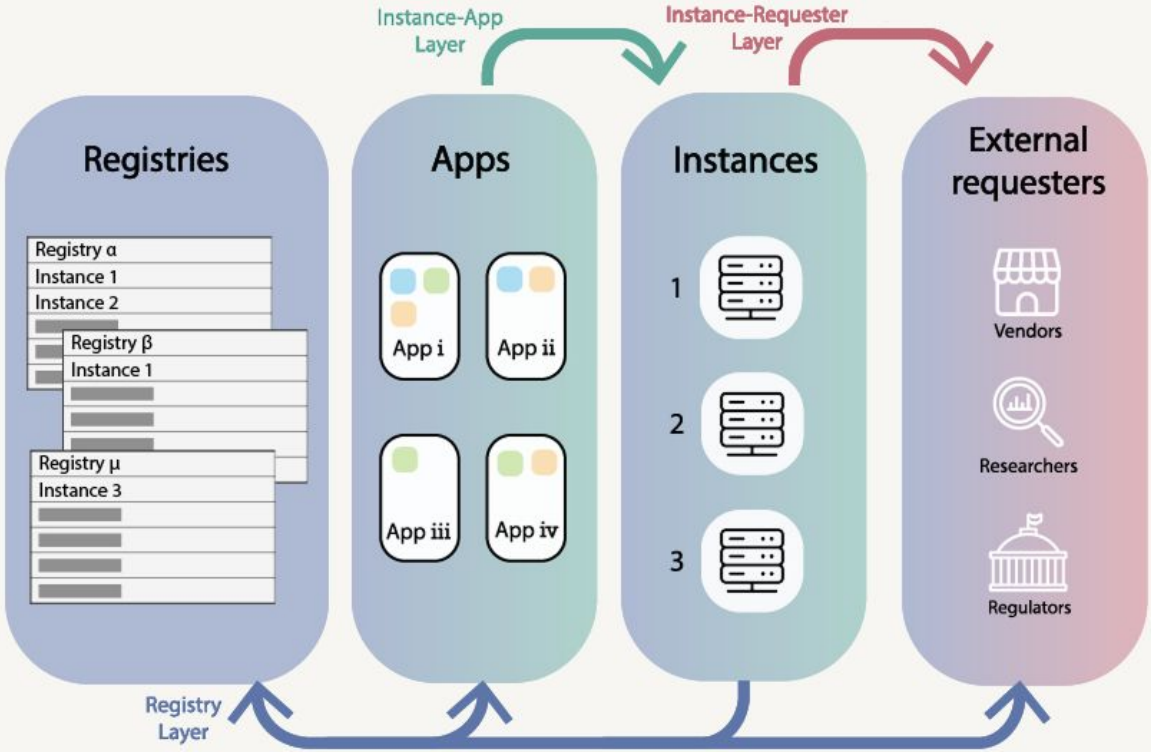


OpenCourier Protocol: Registry Layer

Platform owners register their business in the network

Couriers query and join instances in the network that matches with their values

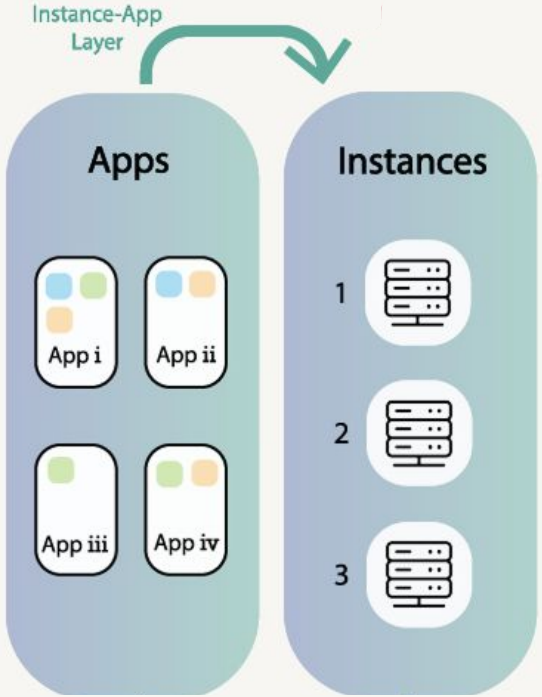
External requesters query instances to look up service providers nearby



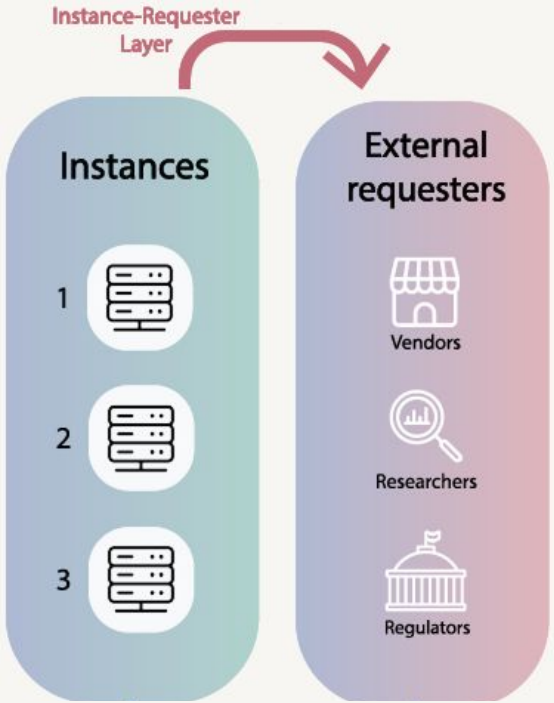
OpenCourier Protocol: App-Instance Layer

Defines how courier-facing apps communicate with infrastructure used by courier instances

- Order dispatching
- Delivery fulfillment
- Working preference input
- …



OpenCourier Protocol: Instance-Requester Layer



Service requesters
- Specify
  - Pickup + drop-off
  - Timing constraints
  - Compensation terms
- Get quotes from instances
- Negotiate with instances

Researchers and regulators ask for
- Ask for anonymized delivery data
- Comparable schemas across instances

↓

- Lower reporting and audit burden
- Required fields in the protocol can enforce information disclosure

Recall: Problems in Mainstream Platforms

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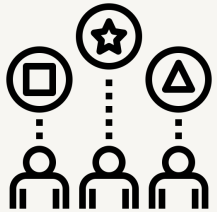
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Become Interconnected: Decentralized Protocol



Give workers agency to join the instance that matches their work preferences



Ensure transparency across the network by allowing key information disclosure and data auditing



Allows developers to create technical infrastructure that are available for anyone within the network

Scenario 1 · Grant Agency to Couriers

A courier can choose across organizations, apps, and allocation policies



COURIER: BOB

work preference change based on needs

sometimes avoids physically intense tasks;
other times prioritizes earnings

Instance A · workers coop

Allocation respects declared physical constraints. avoids intense tasks for Bob when allocating delivery tasks.

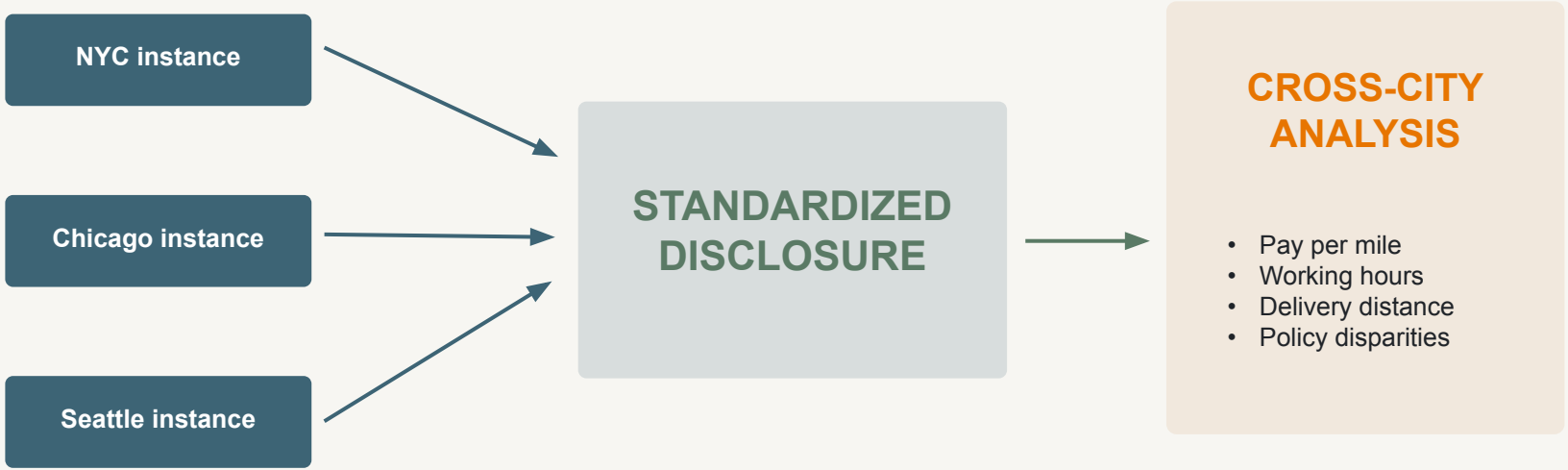
Instance B · commercial platform

Bob doesn’t set up any delivery constraints and opt into more work when appropriate.

Agency = the ability to move, combine, and choose. Not just toggle settings inside one platform.

Scenario 2 · Improve Data Transparency

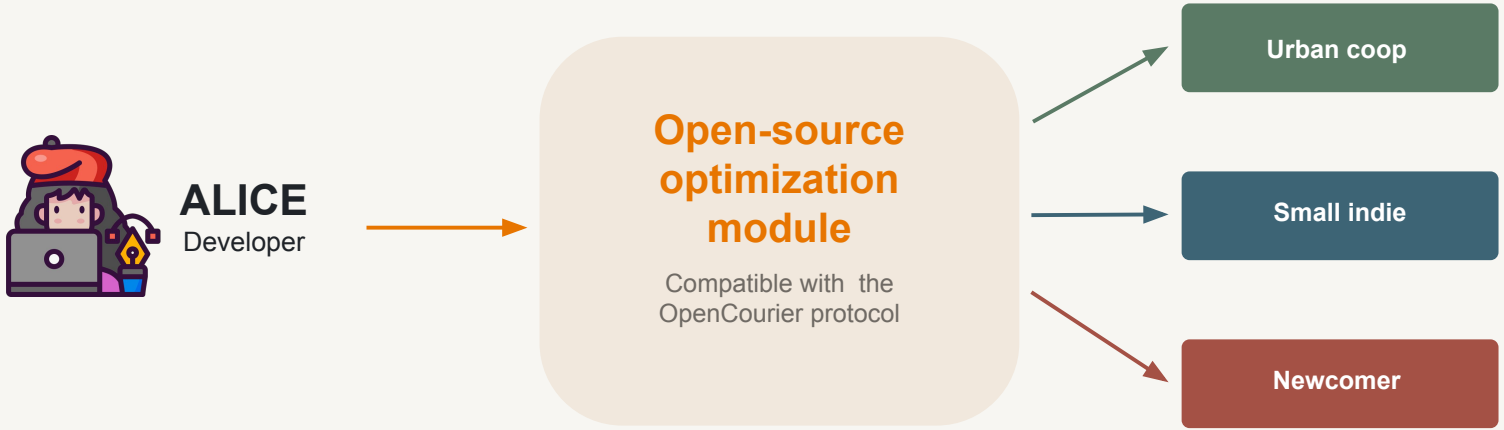
Shared schemas turn fragmented local data into network-level evidence



The network reduces barriers to data sharing while enabling aggregate analysis for policy and industry-wide auditing.

Scenario 3 · Encourage Work-Centered Design and Technical Infrastructure Innovations

Open specifications let third parties build worker-aligned components



Protocol compatibility lowers the cost of reusing better algorithms, interfaces, and services.

Centralized Platform vs. OpenCourier

DIMENSION	CENTRALIZED PLATFORM	OPENCOURIER VISION
Control	One firm sets the rules	**Plural instances + worker mobility**
Interfaces	Tied to platform	**Can be shared across instances**
Data	Proprietary schemas	**Standardized disclosure + audit**
Innovation	Inside platform boundary	**Open ecosystem of compatible tools**
Governance	Mostly corporate	**Distributed**

Future work: design governance models

Within an instance

How are norms set and revised?
How are couriers protected?
How are harmful behaviors handled?

Between instances

What happens when pay policies conflict?
How do overlapping labor pools affect competition?
What is portable—and what is local?

Across the network

Who curates registries?
How are bad-faith instances removed?
How do we prevent harmful actors from hopping?

Decentralization moves power; it does not make power disappear

Future work: implement adoption tools



- Avoid wholesale replacement: bridge existing APIs into the protocol.
- Demonstrate immediate value to indie platforms, couriers, and requesters.
- Consumer-facing adoption remains an open challenge.

Interoperability is valuable only when enough actors can join

OpenCourier: Toward an Open Ecosystem for Local Delivery

- **Interoperability**: Connect independent platforms through a shared protocol rather than another centralized marketplace.
- **Local autonomy**: Let communities retain control over pricing, matching, labor practices, and governance.
- **Shared infrastructure**: Reduce technical barriers while enabling cross-platform discovery, coordination, and auditing.
- **Broader vision**: Reframe delivery as an **open ecosystem** where platforms can cooperate without giving up independence.

Vision paper:
https://dl.acm.org/doi/pdf/10.1145/3772363.3799319
Website: https://opencourier.cs.princeton.edu/
Blog post:
https://platform.coop/blog/toward-worker-owned-delivery-platforms-with-the-opencourier-protocol/

Team







Thank you!

Contact me at