Spatial Signatures

Understanding (urban) spaces through form and function

Dani Arribas-Bel
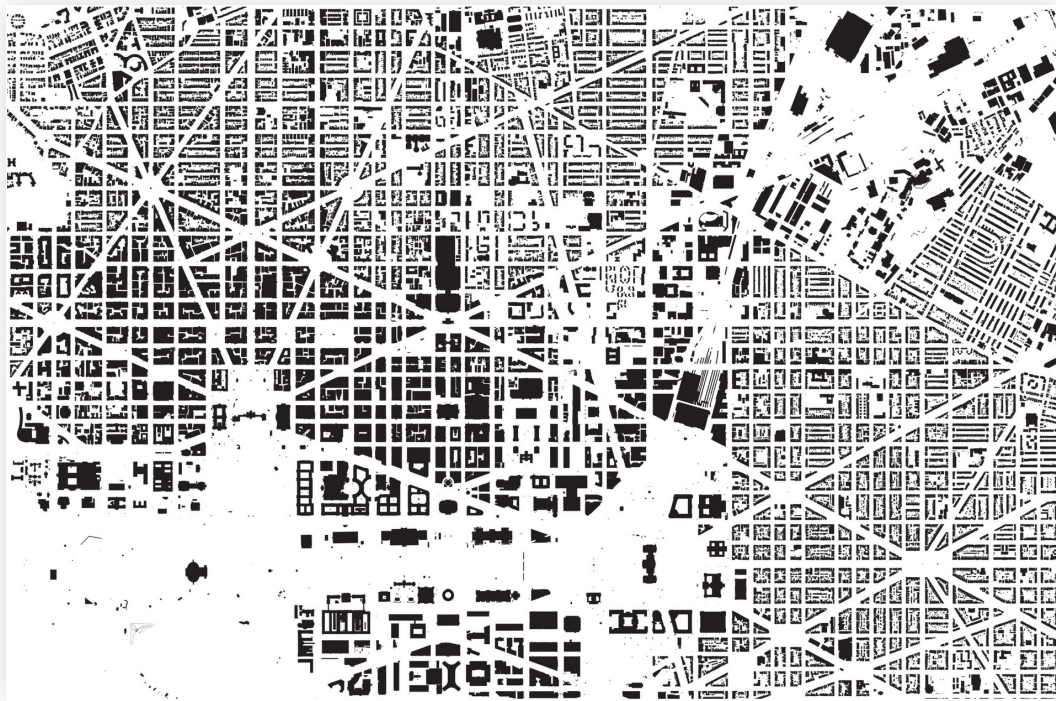
Martin Fleischmann

[@darribas]

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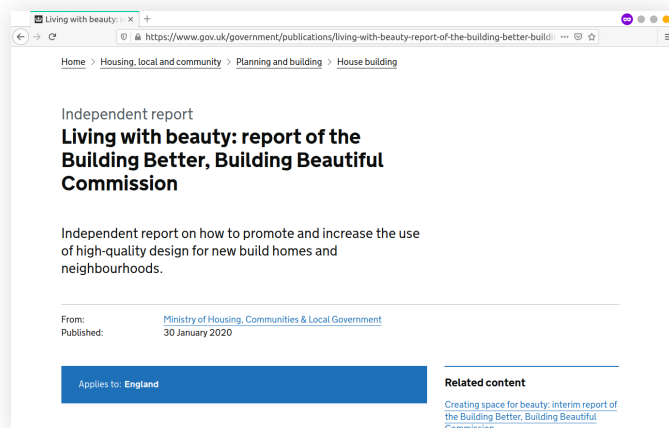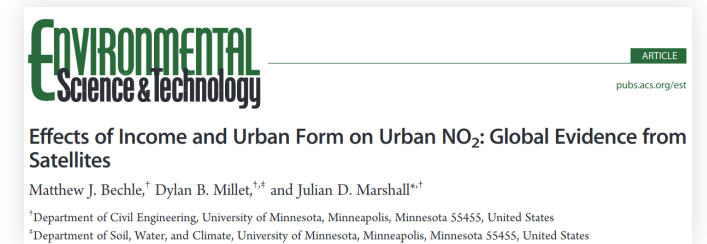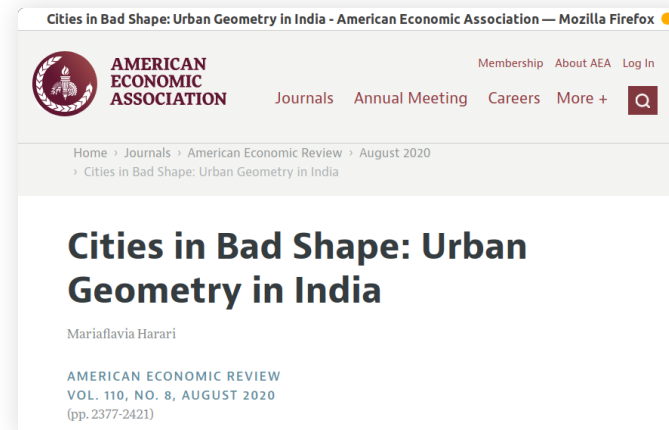The Alan Turing Institute

Geographic Data Science Lab

"The point"

How we arrange "stuff" in cities matters…

… it matters *a lot*

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Contents lists available at ScienceDirect

Journal of Urban Economics

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AMERICAN ECONOMIC REVIEW
VOL. 110, NO. 8, AUGUST 2020
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Rethinking Urban Sprawl
MOVING TOWARDS SUSTAINABLE CITIES

OECD

New Urban Agenda

Form

What does it look like?

"Physical structure and appearance of cities"

Qualitative, quant. case studies, morphometrics, remotely sensed

Function

What is it used for?

"Activities that take place within an environment"

Geography, Economics, Sociology, Environmental Sciences, Tansport studies…

Form & Function

- Richer picture
- Topography, history, technology, cultural values…
- More robust representations

Opportunities

We don't have good ways of measuring form & function in cities

- Detailed, consistent, scalable: "pick two"
- Fragmented understanding
- Land use/cover – ??? – Geodemographics

Spatial Signatures

A characterisation of space based on form and function designed to understand urban envionments

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A characterisation of space based on form and function designed to understand ==urban envionments==

Enclosed Tessellation

Embedding
form & function

Spatial Signatures

Enclosed
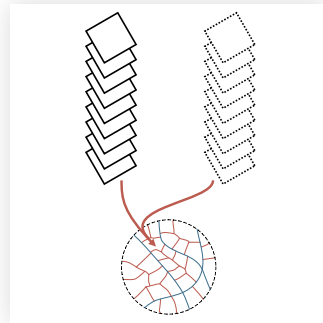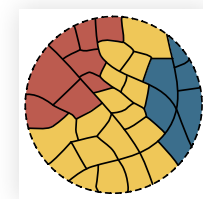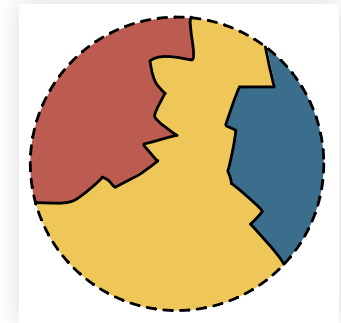Tessellation
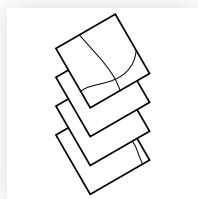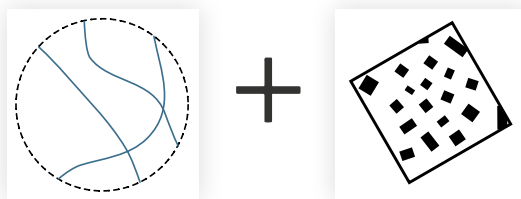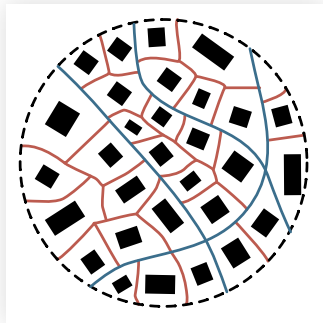
Embedding
form & function

Spatial
Signatures

Characters

Form

- Building
- ET cell
- Street segment
- Cell context

Function

- Land use/cover
- Access to uses
- Activity densities

Benefits

- Data-driven & (multidiscipline) theory-informed
- Granular & scalable
- Flexible deployment

Illustration

The Setup

Five *different* cities

- Historical environments
- Geography & culture
- Data landscapes

The Cities

Barcelona	Dar es Salaam	Houston	Medellin	Singapore
Spain	Tanzania	USA	Colombia	Singapore

The Data

Form

- Local open data
- OpenStreetMap
- Satellite-derived

Function

- Local open data
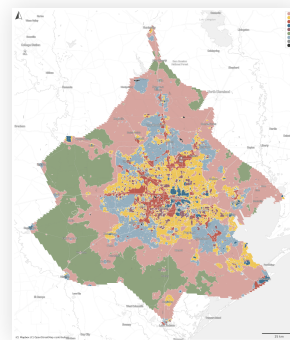- Land use/cover
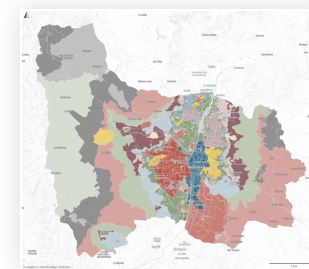- Global grids
- Nightlights

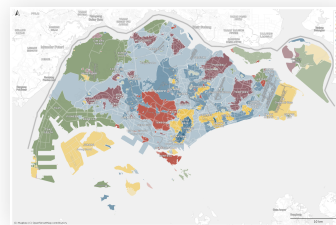Clustered with K-Means + clustergram

The Signatures
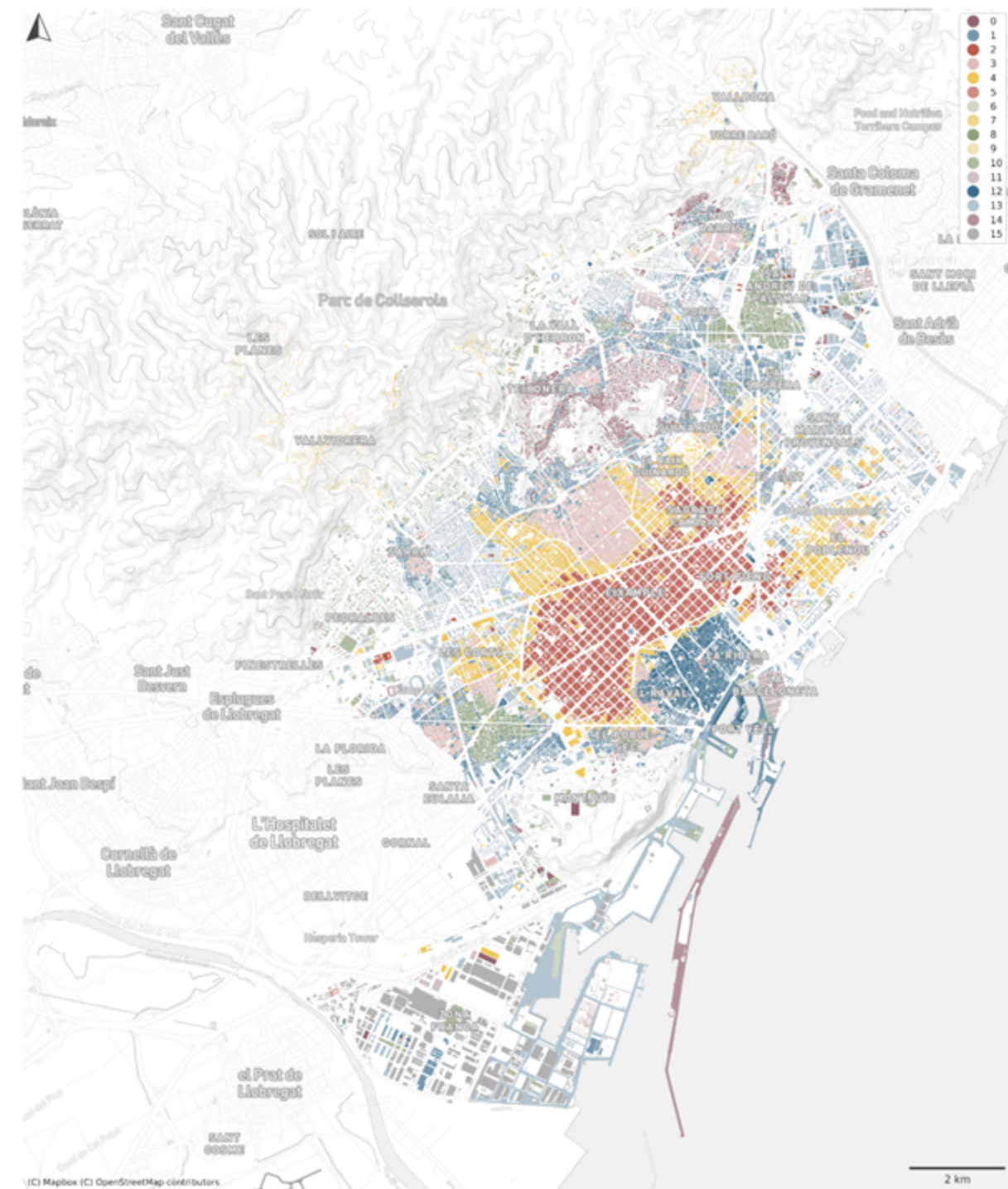

Barcelona

Dar es Salaam
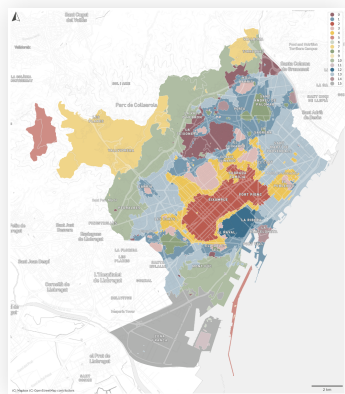
Houston

Medellin

Singapor

Barcelona
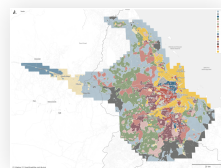
Houston │ Medellin
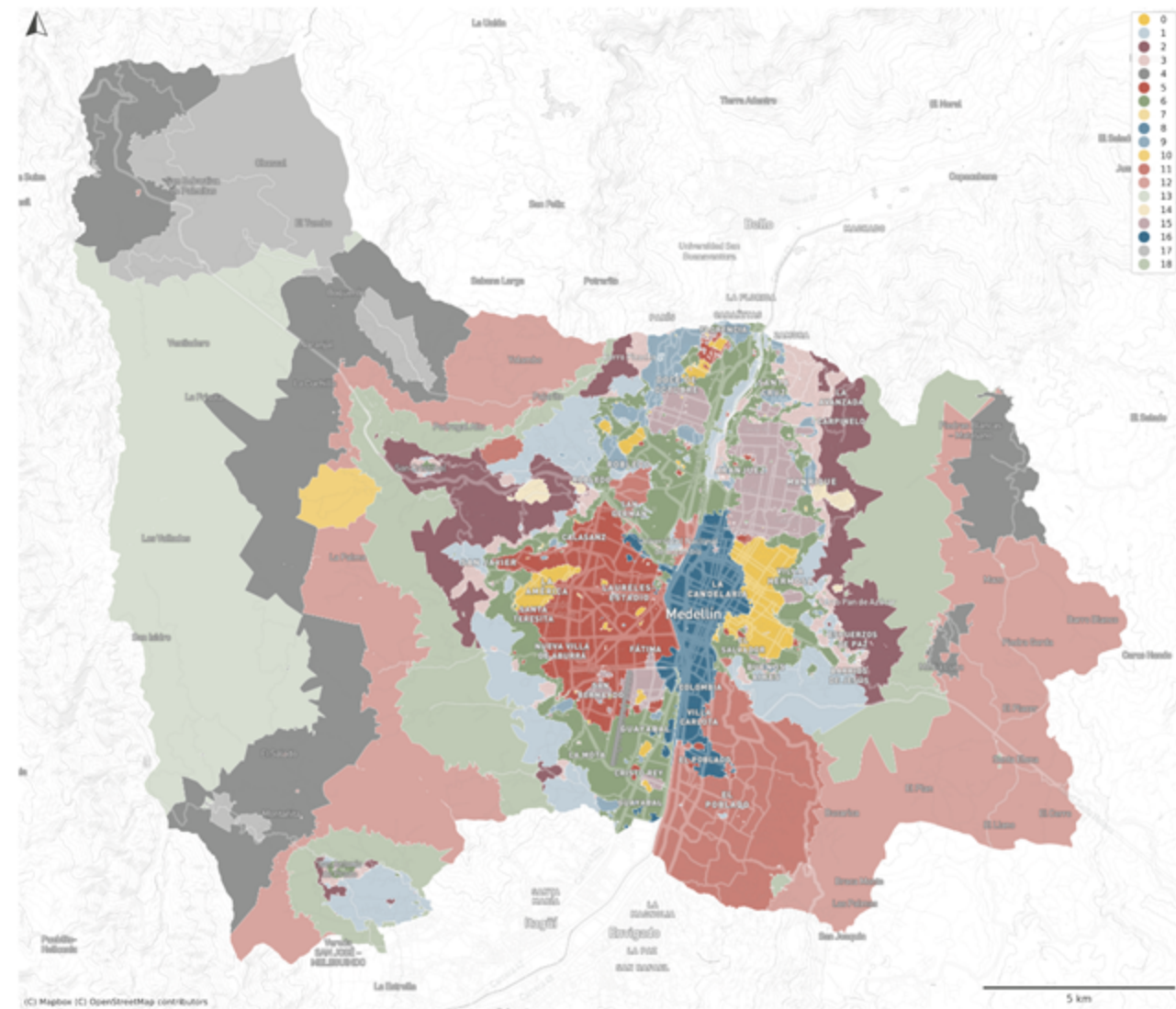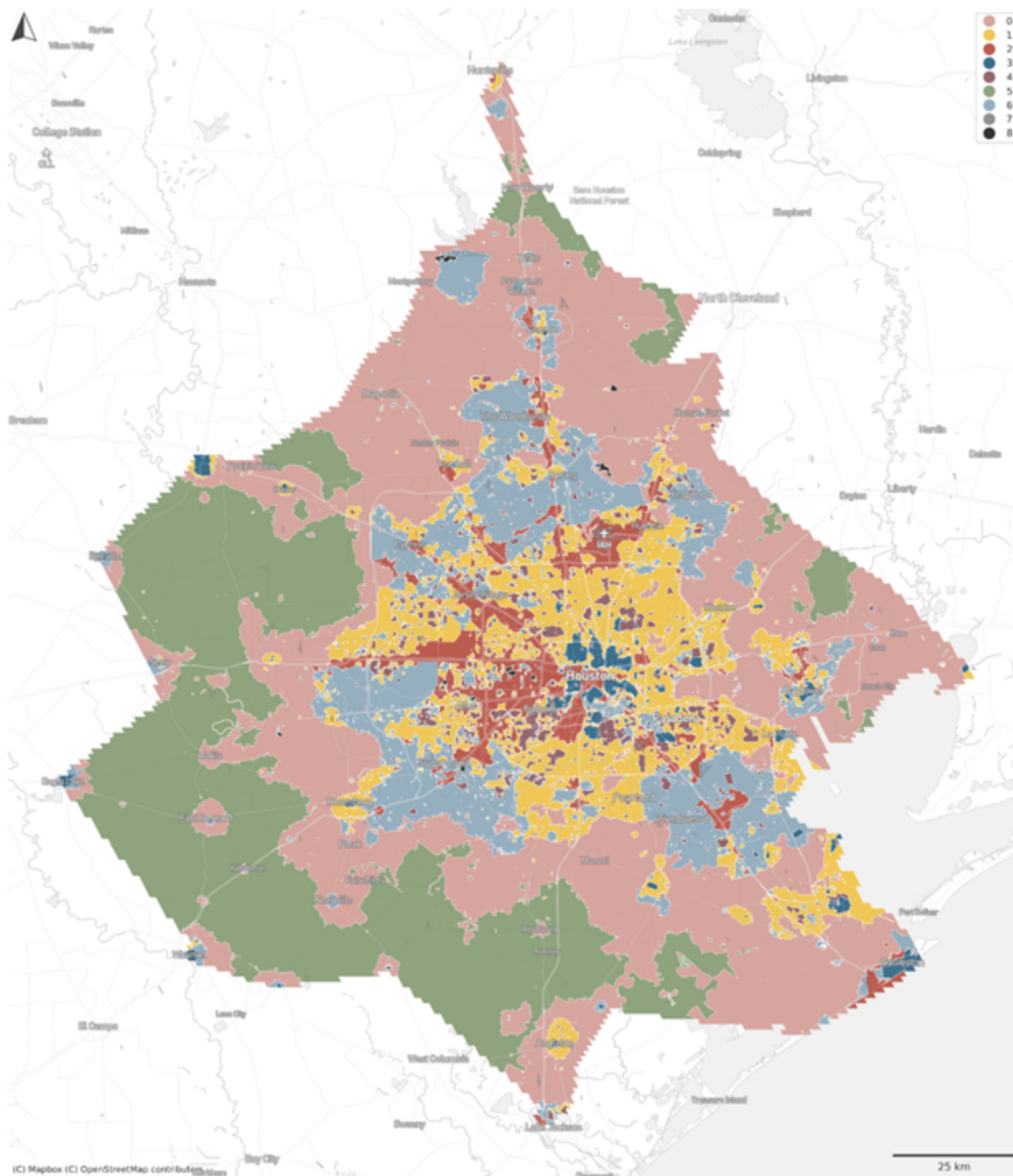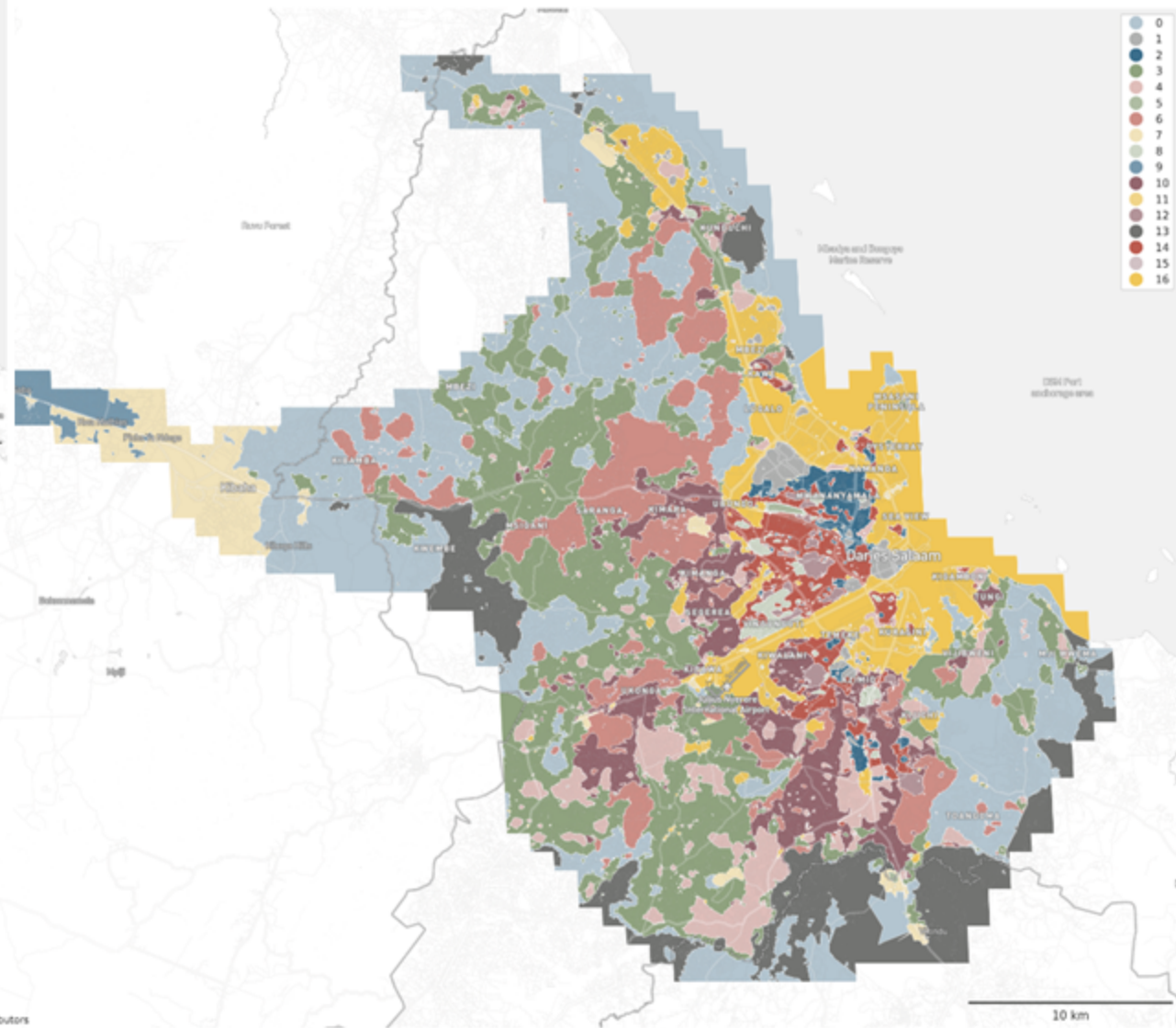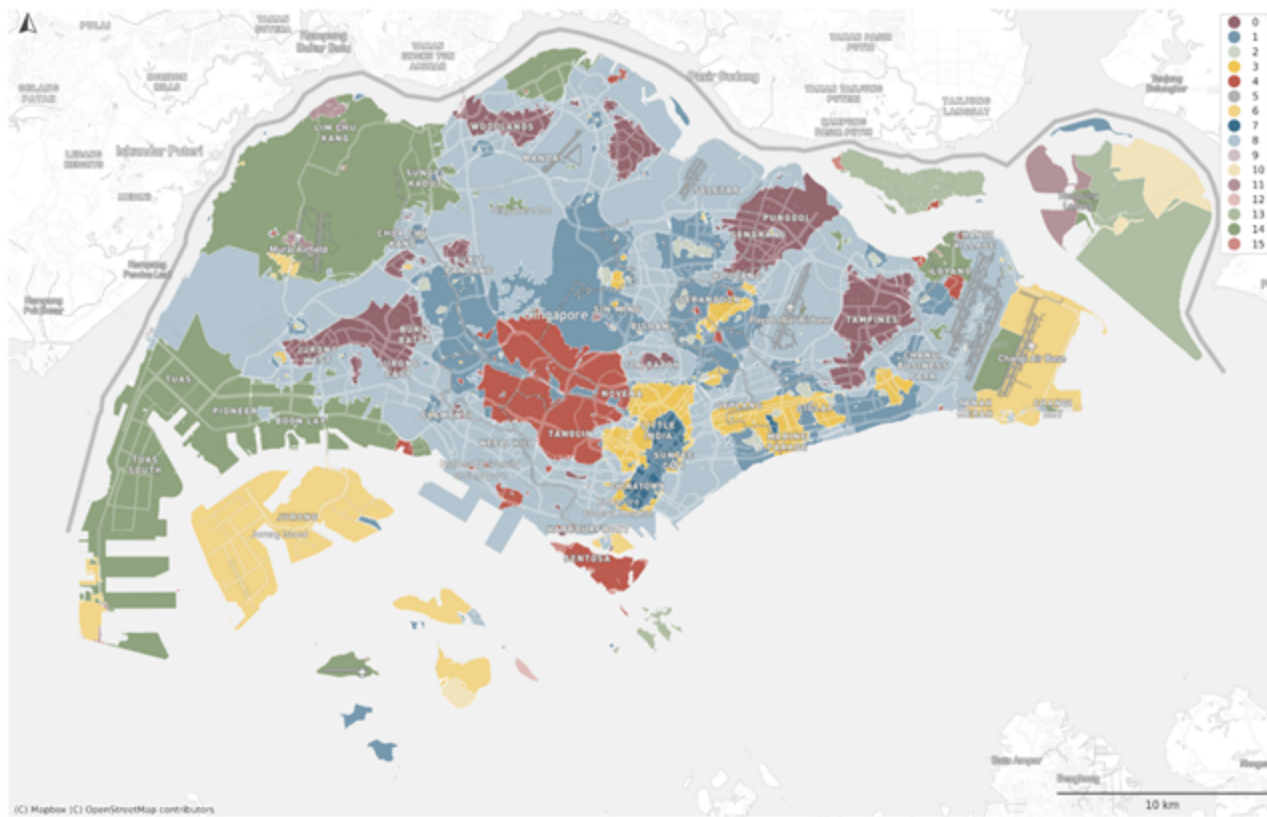
Singapore | Dar es Salaam
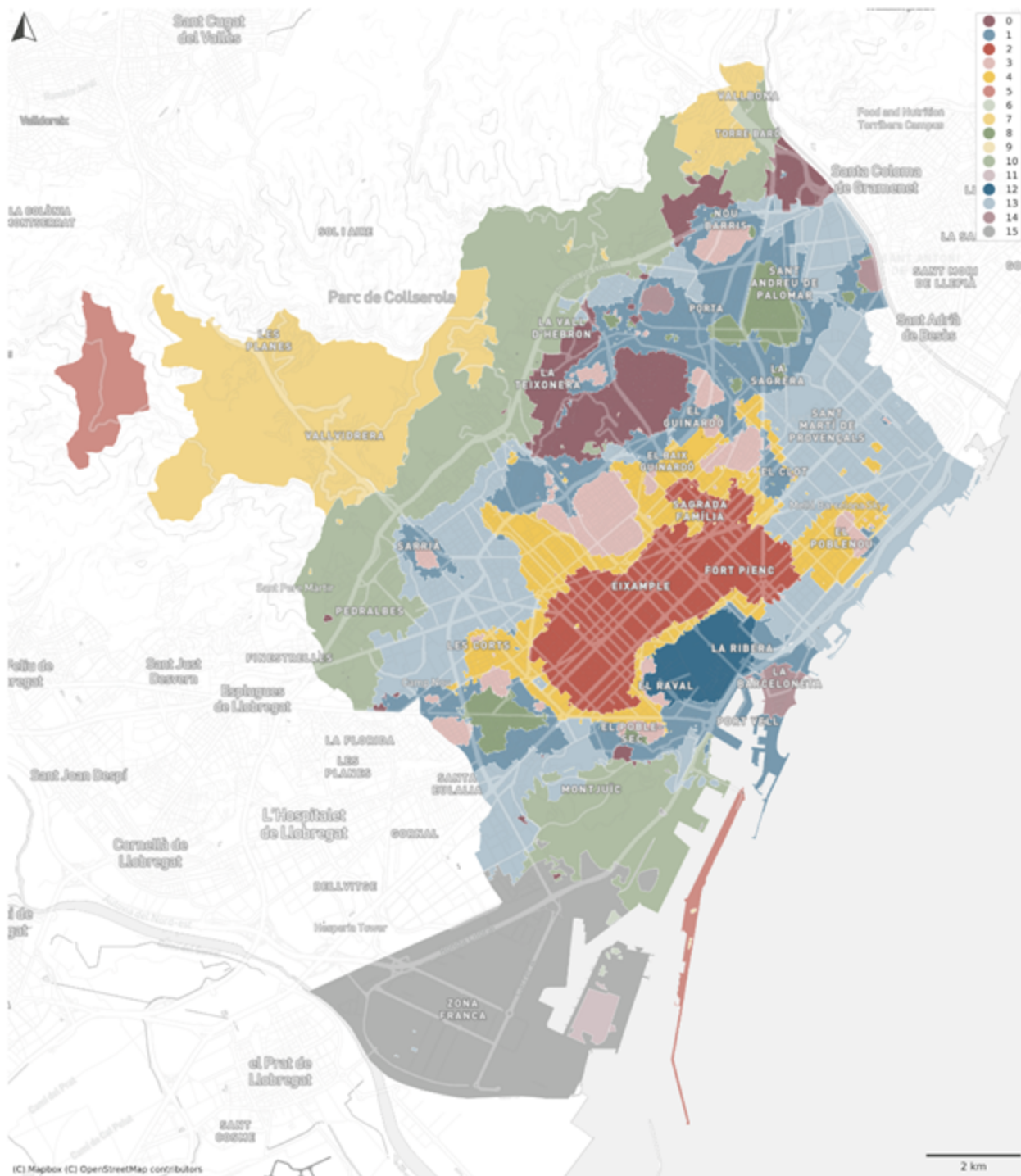
To take away

1. Urban *form* and *function* matters
2. Spatial Signatures: F&F for cities, in detail, at scale
3. Good measurement → better understanding

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