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AND REGIONAL LEADERS  
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## Megacities and Waste Management Beyond the Business as Usual

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### 3 Questions

- What are the waste management challenges in terms of encompassing collection, transport, transfer, treatment, utilization and disposal?
- How to get cost reductions?
- How to achieve the empowerment of citizens as part of the conservation and good management of garbage in the cities, and the formalization of workers who dedicate their work to waste management?



First, let's understand

## Emerging Megacities

- Globalization theaters
- Spatial & Population Growth
- Urban / Rural Interfaces
- Social Patchworks
- Complexity in Governance

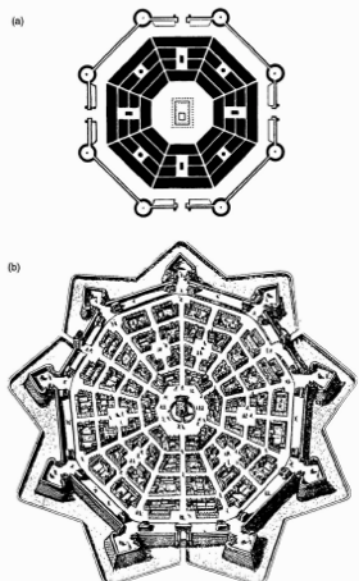
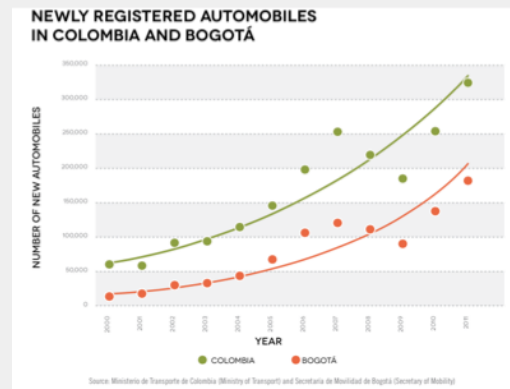
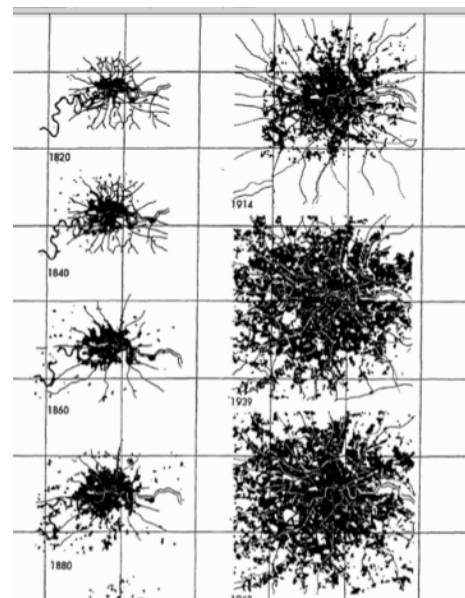


Figure 1.4. Ideal cities of the Renaissance: (a) from Vitruvius; (b) Palma Nuova after Scamozzi (from Morris, 1979).

Complexity  
Management  
or  
Complexity  
Ignorance?



## The major controversy

- Dynamic Systems **Out of Equilibrium** can't be managed with **Static** Master Plans
- **Bottom - up** evolution is difficult to be managed by simple **Top – Down** approaches

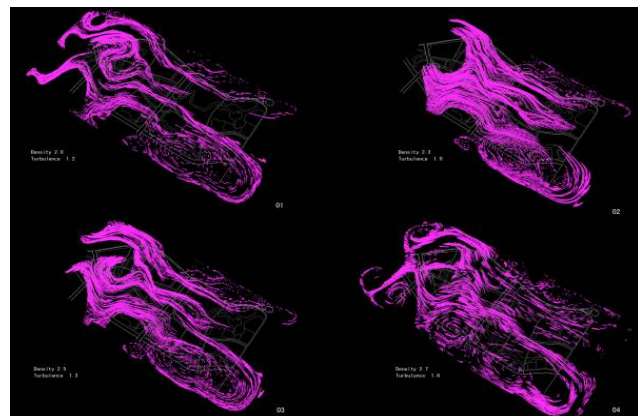
Map 3. Bogotá: 20th Century Growth Patterns - 1950

Map 4. Bogotá: 20th Century Growth Patterns - 1970  
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Map 5. Bogotá: 20th Century Growth Patterns - 1990

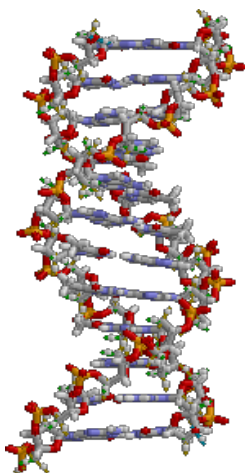
## Mapping the Flows

Megacities as a whole exhibit properties not obvious from the properties of the interconnected parts



Source: *Urban World: Design & Research For Qinzhou Masterplan*, Feng Xu, 2010

## The SWM DNA in megacities



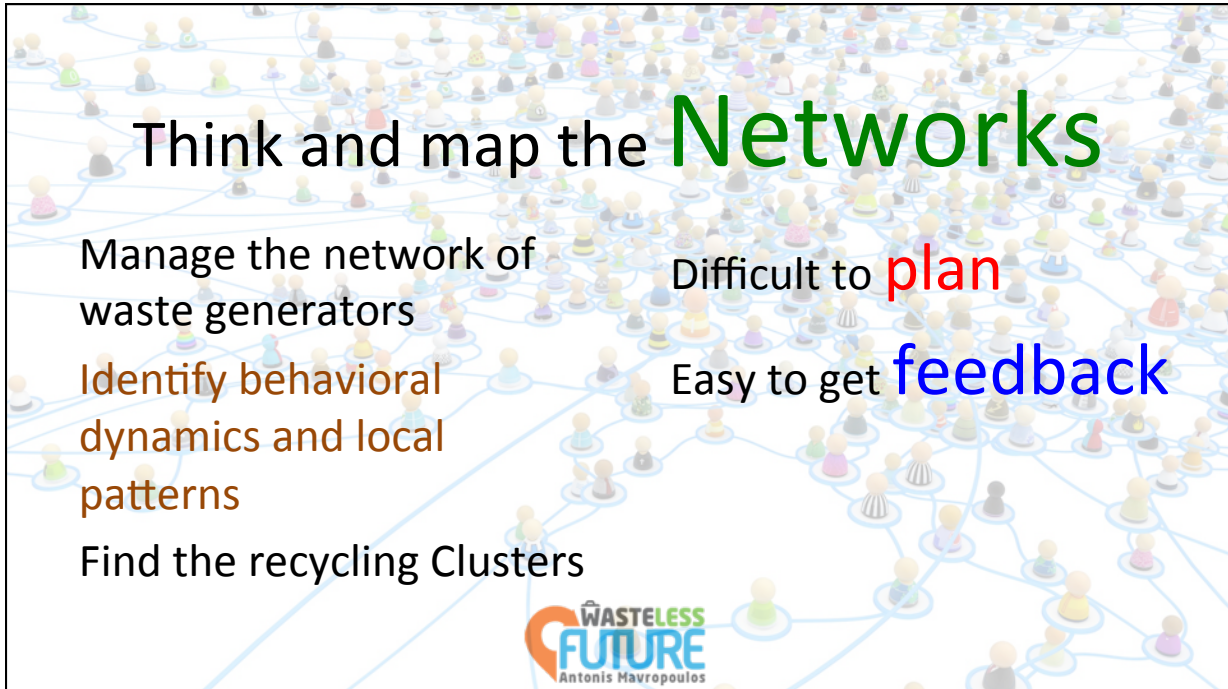
- Global Input – Local Output
- Infrastructure is always late
- Local patterns – Heterogeneity
- Complex stakeholder engagement
- Lack of on-time data
- Informal Recyclers



## How to deal with this complex DNA?







# Think and map the Networks

- Manage the network of waste generators
- Identify behavioral dynamics and local patterns
- Find the recycling Clusters

Difficult to **plan**

Easy to get **feedback**

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## Two ways to map networks





# Work with the organic fraction



## Barrios secos

Número de familias afectadas

### Zona 1 USAQUÉN

La vereda Altos de Serrezuela  
- Km 5 vía al Guavio

**70**

Araucuita I y II sector  
Mirador Norte  
La Capilla San Isidro

• Estos cuentan con redes comunitarias, las cuales se encuentran conectadas a las redes oficiales del servicio de acueducto y alcantarillado, y se facturan mediante una tarifa mínima establecida de acuerdo con el nivel del servicio.

TOTAL FAMILIAS AFECTADAS  
**9.063**

### Zona 2 CHAPINERO

**155**  
Bosques Calderón 93  
Villa del Cerro 62

### ENGATIVÁ

**164**  
Jardín Botánico 139  
Unir II 25

## Collection

La Paz Centro 205

### SANTA FE

**12**  
Ramírez 12

### SAN CRISTÓBAL

**1.763**  
Tibaque 271  
San Pedro Sur 159  
Altamira 128

### USME

**1.991**  
El Espino 304  
Sierra Morena 289  
Villa Diana 130

### CIUDAD BOLÍVAR

**3.775**  
Perdomo Alto 274  
Caracolí 268  
Santo Domingo 266

### RAFAEL URIBE

**115**  
La Paz 104  
Arboleda Sur 100  
La Picota 71

### TUNJUELITO

**55**  
Venecia 11  
Isla del Sol 44

### KENNEDY

**52**  
Guadalupe 22  
Santa Catalina 14  
Sumapaz 16

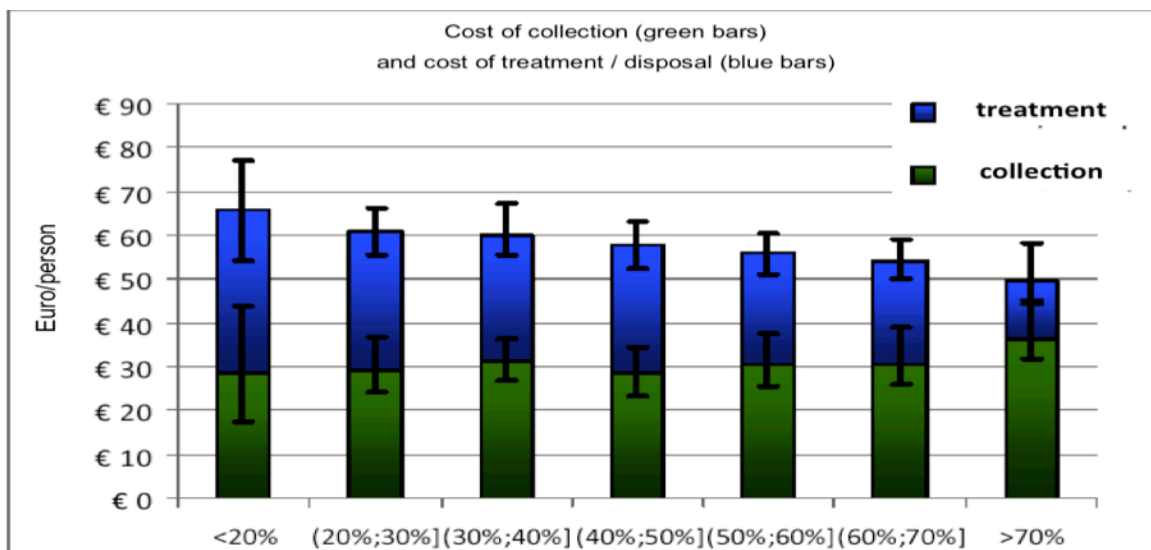
### BOSA

**56**  
Danubio II 56



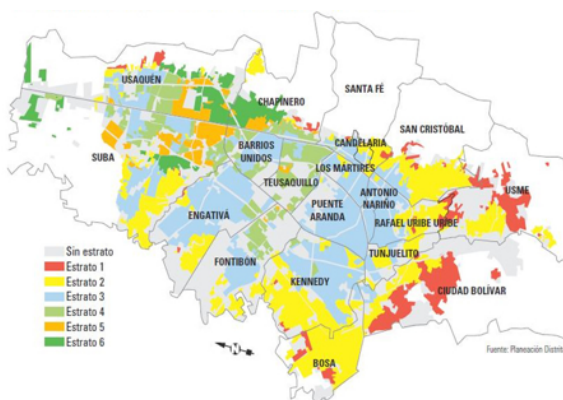
Fuente: Empresa de acueducto y Alcantarillado de Bogotá Gráfico El Espectador

## More expensive?



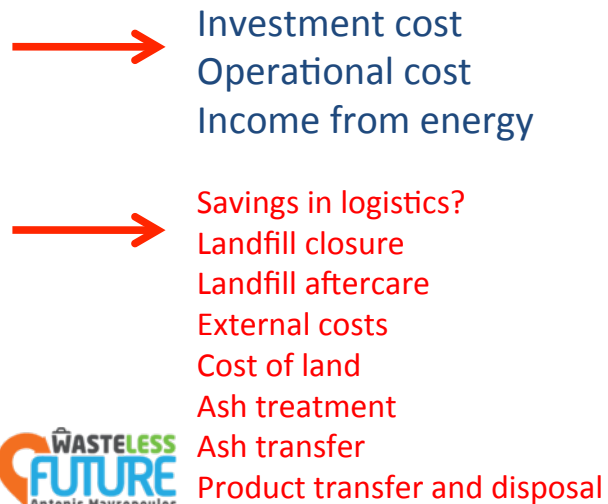
## Treatment & Disposal

- Ensure landfill capacity and use it as an asset
- **Go modular**
- Think in depth about WtE
- **Think about affordability**
- Think the system





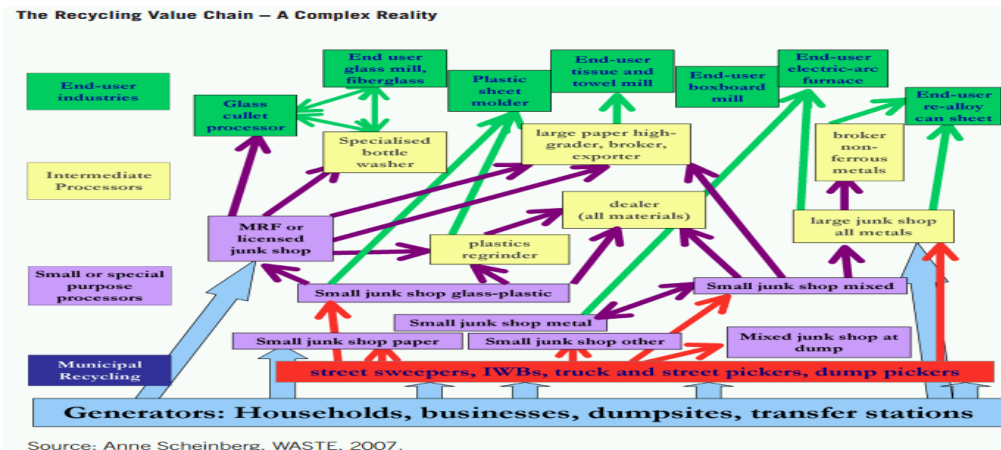
## Remember the iceberg



## How to deal with informal recyclers?

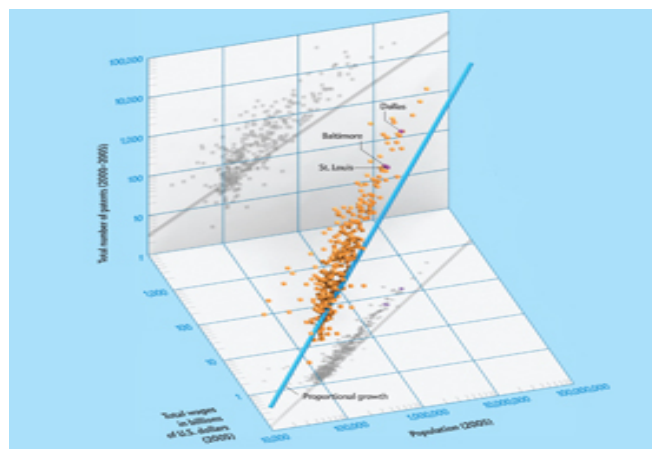


## Take care of the supply chains



## The other side of megacities

Source: Bigger cities do more with less, Luis Bettencourt, Geoffrey West, Sc. American, September 2011



<http://wastelessfuture.com>

**THANKS FOR YOUR ATTENTION**

