

# BudgetMap:

## Engaging Taxpayers in the Issue-Driven Classification of a Government Budget



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# Sewol Ferry Disaster

Apr 16, 2014,  
294 out of 476 people died





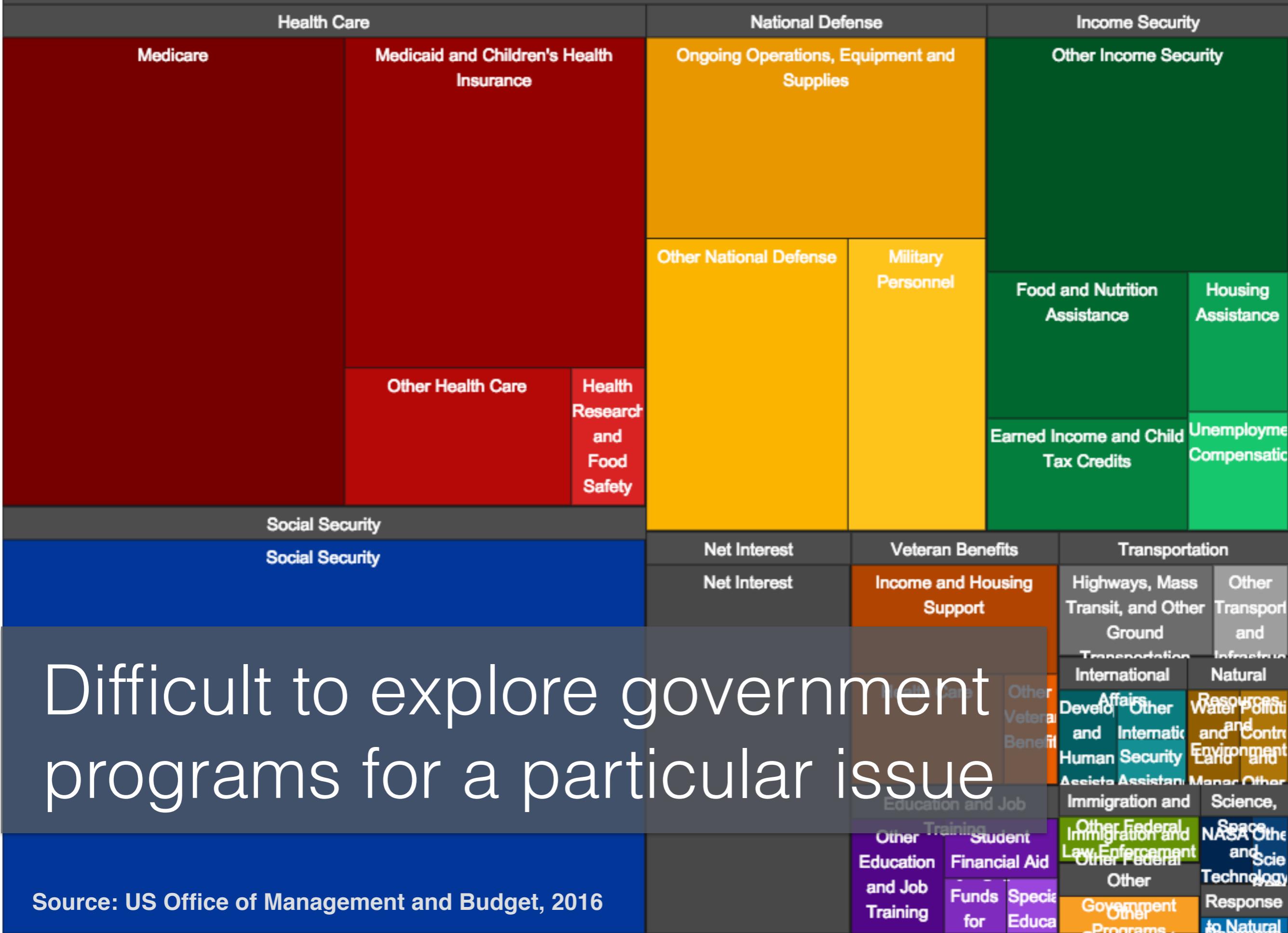
**325** of the passengers were  
secondary school **students** on a field trip.

# Public safety

A large crowd of people, mostly women, are holding up numerous black protest signs. Each sign features a large yellow ribbon at the top. Below the ribbon, the Korean text "더 이상 아이들을 죽이지 마라!" (No more children die!) is written in white. Some signs also include smaller text like "규명 처벌 임저라!" (Investigation and punishment) and "아이를 살피는 정부를 원합니다" (We want a government that cares about children).

Citizens became suspicious  
about where the government  
spends their taxes.

2016 outlays from the 2016 Budget, in millions of dollars



2016 outlays from the 2016 Budget, in millions of dollars



*“The traditional budget classification system is mainly designed for **administrative efficiency**. ”*

— A former congressman

# Open Government

*Simply opening up more budget information to the public may not be sufficient.*

Supporting  
the **navigation** of  
a government **budget**  
through **social issues**

# Supporting the **navigation** of a government **budget** through **social issues**

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**A social problem or conflict**  
raised by a society.

from Wikipedia

# Supporting the **navigation** of a government **budget** through **social issues**

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- Use **the language of the public**
- Reflect timely **public interests**

# Challenge

How can we **classify budget data** using **social issues**?

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- **Huge** amount of budget **data**
- Constantly **changing** social **issues**

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- Constantly **changing** social **issues**



**Unsustainable for a government**  
to handle this problem every time  
a new issue arises.

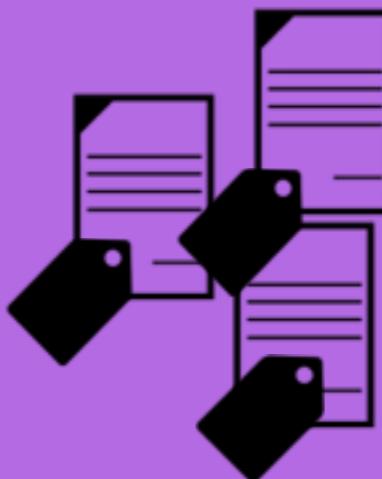
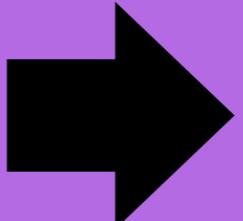
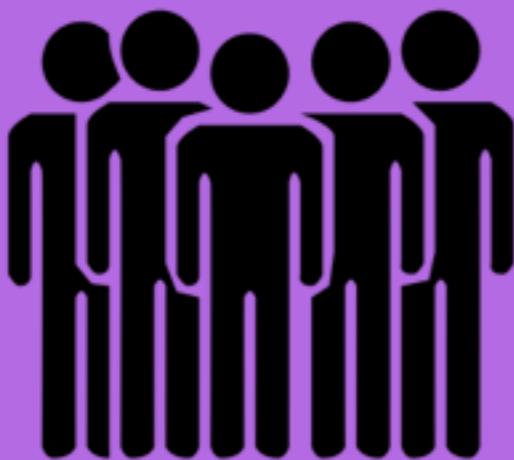
# Challenge

How can we **classify budget data** using **social Issues**?

- **Huge** amount of budget **data**
  - Constantly **changing** social **issues**
- Automated solution may not be able to understand **nuances in social issues.**

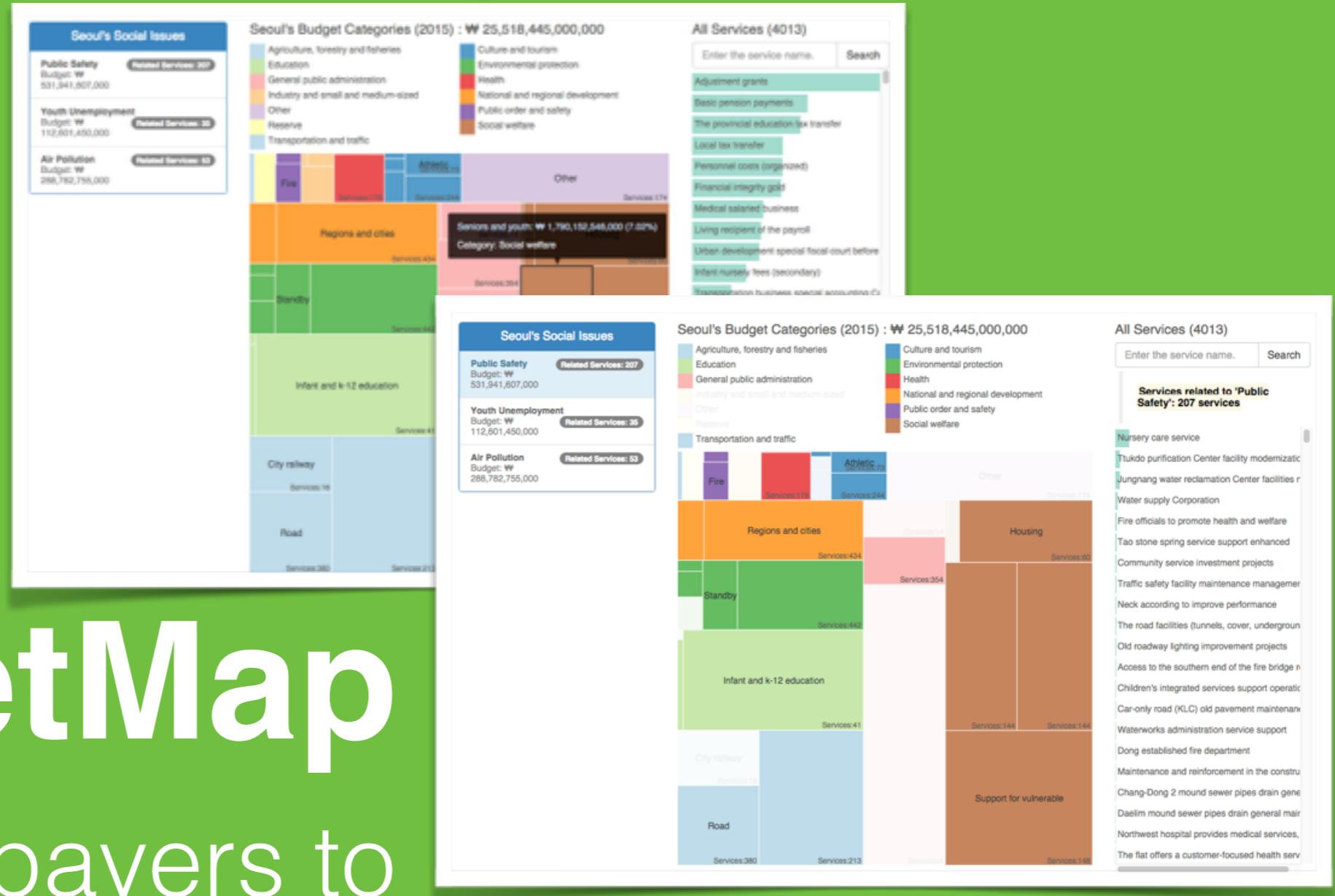
# Citizensourcing + Tagging

To turn to **taxpayers**  
to **classify** budget **programs**  
with **social issues**.



# BudgetMap

Solicits taxpayers to identify **issue-budget tags** and facilitates **visual exploration** of the tagged budget data

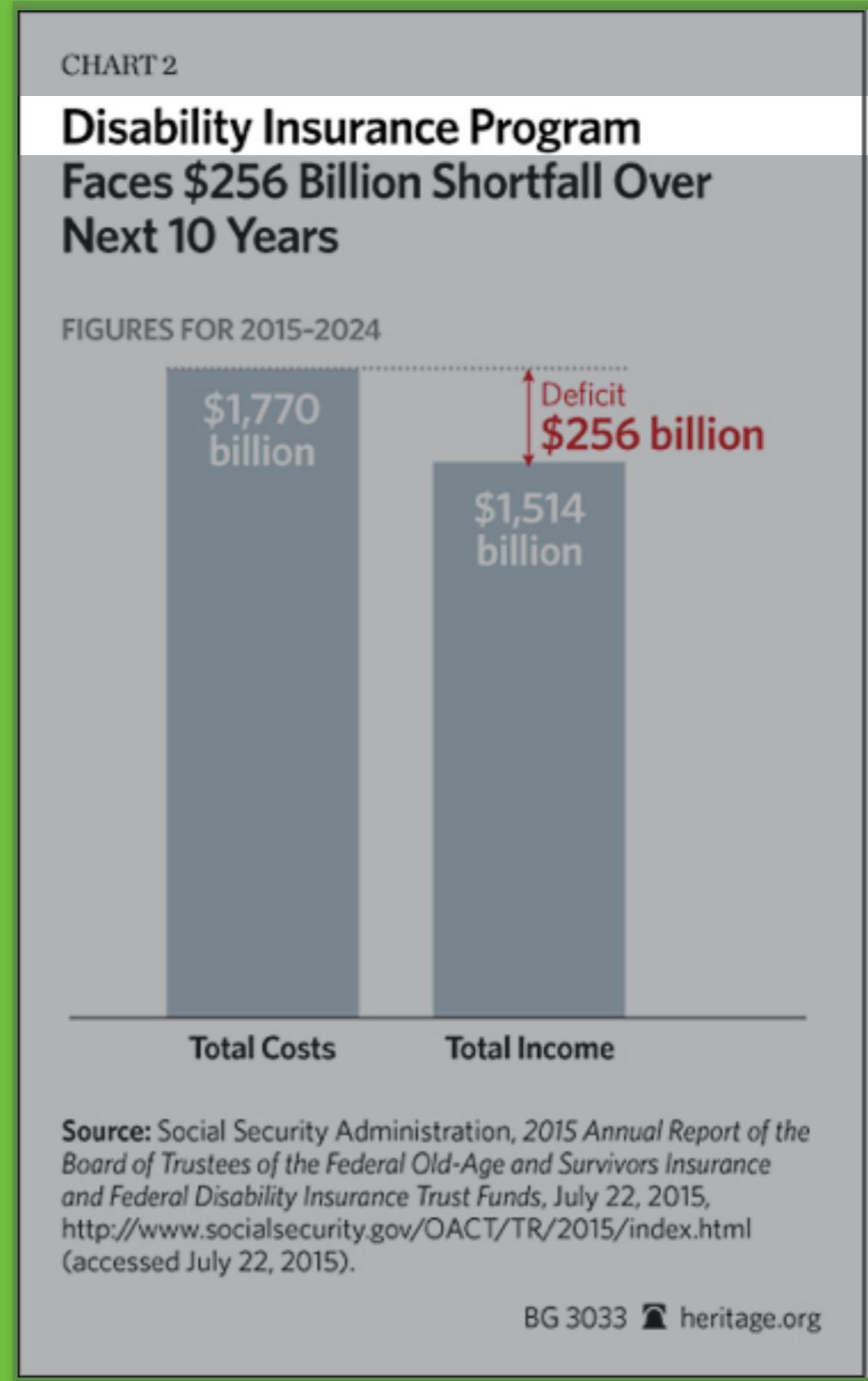


# Budget Data from the City of Seoul

Budget **spending** and  
Budget **categories** for  
4013 programs in 2015



**Program** is a unit of operating **budget** for a set of services.



# Social Issue

is a form of **tag** that may connect to multiple programs.



# Budget Data Model





# BudgetMap Tagging Interface

The screenshot shows the BudgetMap Tagging Interface. On the left, a sidebar menu includes 'Experiment Guide', 'Start Issue Tagging' (which is highlighted in dark grey), 'Browse Tags by Issues', 'My Profile', and 'Logout'. Below this, a red box displays 'Your Rank: 124' and '(Top ranked user tagged: 12522)'. The main content area has a blue header 'Public Safety' with the sub-instruction 'Find Related/Unrelated Budget Programs.' Below the header, a text block explains how tagging relates to budget programs. Two examples are shown in boxes: one for 'Homecare Support for Disabled Women' and another for 'Mok-dong & Sinjeong-dong Sewage Pipe Line Maintenance.'

**"Public Safety"**  
Find Related/Unrelated Budget Programs.

For instance, if you think "Fire Department Vehicle Maintenance" program is related to "Public Safety", click "Related". It is also important to find "Unrelated" programs in order to aggregate total budget for an issue. Your contribution is calculated based on the number of programs you tagged.

Social Welfare > Vulnerable Group Support > Support for Disabled > Support for Local Disabled Community

Homecare Support for Disabled Women **≈ \$0.85M**

Related  Unclear  Unrelated

Environmental Protection > Water Supply Sewage > Sewerage Management > Sewage Pipe Line Repair

Mok-dong & Sinjeong-dong Sewage Pipe Line Maintenance. **≈ \$1.50K**

Related  Unclear  Unrelated

# BudgetMap Tagging Interface

The screenshot shows the BudgetMap Tagging Interface. On the left, a sidebar menu includes 'Experiment Guide', 'Start Issue Tagging' (which is highlighted in a dark grey bar), 'Browse Tags by Issues', 'My Profile', 'Logout', 'Your Rank: 124', and '(Top ranked user tagged: 12522)'. The main content area has a blue header box with the text '"Public Safety"' and 'Find Related/Unrelated Budget Programs.' Below this, a large white text box contains the instruction: 'Explore randomly selected budget programs'. To the right of this text box are two program cards. The first card is for 'Homecare Support for Disabled Women ≈ \$0.85M' and the second is for 'Mok-dong & Sinjeong-dong Sewage Pipe Line Maintenance. ≈ \$1.50K'. Each card shows a path from 'Social Welfare' down to the specific program. Under each program name, there is a set of three radio buttons labeled 'Related', 'Unclear', and 'Unrelated'. A yellow arrow points downwards from the bottom of the second program card towards the text 'and the list goes on' at the bottom.

Experiment Guide

Start Issue Tagging

Browse Tags by Issues

My Profile

Logout

Your Rank: 124

(Top ranked user tagged:  
12522)

"Public Safety"

Find Related/Unrelated Budget Programs.

Explore randomly selected budget programs

Social Welfare > Vulnerable Group Support > Support for Disabled > Support for Local Disabled Community

Homecare Support for Disabled Women ≈ \$0.85M

Related  Unclear  Unrelated

Environmental Protection > Water Supply Sewage > Sewerage Management > Sewage Pipe Line Repair

Mok-dong & Sinjeong-dong Sewage Pipe Line Maintenance. ≈ \$1.50K

Related  Unclear  Unrelated

and the list goes on

# Majority Voting

**Issue**

Public Safety



**Program**

Special Rescue  
Team Operation

# Majority Voting

**Issue**

Public Safety



**Program**

Special Rescue  
Team Operation

**Related if**

'Related' Tags



**10** people

'Unrelated' Tags



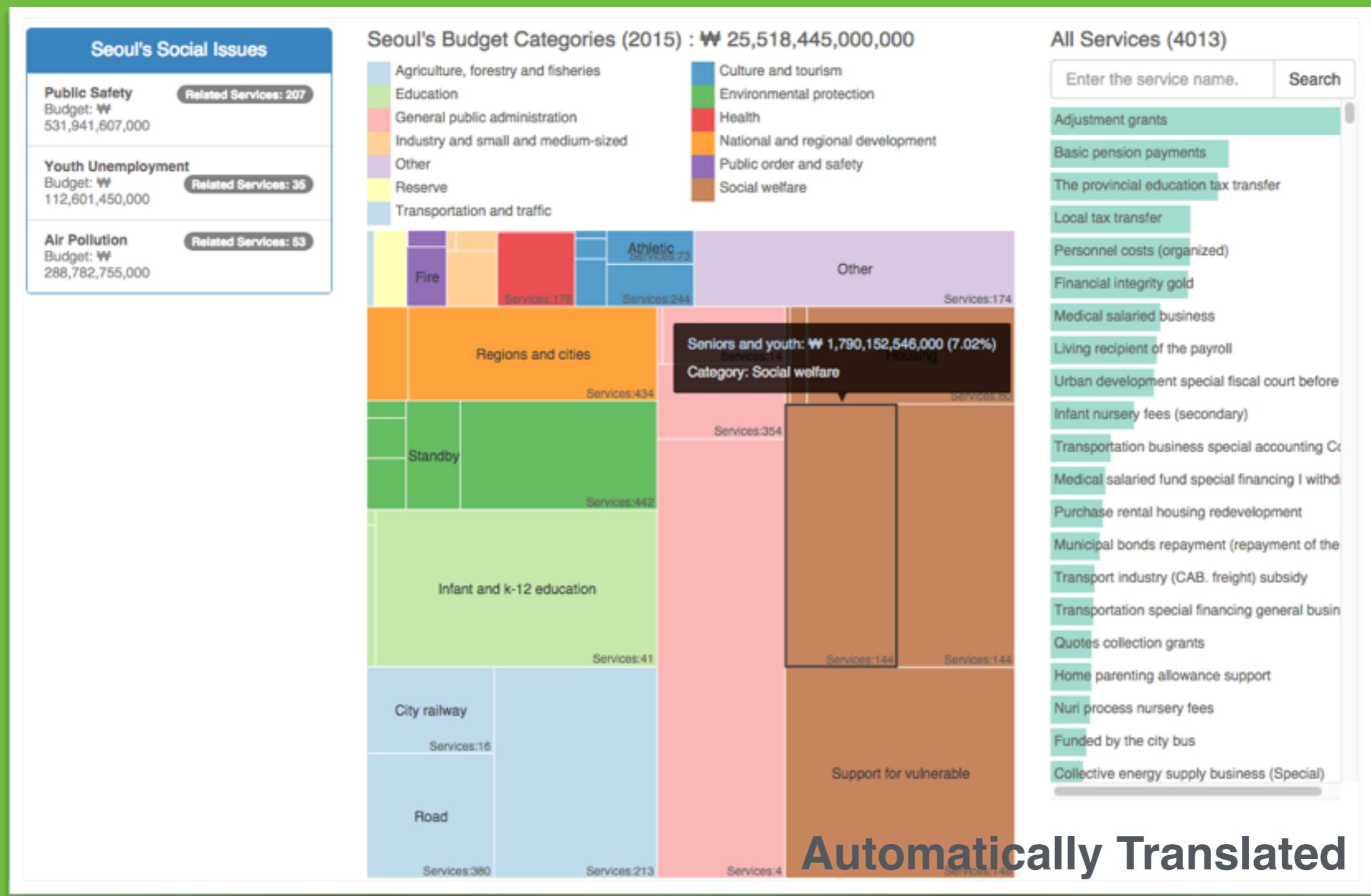
**5** people

>

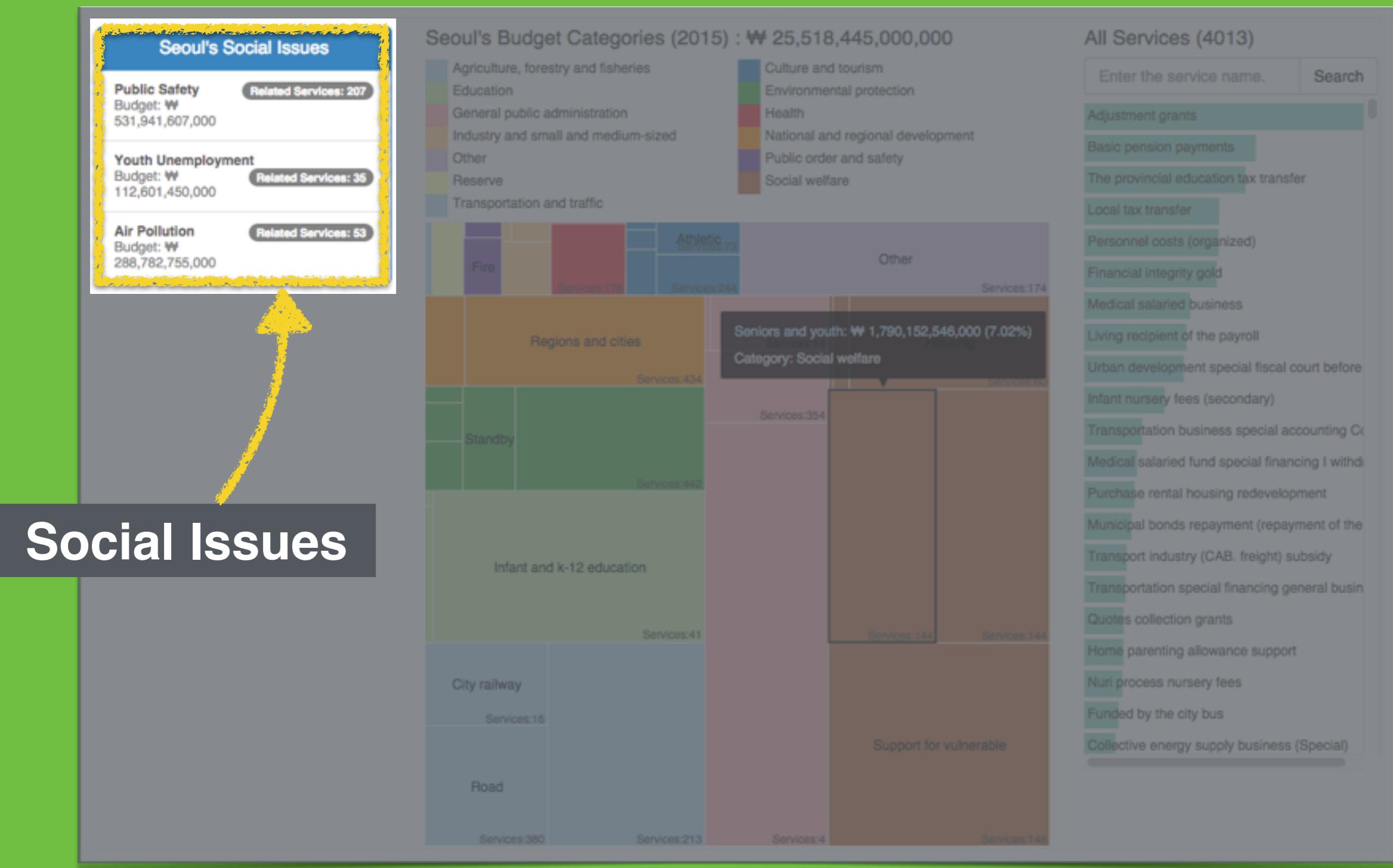
+

Threshold (x)  
e.g., **x=3**

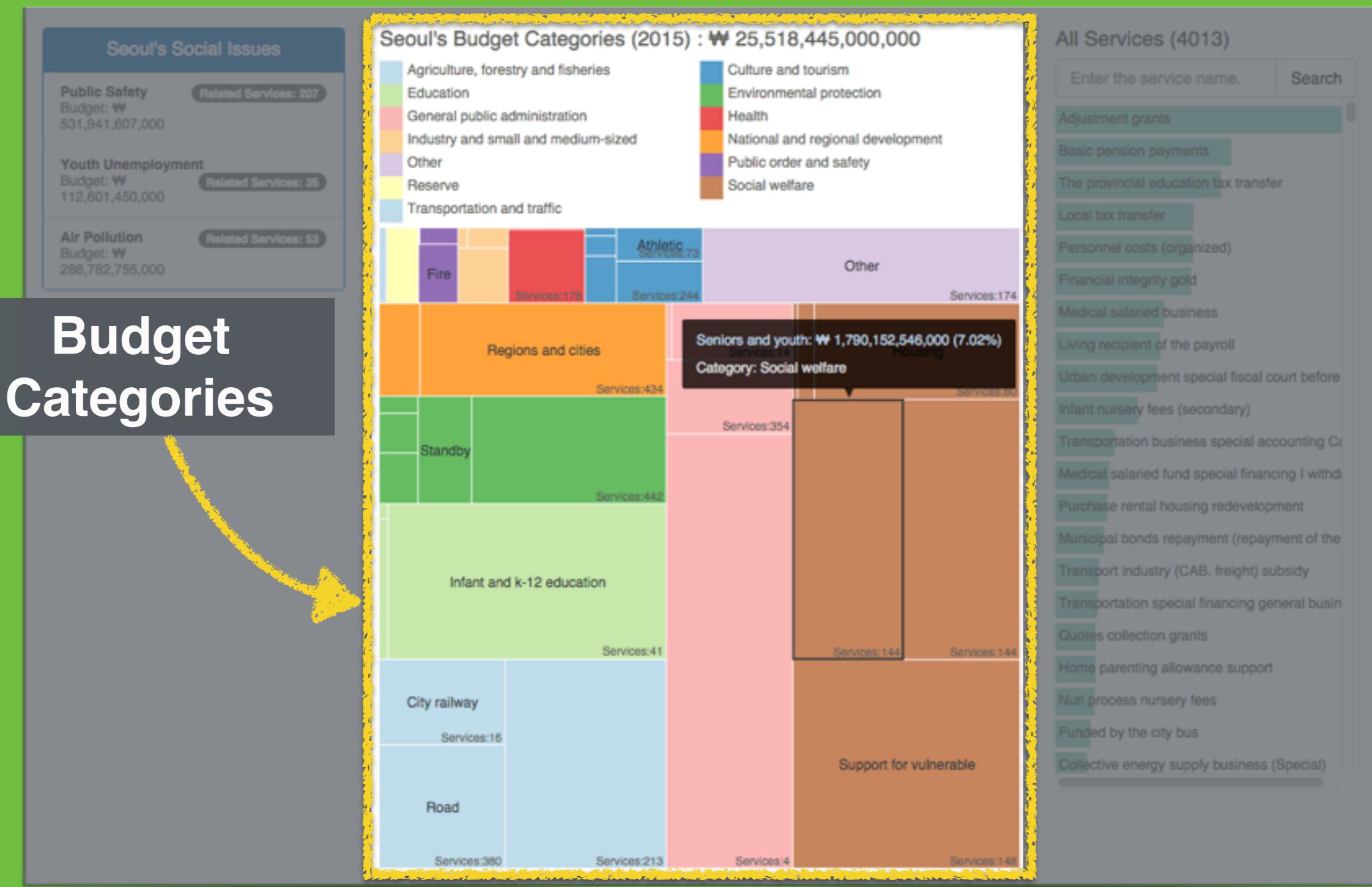
# BudgetMap Visualization



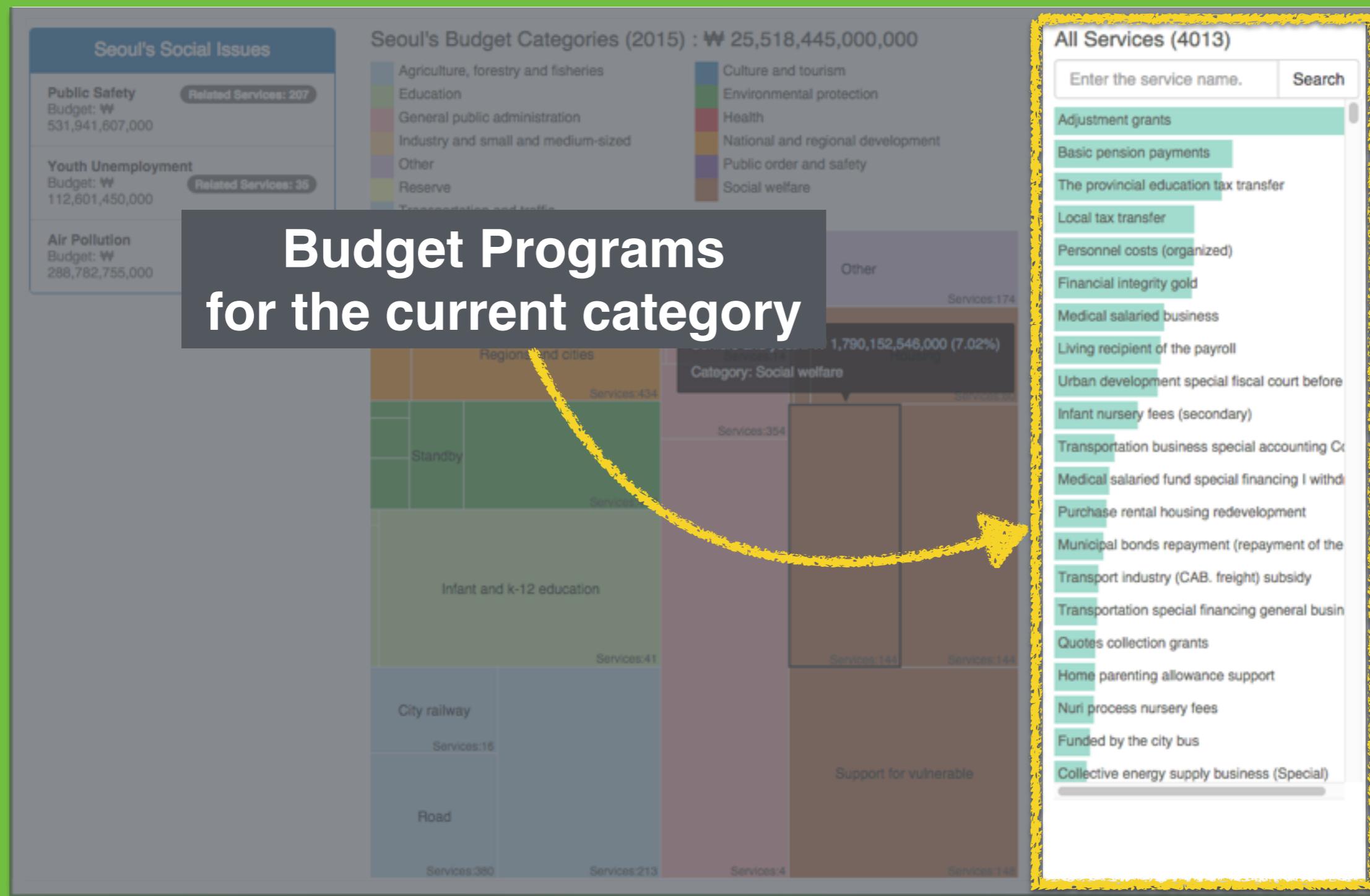
# BudgetMap Visualization



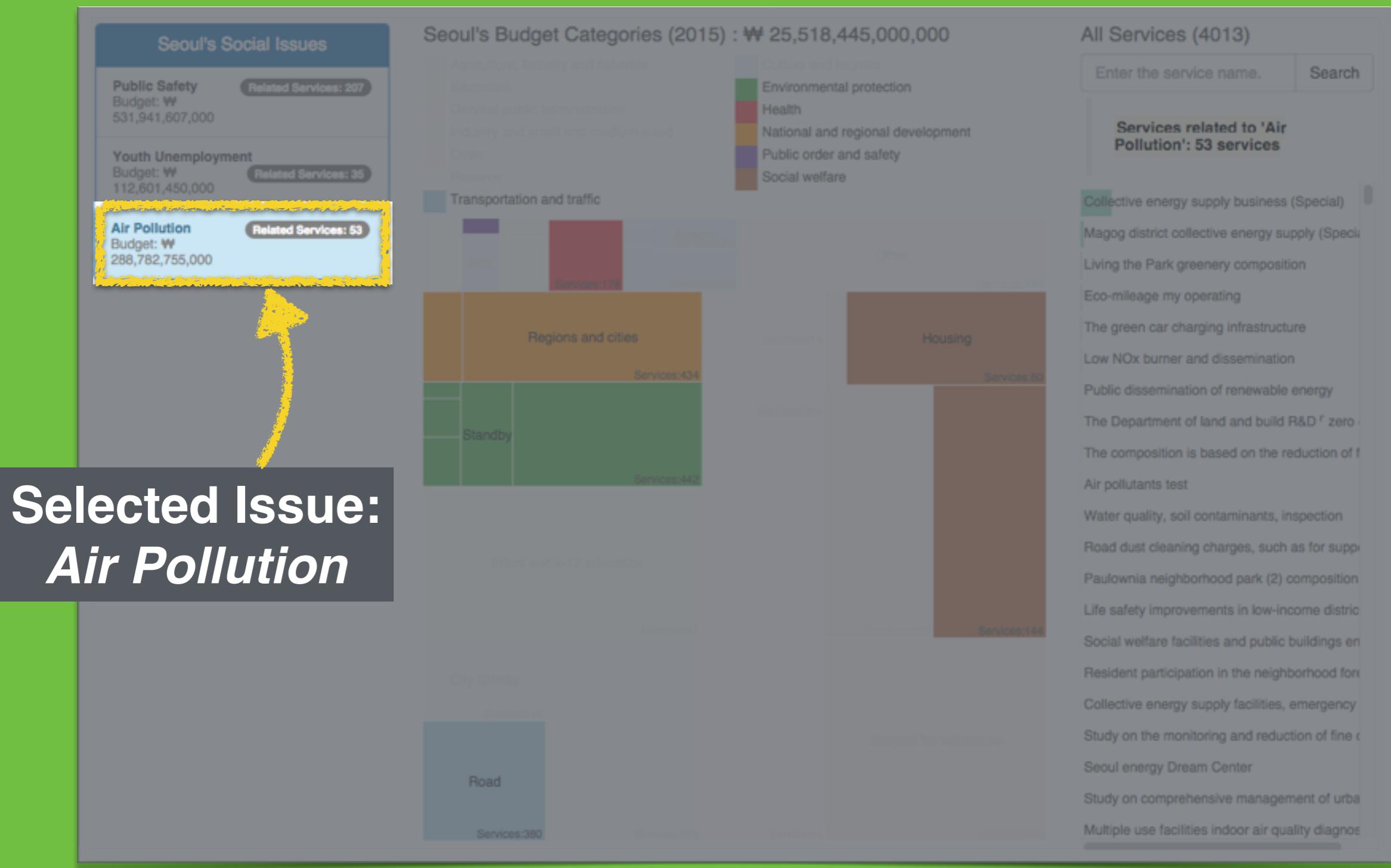
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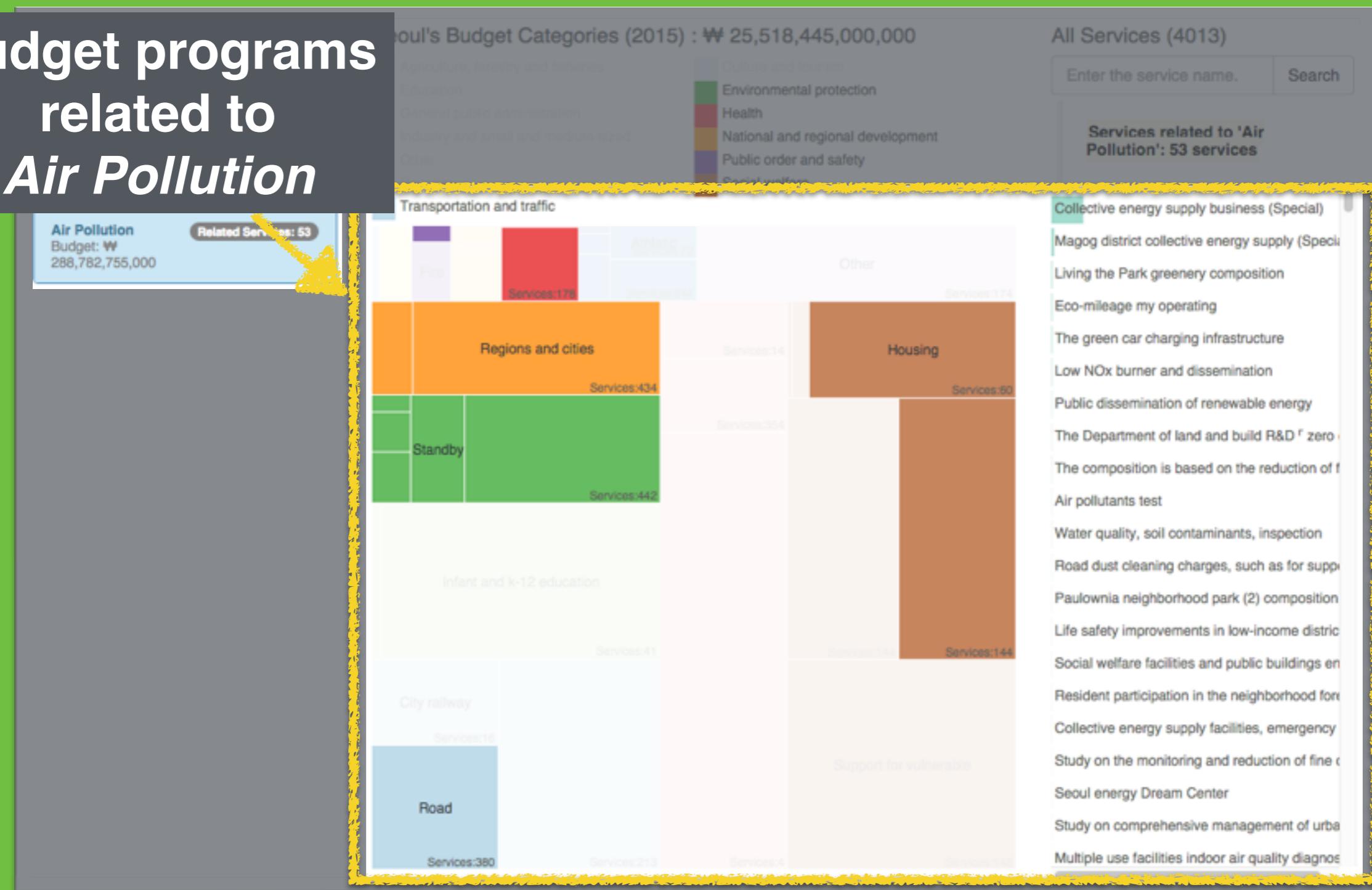


# BudgetMap Visualization

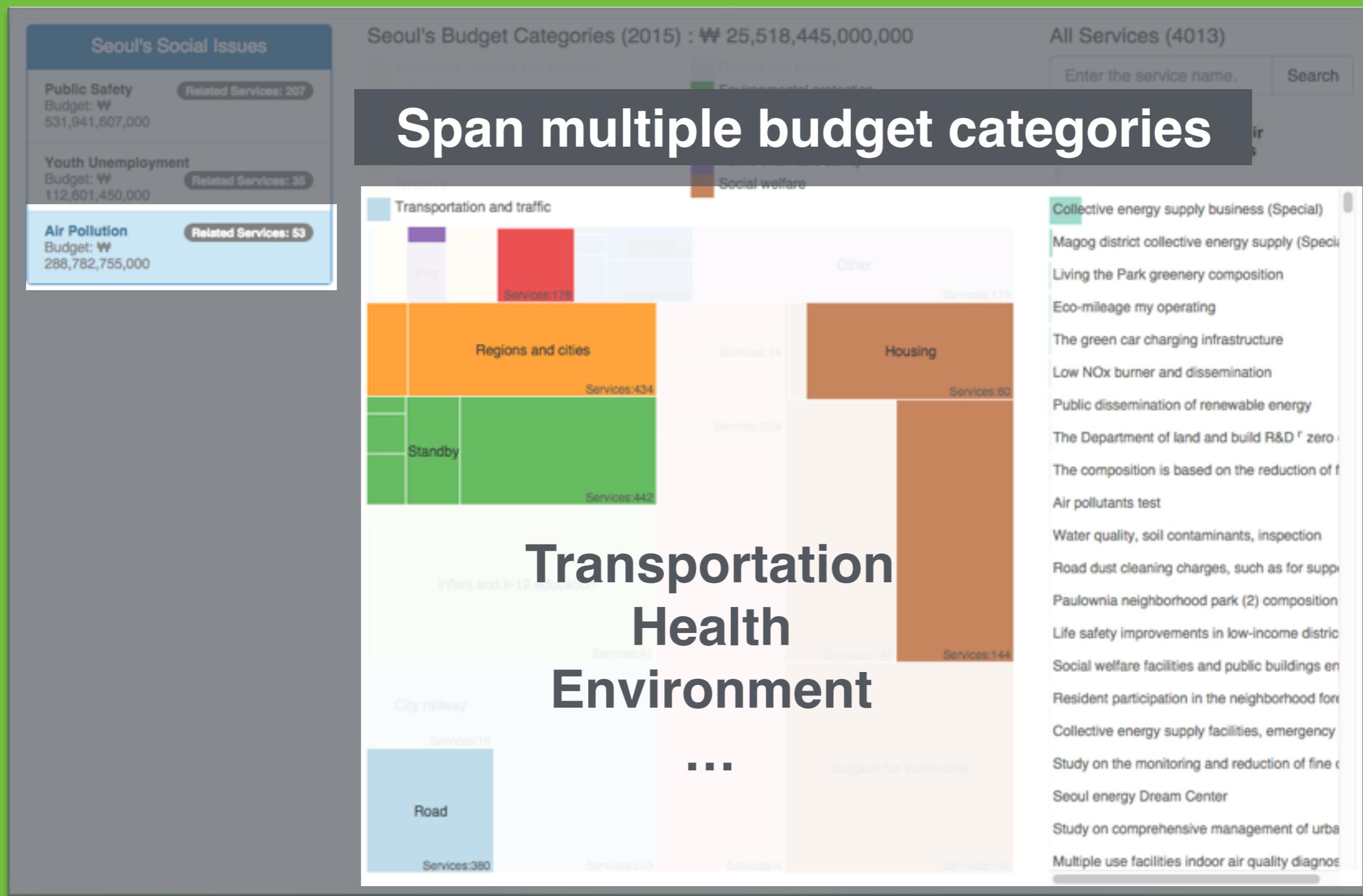


# BudgetMap Visualization

Budget programs  
related to  
*Air Pollution*



# BudgetMap Visualization



# **Evaluation**

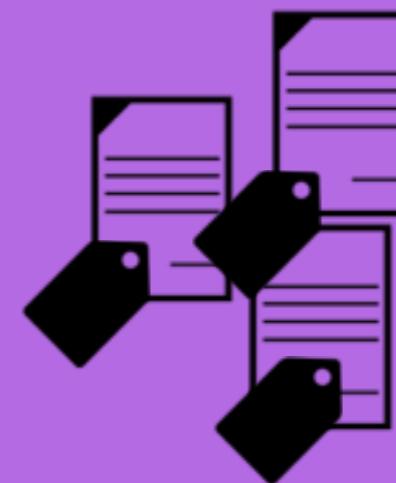
**Tagging results and  
perception changes after  
tagging tasks**

# Evaluation: Procedure

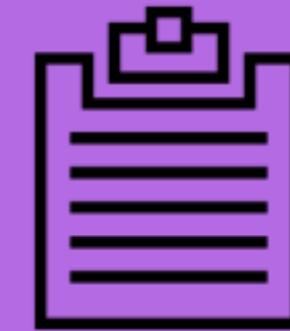
**Pre-task  
Survey**



**Tagging  
Task**



**Post-task  
Survey**

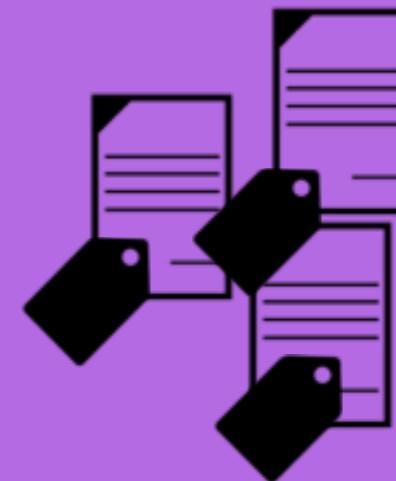


## Evaluation: Procedure

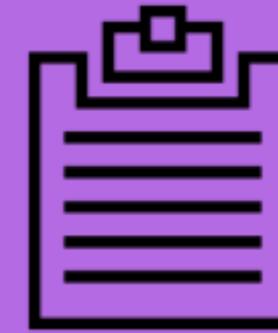
**Pre-task  
Survey**



**Tagging  
Task**



**Post-task  
Survey**



**+ Interviews with budget experts**

## Evaluation: Procedure

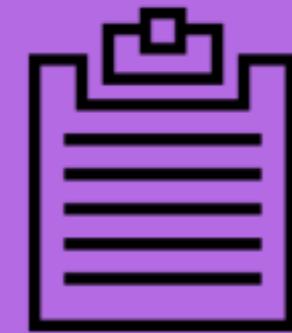
**Pre-task  
Survey**



**Tagging  
Task**



**Post-task  
Survey**



**+ Interviews with budget experts**

**Paid for participation**

## Evaluation: Procedure

### Pre-task Survey



### Tagging Task



### Post-task Survey



**Informedness & perspective** on the city's budget.

## Evaluation: Procedure

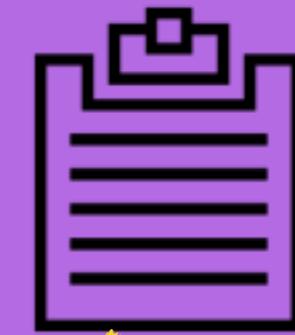
Pre-task  
Survey



Tagging  
Task



Post-task  
Survey



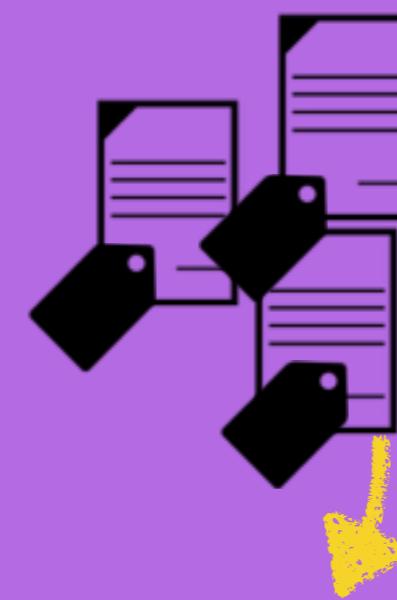
**Changes in informedness & perspective**  
on the city's budget.

## Evaluation: Procedure

### Pre-task Survey



### Tagging Task



### Post-task Survey



Tagging budget programs with:

- 1) ***public safety***,
- 2) ***air pollution***, and
- 3) ***youth unemployment***.

## Evaluation: Tag Results

**104 citizens** participated through online communities & social media, generated **730 tags** per participant.

## Evaluation: Tag Results

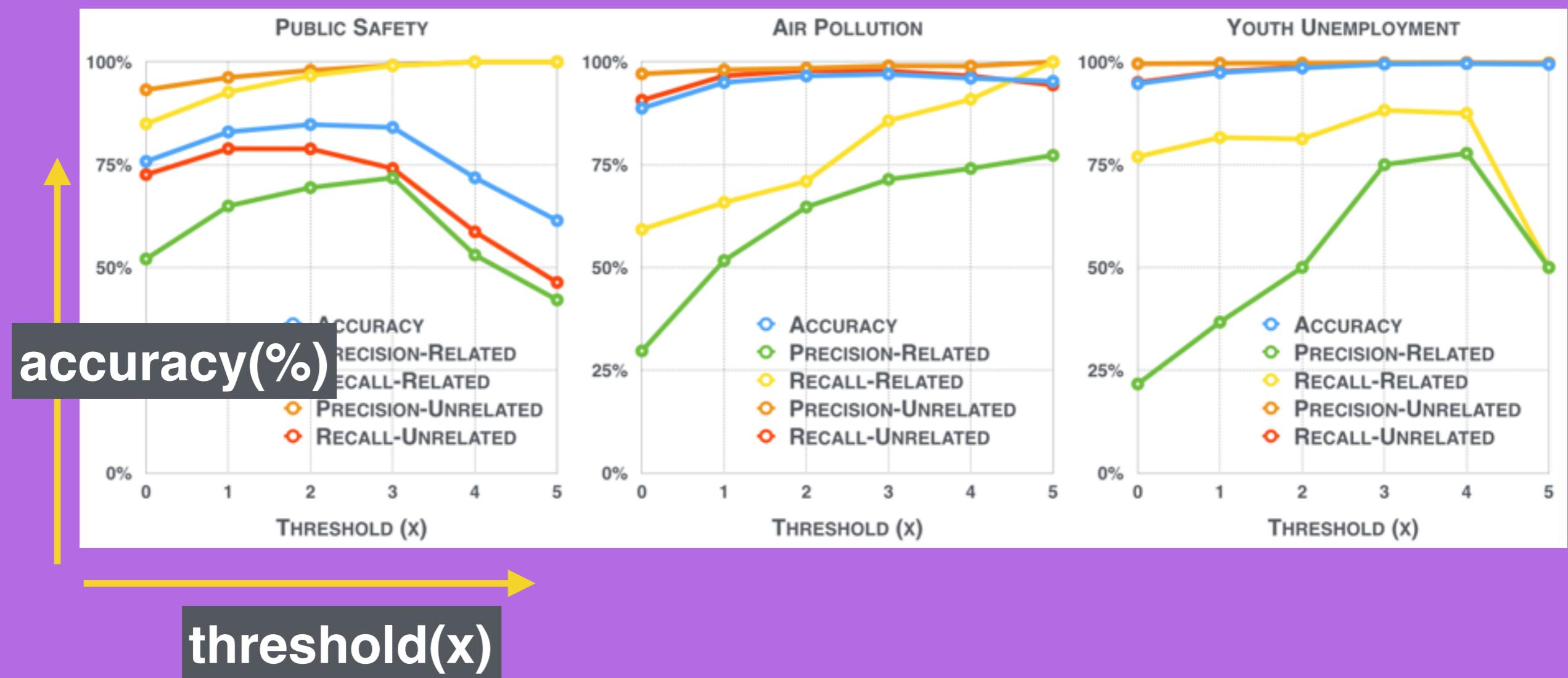
**104 citizens** participated through online communities & social media, generated **730 tags per participant.**

Compared with a **reference solution** constructed by 3 budget experts

## Evaluation: Tag Results

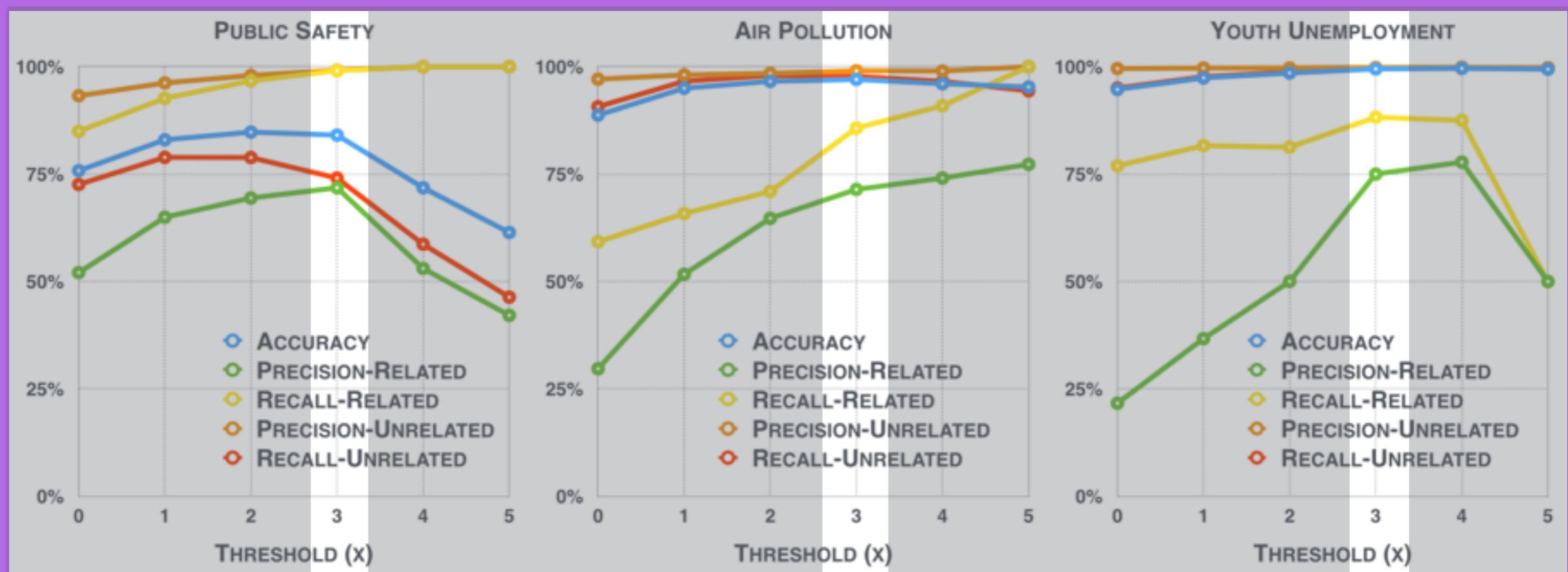
Evaluated by varying the **threshold (x)** in the **majority voting** formula:

'Related' Tags > 'Unrelated' Tags + threshold (x)



## Evaluation: Tag Results

84% ( $x=3$ ) of the issue-budget **tags** were **correctly matched** to the **reference solution**.



# Coverage of Participants' Tags



*Public Safety:*

**7% (843 tags)**

*Air Pollution:*

**14% (1685 tags)**

*Youth Unemployment:*

**33% (3973 tags)**

**Out of Total Possible Tags**

**3 issues x 4,013 programs = 12,039 tags**

People are capable of  
contributing  
**expert-quality tags**

Participants' level of **informedness** significantly **improved** after tagging tasks

“I know in which budget programs Seoul’s tax revenues are spent.”

Their **perspective** on government spending **marginally improved**, remaining on the **negative** side.

“The city government is executing its budget in the right direction regarding public safety.”

People gain  
**informational benefits** from doing  
tagging tasks.

# Lessons

**Confirmed** the  
**Feasibility** of  
Issue-Driven Approach

*“We encounter social **issues in our daily lives**. They made it easier for me to evaluate the suitability of budget programs.” — p045*

*“Understanding government budget spending through issues would be effective in **solving social problems.**”*

— p026

*“The issue-driven approach would be more **intuitive to the general public.**”*

— Officer in the Seoul government

# More importantly,

*By looking into  
the **differences** among **tags***

**No ground truth for  
issue-program tags**

**Individuals have  
different perspectives**

Dealing with  
**opinionated crowds**  
calls for a different  
kind of quality control.

**Important to  
incorporate  
diverse,  
contextual, and  
localized viewpoints**

# Limitations & Future Work

*Allow people to create new issues  
& Live deployment  
& Data spanning multiple years*

# BudgetMap is a step toward participatory democracy

Leverage open  
government data



Build systems for  
civic engagement



Improve awareness  
on budgetary issues



Make  
Government  
Great  
Again!



## Seoul's Social Issues

Public Safety	Budget: ₩ 531,941,607,000	Related Services: 207
Youth Unemployment	Budget: ₩ 112,601,450,000	Related Services: 35
Air Pollution	Budget: ₩ 268,782,755,000	Related Services: 53

## Seoul's Budget Categories (2015) : ₩ 25,518,445,000,000



## All Services (4012)



# BUDGETWISER

POLICY MAKING AS A PUBLIC-DRIVEN PROCESS

# budgetwiser.org

- 1. 20 stone spring service support enhanced
- 2. Community service investment projects
- 3. Traffic safety facility maintenance management
- 4. Neck according to improve performance
- 5. The road facilities (tunnels, cover, underground)
- 6. Old roadway lighting improvement projects
- 7. Access to the southern end of the fire bridge n
- 8. Children's integrated services support operation
- 9. Car-only road (KLC) old pavement maintenance
- 10. Waterworks administration service support
- 11. Dong established fire department
- 12. Maintenance and reinforcement in the constru
- 13. Chang-Dong 2 mound sewer pipes drain gene
- 14. Daeilim mound sewer pipes drain general main
- 15. Northwest hospital provides medical services,
- 16. The flat offers a customer-focused health serv

# Thank you

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