Disaster Mitigation Planning Support System based on GIS

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My speciality: urban planning,
planning support system
vulnerability assessment theory,
especially vulnerability to urban fire spread

Self-introduction

- Urban Planning of Urban Engineering Dept.
- Two different approaches
  - **Extreme practical approach**
    - I work like an administrative officer, or urban planning consultant
      - Discussing community-based urban plan with the residents
      - Collaborating on a plan or practical researches with officers and consultants
  - **Extreme theoretical approach**
    - Analysis on urban disaster phenomena, especially urban fire spread.
    - Development of vulnerability assessment and damage estimation method
    - Using Percolation theory, Complex science, Multi agent system, etc.
- My characteristic:
  - **This balance of these two different approaches**

Content of this presentation

- Introduction to some systems our team developed
  - **Community-based urban mitigation planning support system**
  - **Urban earthquake disaster mitigation and response planning support system for a local government**
  - **Urban flood disaster mitigation planning support system for a local government and citizens in vast flood plain**

our group consists of :

an academic researcher

information system engineers (private company)

consultants of urban planning and urban mitigation planning (private company)

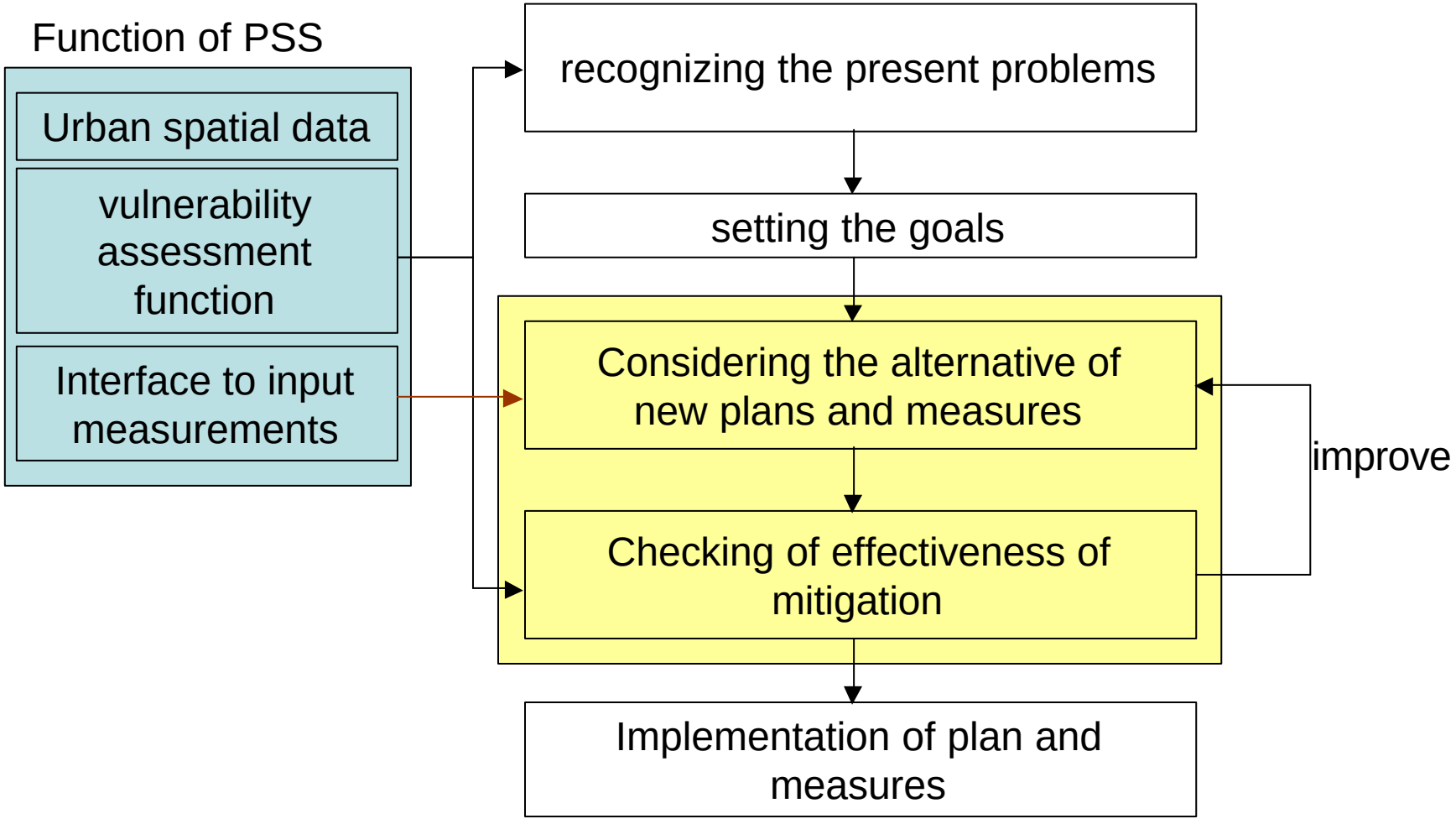
The common frame of the planning support system

-the main three function of the systems -

- **Urban spatial database**
  - ground information: ground structure, soil
  - Urban spatial information: infrastructures, buildings, land use, population
  - etc.
- **vulnerability analysis function or simulator**
  - building vulnerability analysis function
  - Urban fire spread simulation
  - ability assessment of post-disaster response activities
  - etc.
- **interface to input an alternative plan or countermeasure**
  - For example,
    - input a new road plan, and urban renewal plan,
    - evacuation and shelter plan, etc.

The common frame of the planning support system

-What can we do in the system?-



Optimization of countermeasures

Drafting the best measures corresponding with each district characteristics

The common frame of the planning support system

-the roles of PSS in the process of planning or decision-making -

- Users:
  - **all participants in the planning process**
    - planners, administration officers, and residents
    - decision-maker, and citizens
- As a tool to
  - **Make a plan and a countermeasure**
  - **Share common perception of hazard or risk**
  - **Communicate**
    - With planners, administration officers, and residents
    - With decision-maker, and citizens

Community-based urban mitigation planning support system

1995 Hanshin-Awaji earthquake disaster

Community-based urban mitigation planning support system

- Problem
  - Densely wooden houses packed built-up area

1995 Hanshin-Awaji earthquake disaster

Community-based urban planning support system

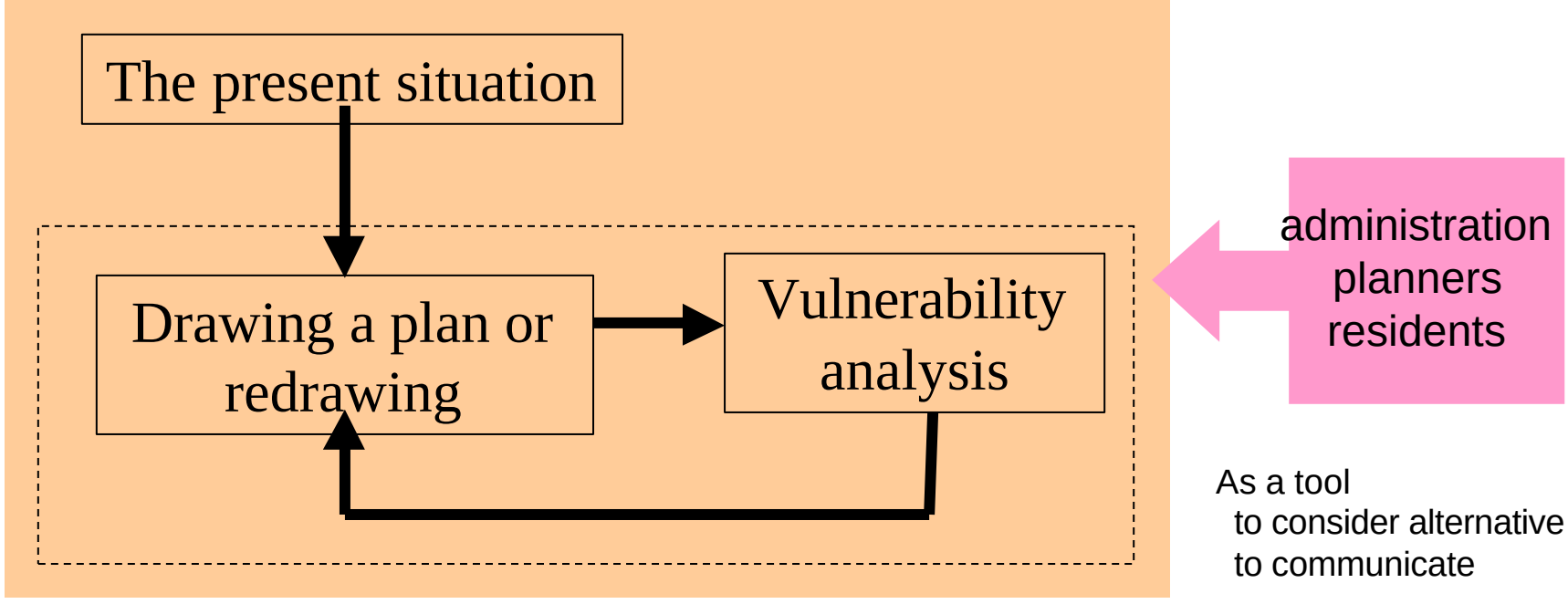
- Lessens we learned from the urban planning viewpoint
  - We can ensure our safety by improvement on a scale of district. For example,
    - improvement of Houses in fire resistance and earthquake-resistance
    - widening of narrow streets and strengthening of road network function in a district
    - Creation of open space in a district as an evacuation area and a base of post-disaster response activities.

? community-based mitigation urban plan

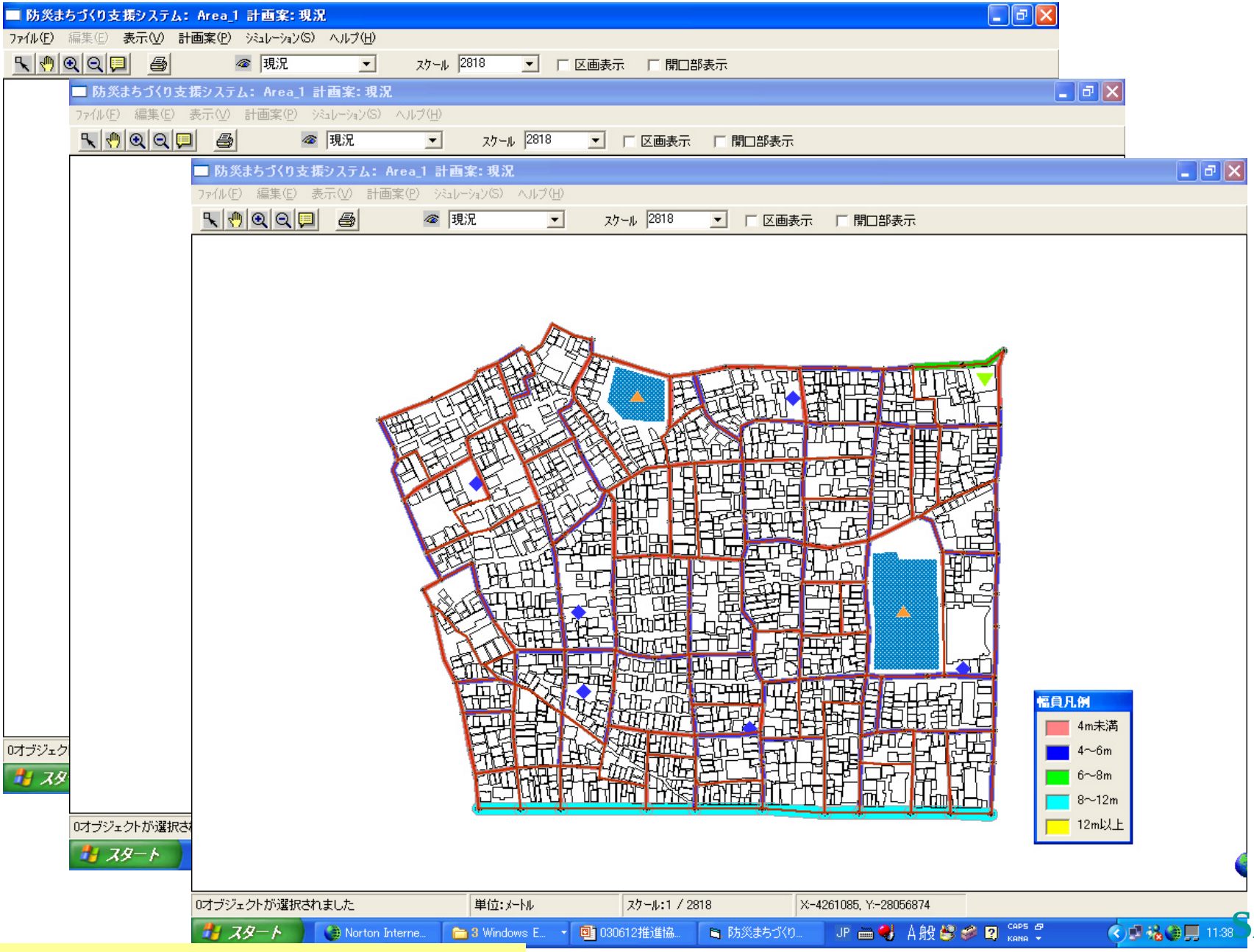
- Based on community participation
- Needed to collaborate with all participants

Community-based urban mitigation planning support system

- We can understand the present situation.
- We can understand the vulnerability to earthquake.
- We can draw the new urban plan on GIS.

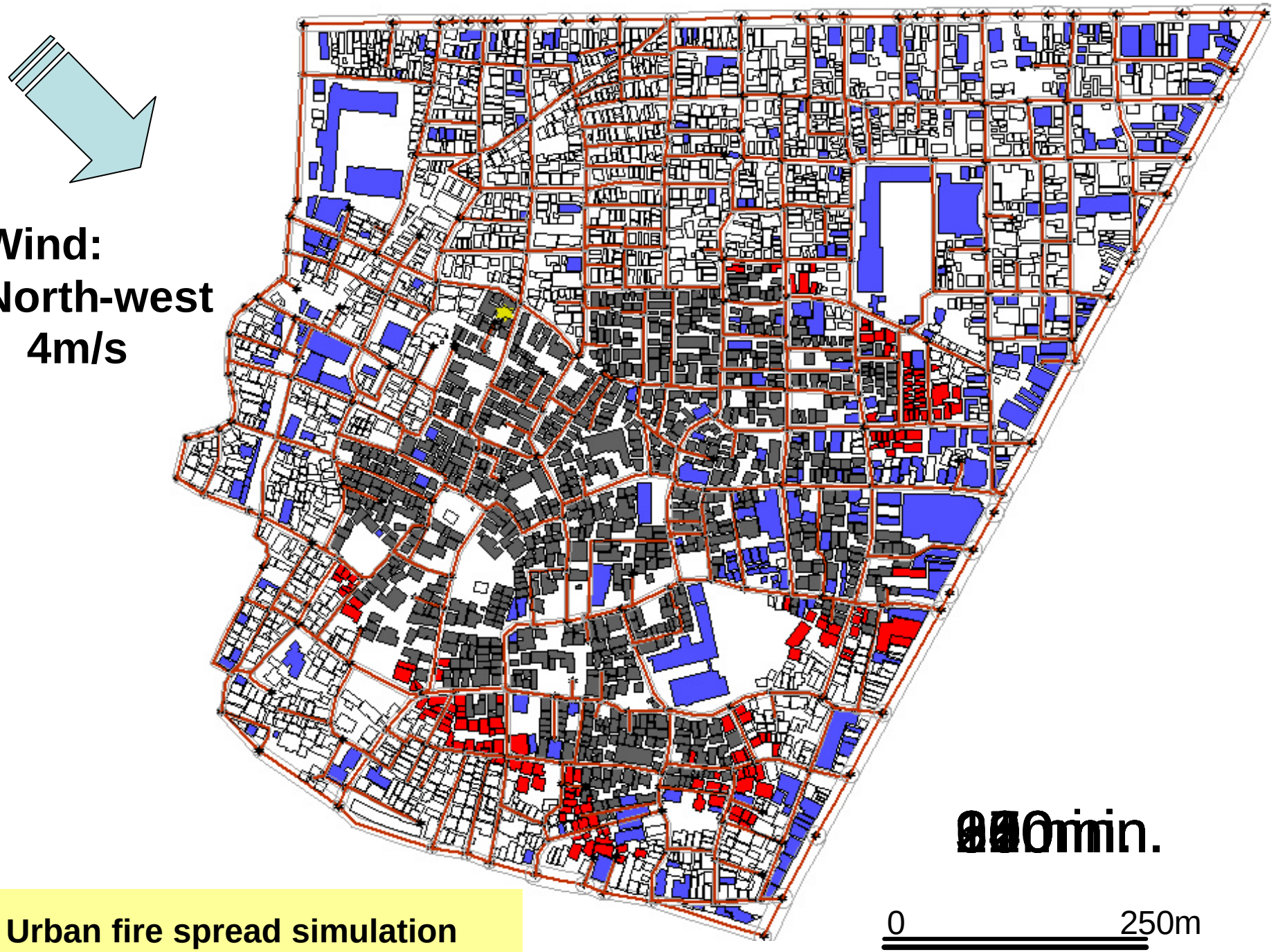


We can consider alternative, checking effectiveness of mitigation.
We can draw better plan corresponding with local characteristics

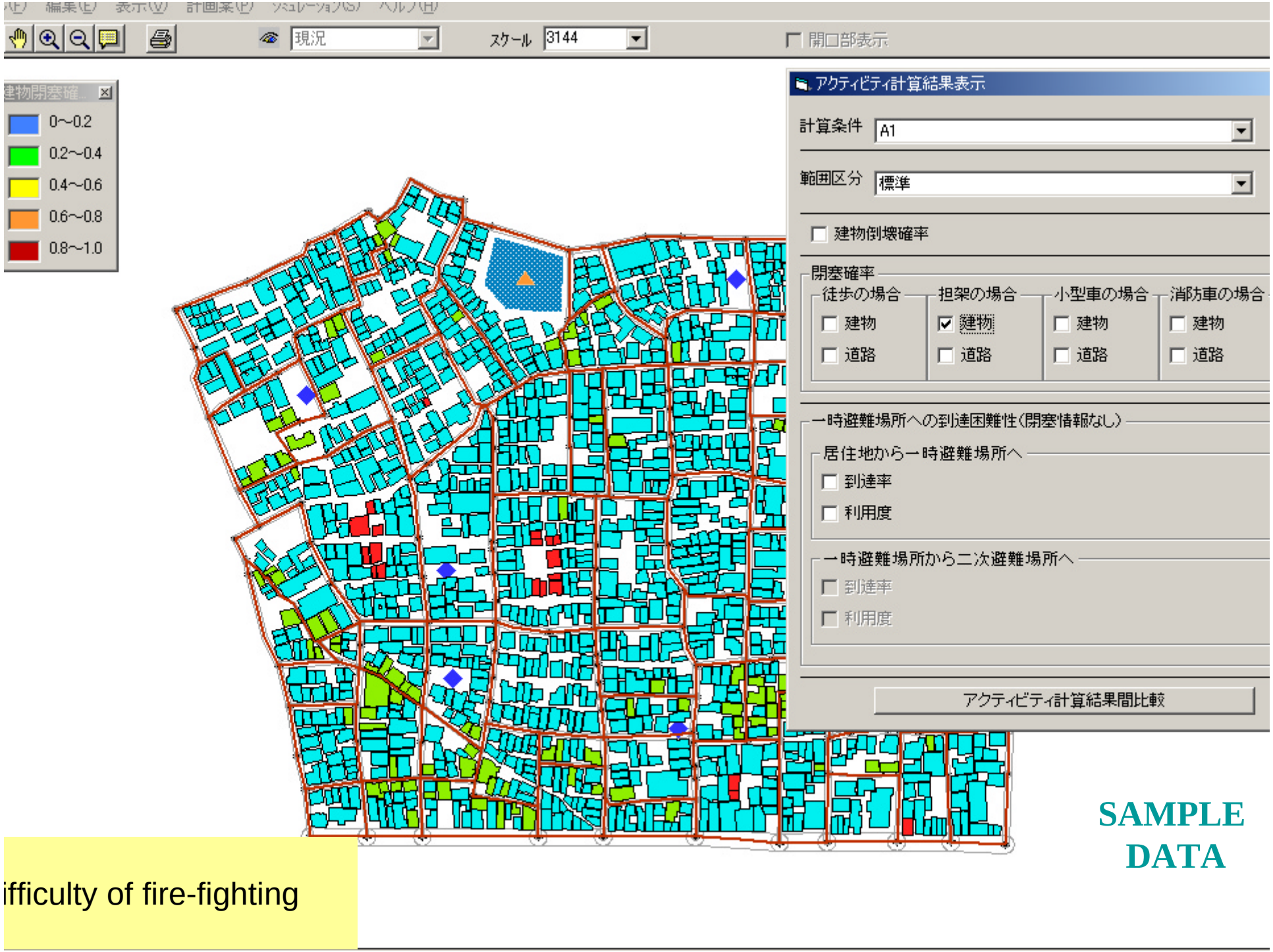


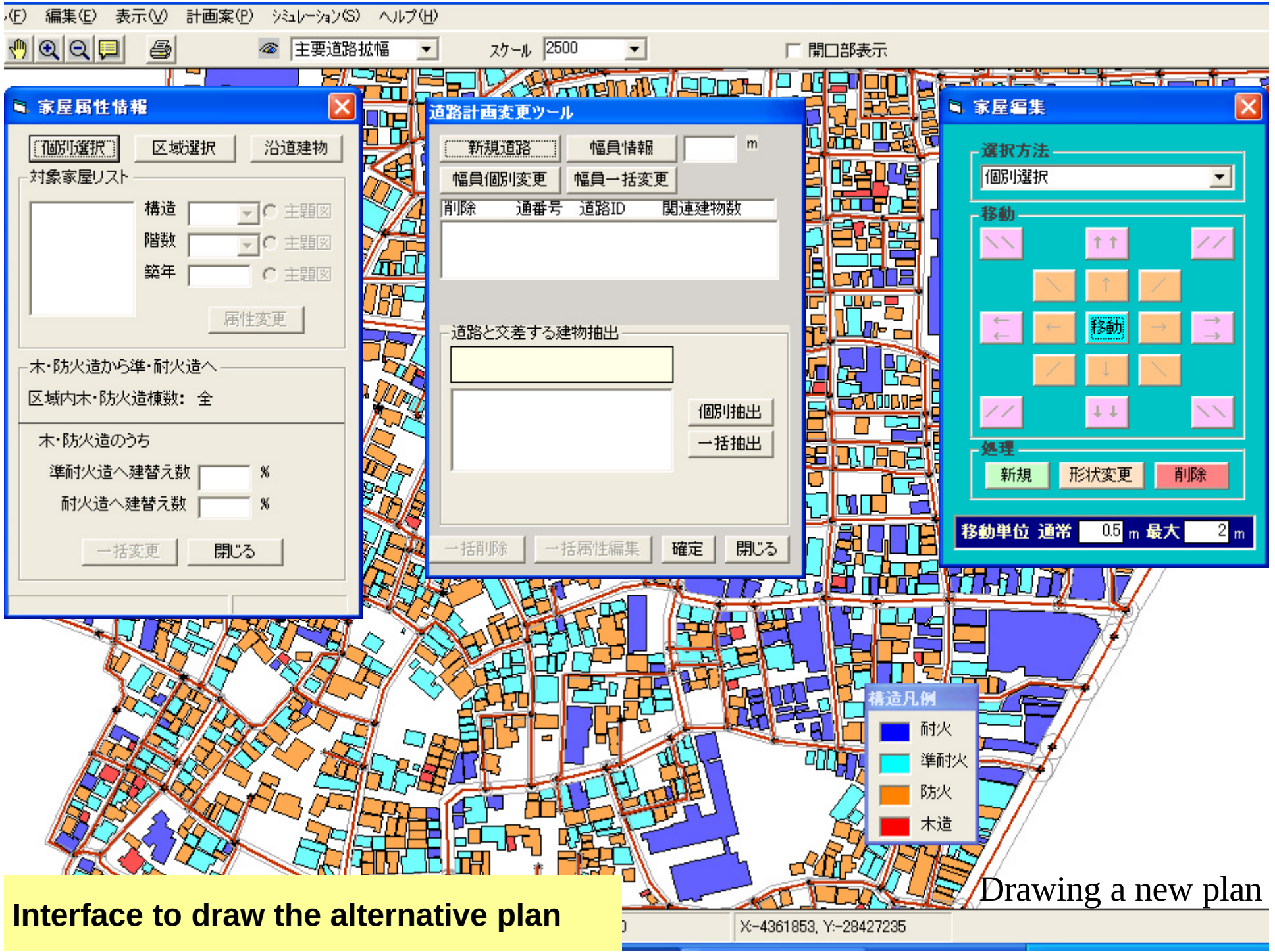
The present situation analysis

SAMPLE



Urban fire spread simulation

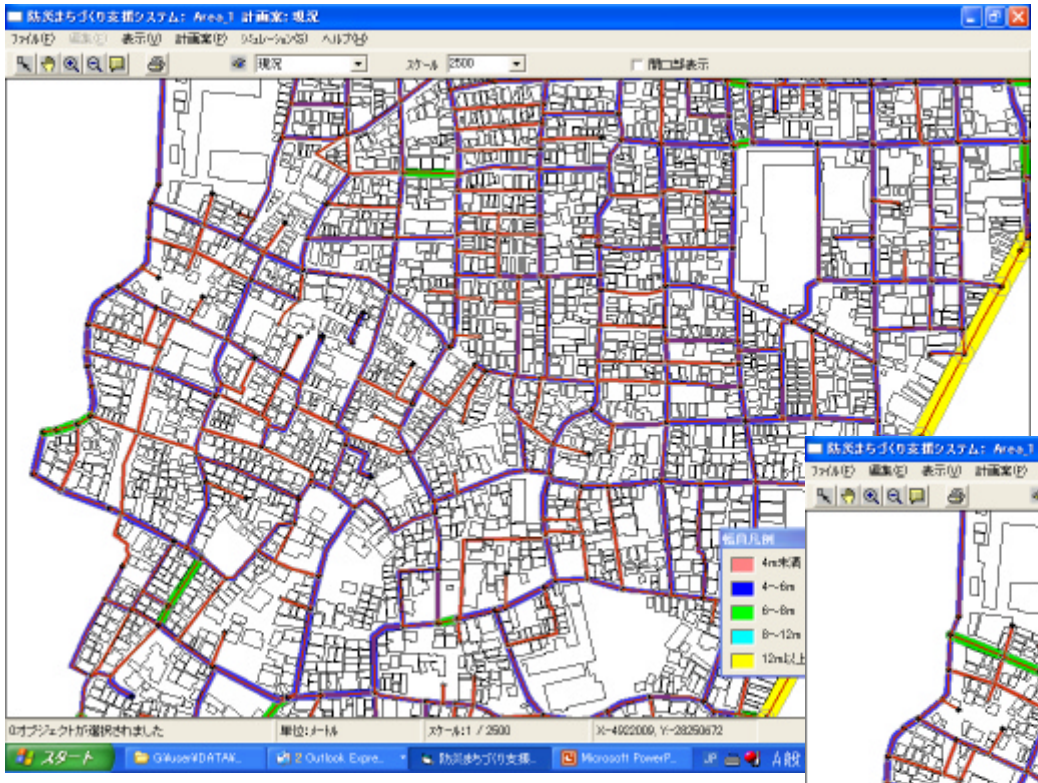

現況
スケール
3144
開口部表示
建物閉塞確...
0~0.2
0.2~0.4
0.4~0.6
0.6~0.8
0.8~1.0
アクティビティ計算結果表示
計算条件
A1
範囲区分
標準
建物倒壊確率
閉塞確率
徒歩の場合
担架の場合
小型車の場合
消防車の場合
建物
道路
一時避難場所への到達困難性(閉塞情報なし)
居住地から一時避難場所へ
到達率
利用度
一時避難場所から二次避難場所へ
アクティビティ計算結果間比較
SAMPLE
DATA
ifficulty of fire-fighting



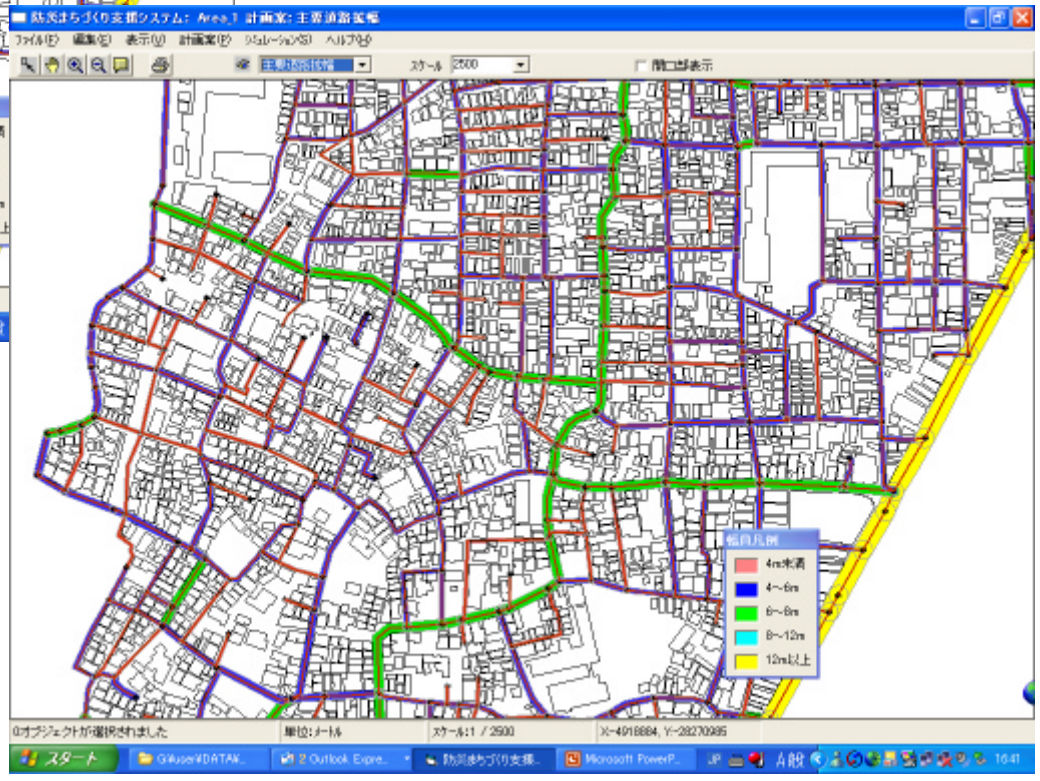
Interface to draw the alternative plan

Drawing a new plan

Example

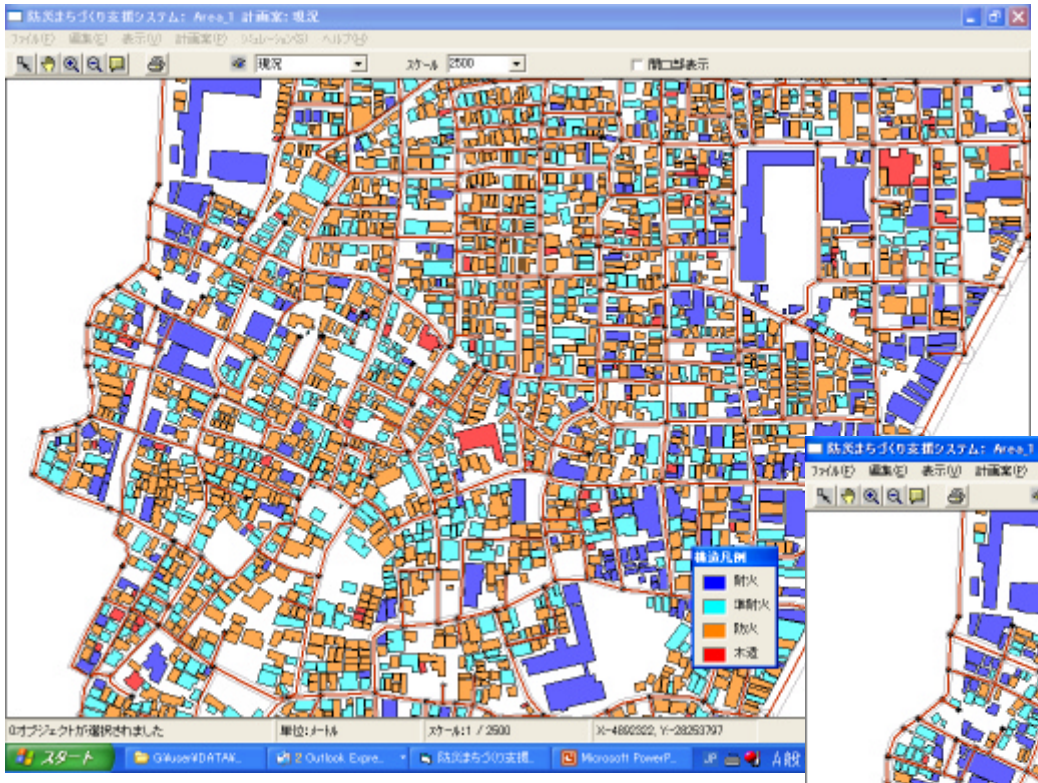


The present situation



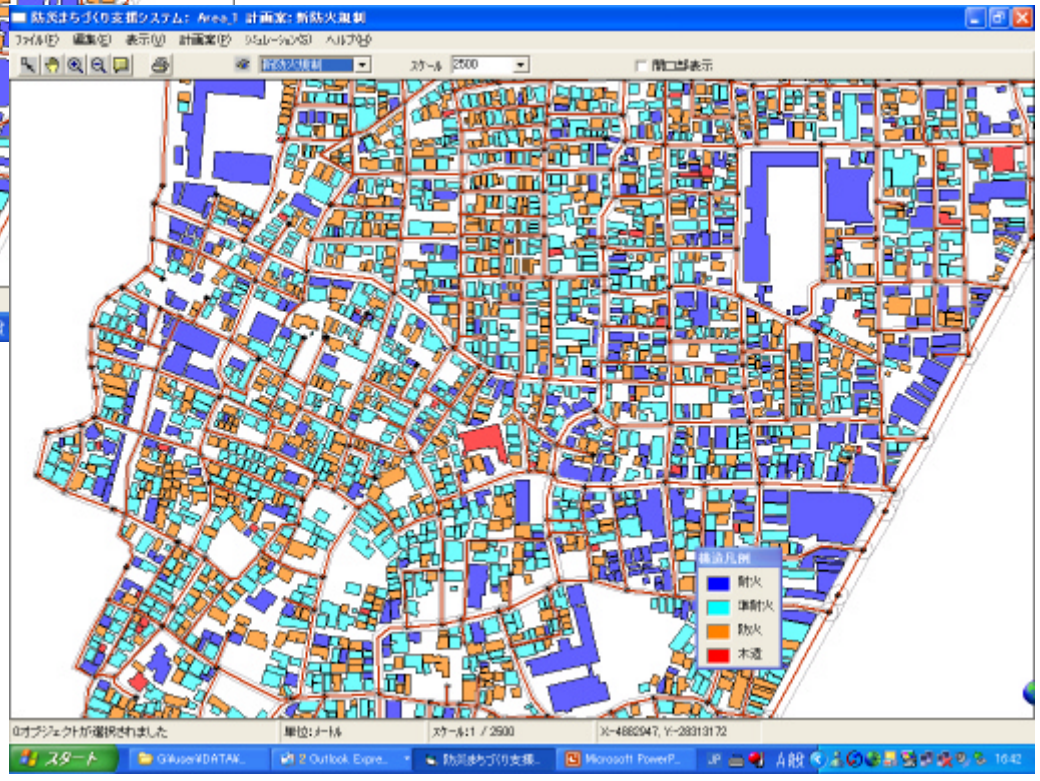
New plan:
widening two streets

Example



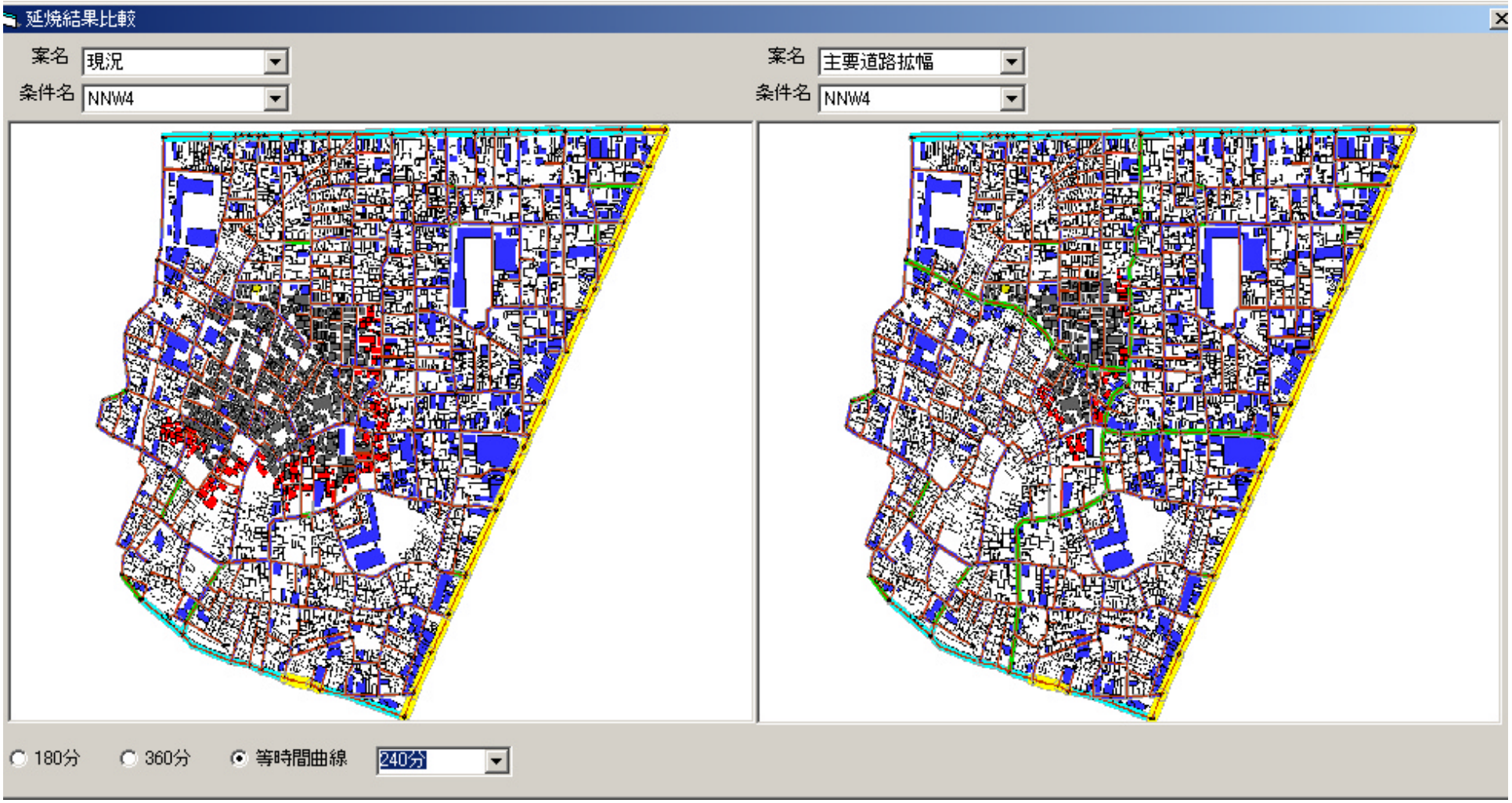
The present situation

light blue: fire-resisting houses
blue : fire-proof houses



New regulation for building code of fire-resistance

Effectiveness check by simulation (Example)

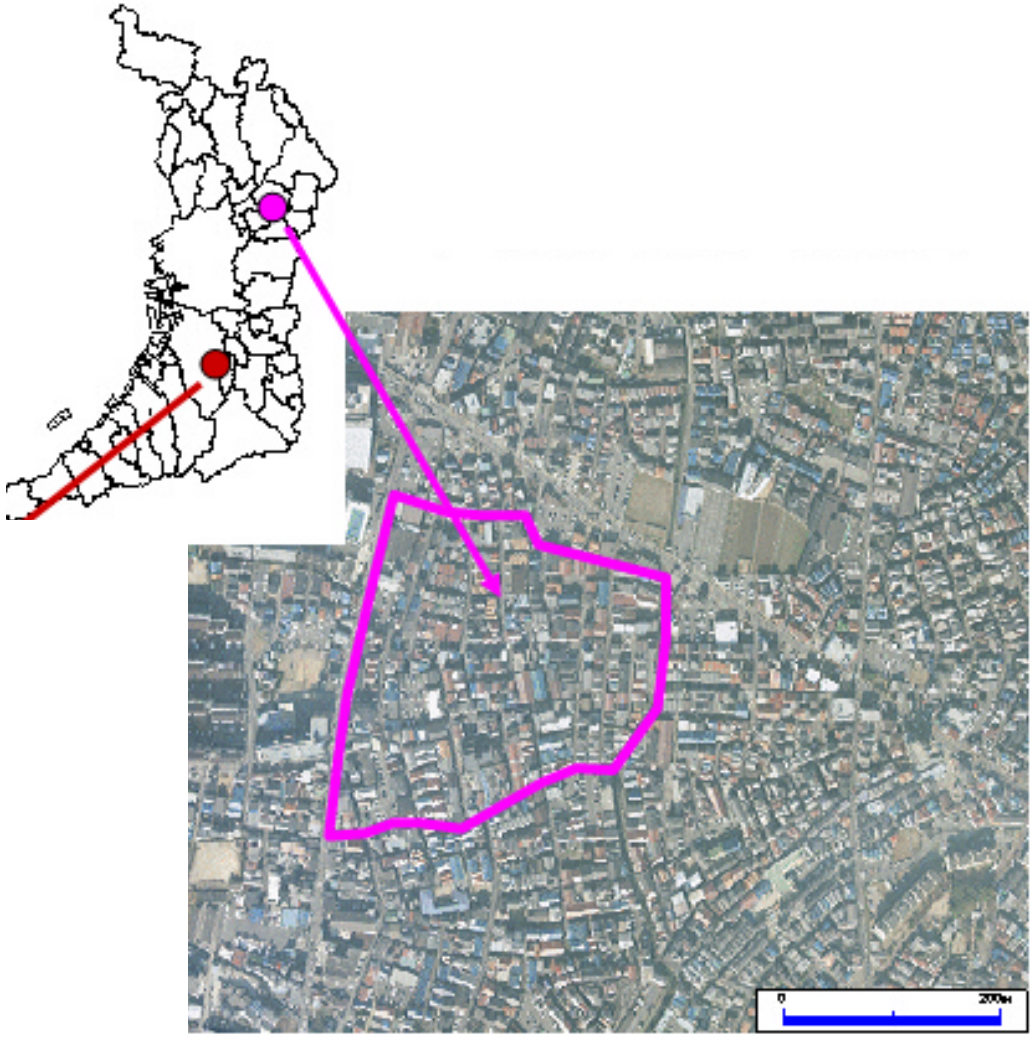


The present situation

The new plan

? Actual Case: planning workshop ?

Ikeda Asahi Town District
Neyagawa City, Osaka



Paticipants:
  Planners
  Administration Officers
  Residents 30 persons
(residents association)

Typical densely wooden houses packed area

Characteristics: old wooden houses and elder residents

Area of a district : approx.25 ha

Scenes in the workshop

Residents consider evacuation

Simulation on PSS

Finding out problems by field work

Comprehend on a map

1st workshop

To make residents percept problem of the district

2nd workshop

To make them understand the problem and consider the direction of improvement

3rd workshop

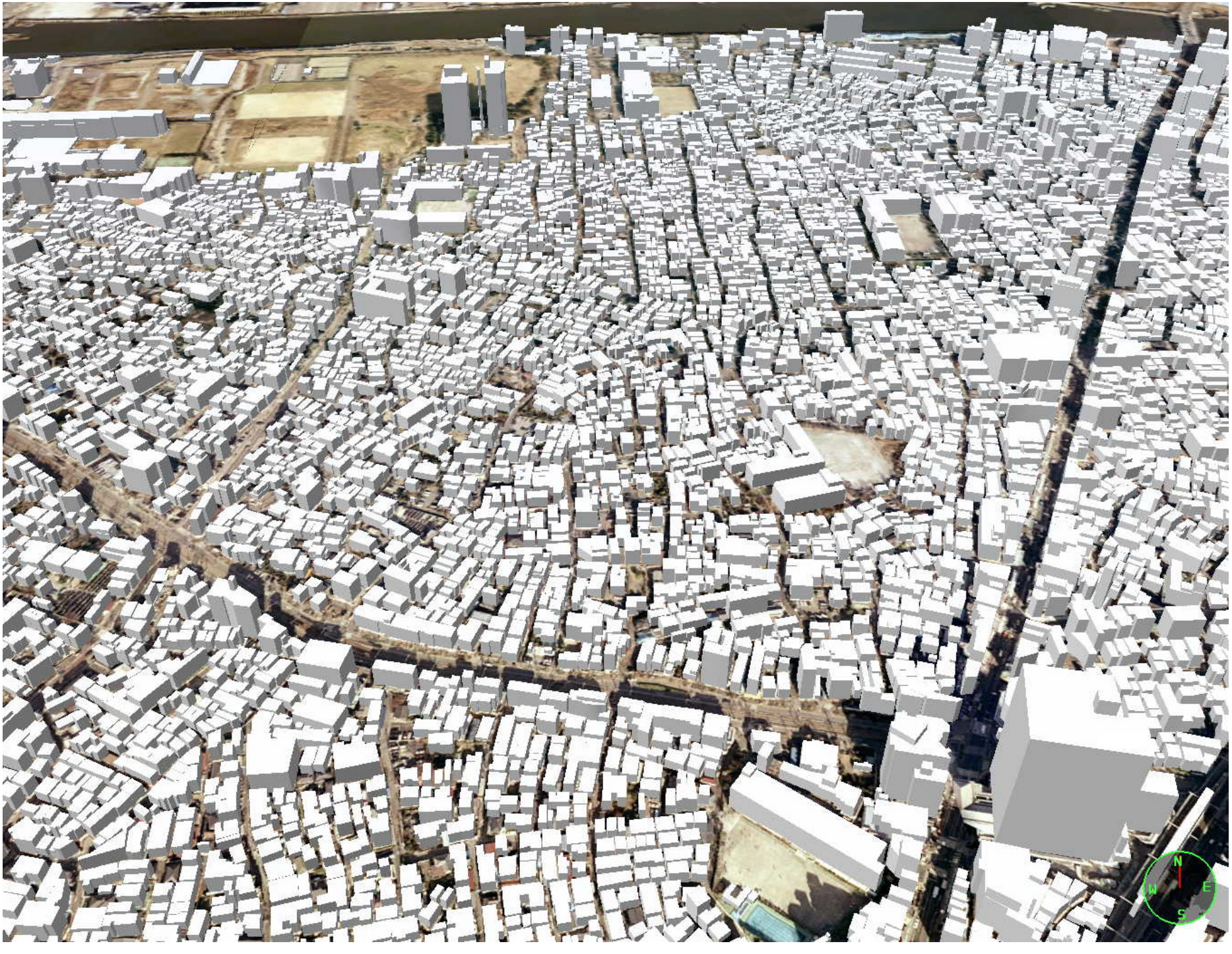
Draw up a plan and effectiveness check

? ? ? ? ? ? ? ? ? ? ? 3? ? ? ? ? ? ? ? (? ? 17? 2? 18?)
the scene in the last workshop

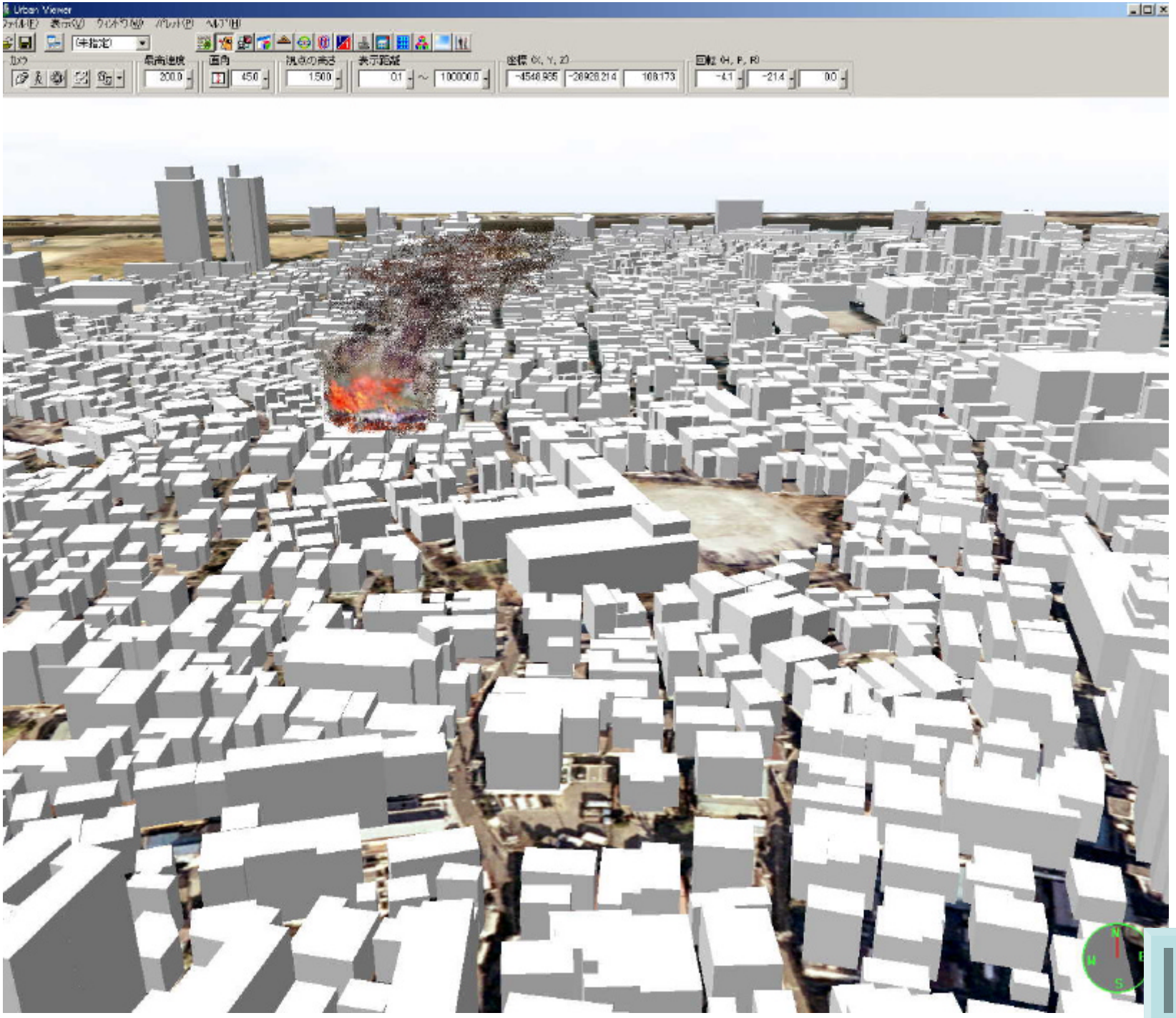
? consideration of an alternative by residents

? presentation by residents

? effectiveness check by PSS


N
W
E
S


815.4 m
N
E
S
W


Urban Viewer
ファイル(F) 表示(V) ウィンドウ(W) パレット(P) ヘルプ(H)
(未指定)
カメラ
最高速度
200.0
画角
45.0
視点の高さ
1.500
表示距離
0.1
~
100000.0
座標 (X, Y, Z)
-4548.935
-26928.214
108.173
回転 (H, P, R)
-4.1
-21.4
0.0

The Board of
Community based urban disaster mitigation PSS
Chairman: KATO Takaaki

You can know in detail on the Home page, **http://www.bousai-pss.jp.**

TOP Page

English page will start, after I go back to Japan.

Sep. 1th -