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**Urban Sustainability and Vulnerability Indicators:
How Do We Evaluate Our Sustainability and Vulnerability?**

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Background of the study

Platform development of vulnerability study

- Sustainability related study review
- Vulnerability index development
- Understand the urban vulnerability mechanism
- Develop the recommendation for the sustainable development

Sustainable :

1. able to be sustained.
2. (of industry, development, or agriculture)
avoiding depletion of natural resources.

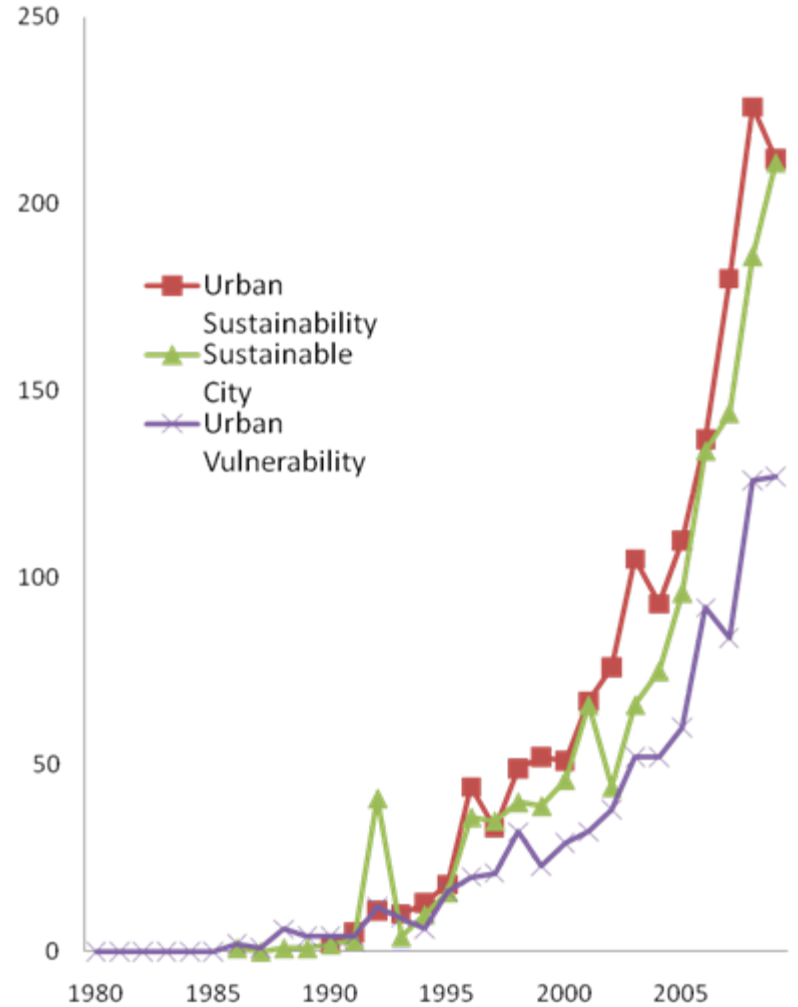
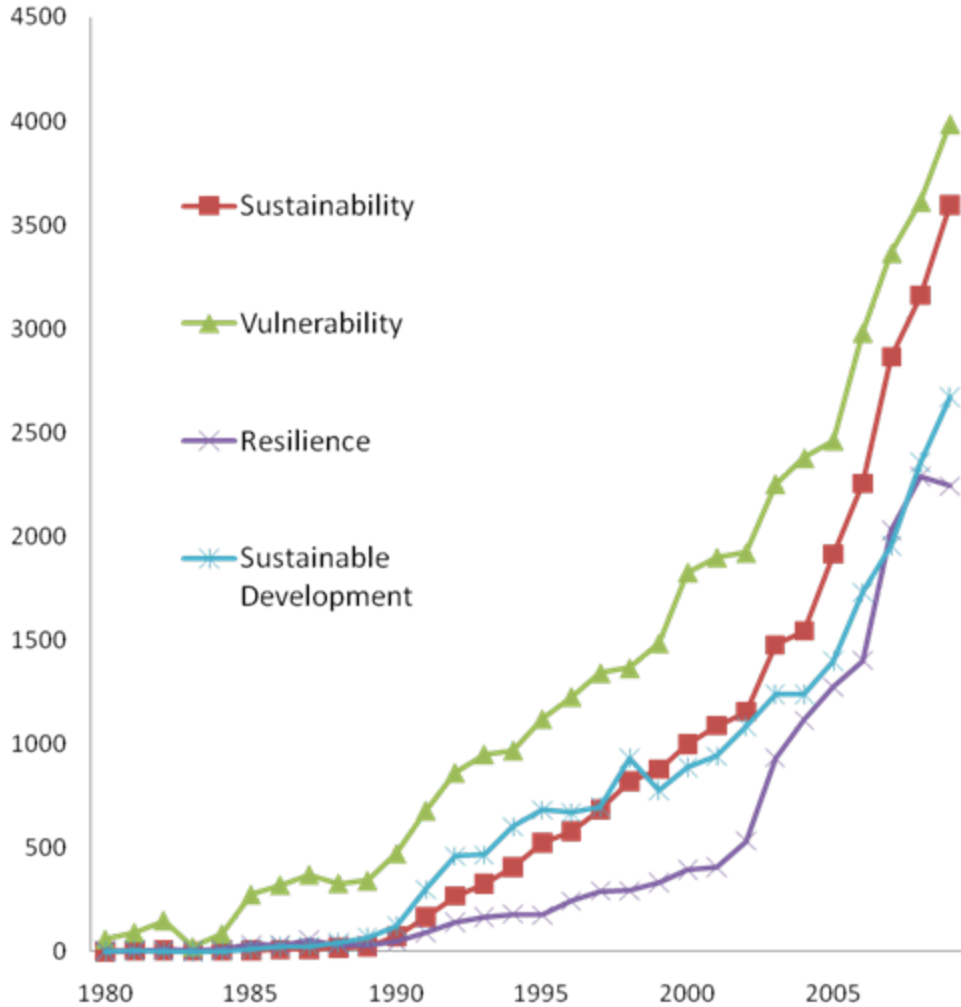
- Oxford Dictionary

sus·tain·a·ble

1. Capable of being sustained.
2. Capable of being continued with minimal long-term effect on the environment

- Dictionary.com

Number of Published Papers with Each Keyword



* Data: ISI Web of Knowledge (<http://isiwebofknowledge.com/>), as of 30 Jan 2010

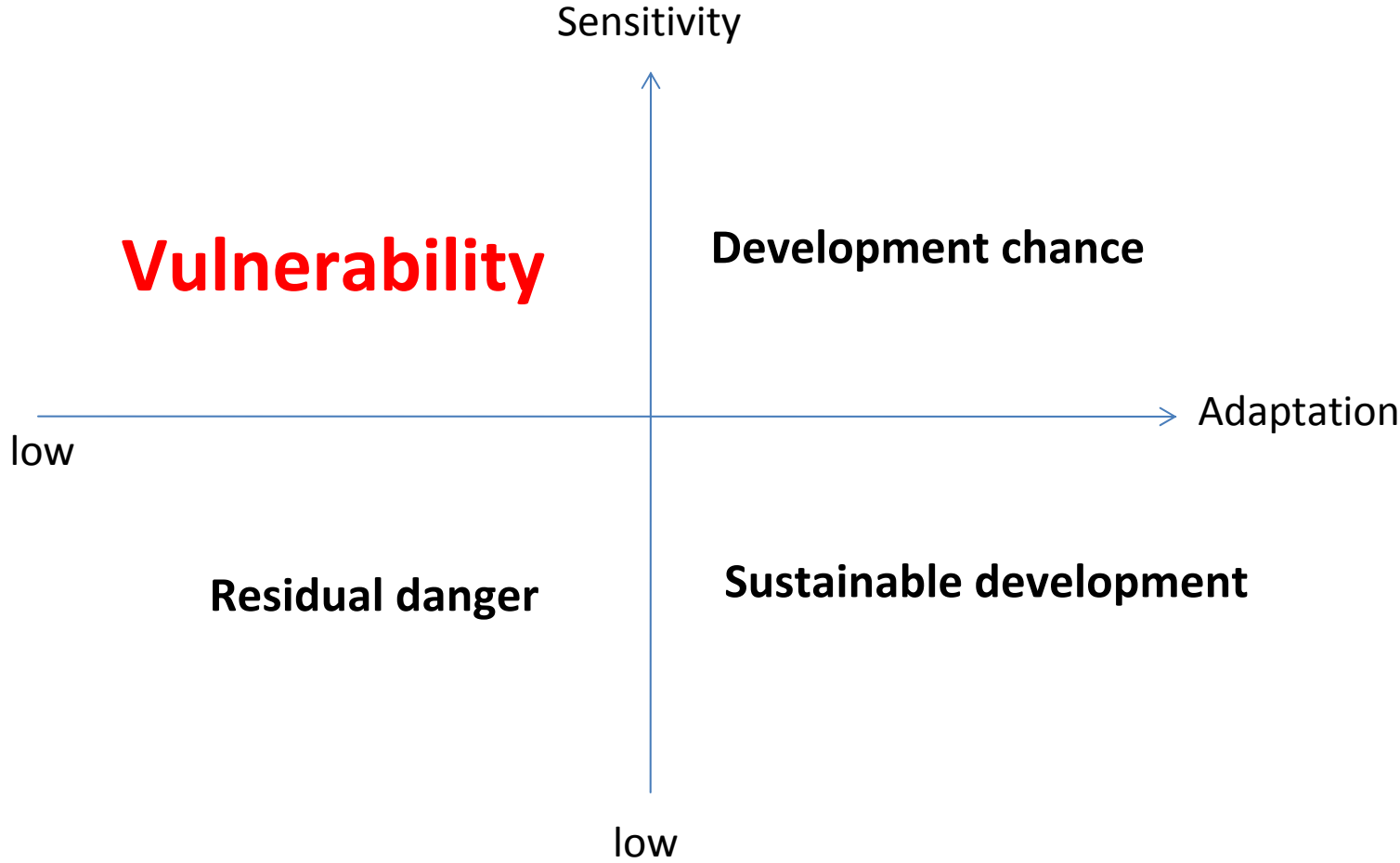
“While **cities are** considered to be **inherently unsustainable**, these urban human settlements will be where a majority of the population will be living in the next two to three decades.”

Giok-Ling Ooi (2008:193)

Cities are inherently vulnerable!



What is vulnerability?



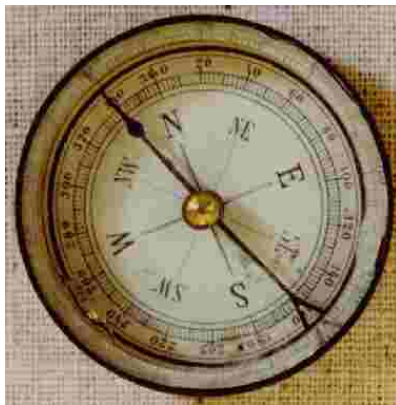
(Creating with the reference of Han et al. 2007:25)



Function of Indicators

*“An indicator is something that helps you **understand where you are, which way you are going and how far you are from where you want to be.**”*

Sustainable Measures (www.sustainablemeasures.com)



An indicator is an compass!




*“Indicators are bits of information that highlight what is happening in a larger system. They are **small windows that together provide a glimpse of the ‘big picture.’**”*

Sustainable Seattle 1998:3





The Use of S/V Indicators

- Local media
 - Public policy development
 - Business and econ. dev.
 - Education
 - Personal lifestyle change
 - Examine
 - Assess
- 
- Understand the vul. of our cities
 - Compare the vul. of cities
 - Develop remedies

Characteristics of Indicators

*“Traditional indicators -- such as stockholder profits, asthma rates, and water quality -- measure changes in one part of a community as if they were **entirely independent** of the other parts.”*

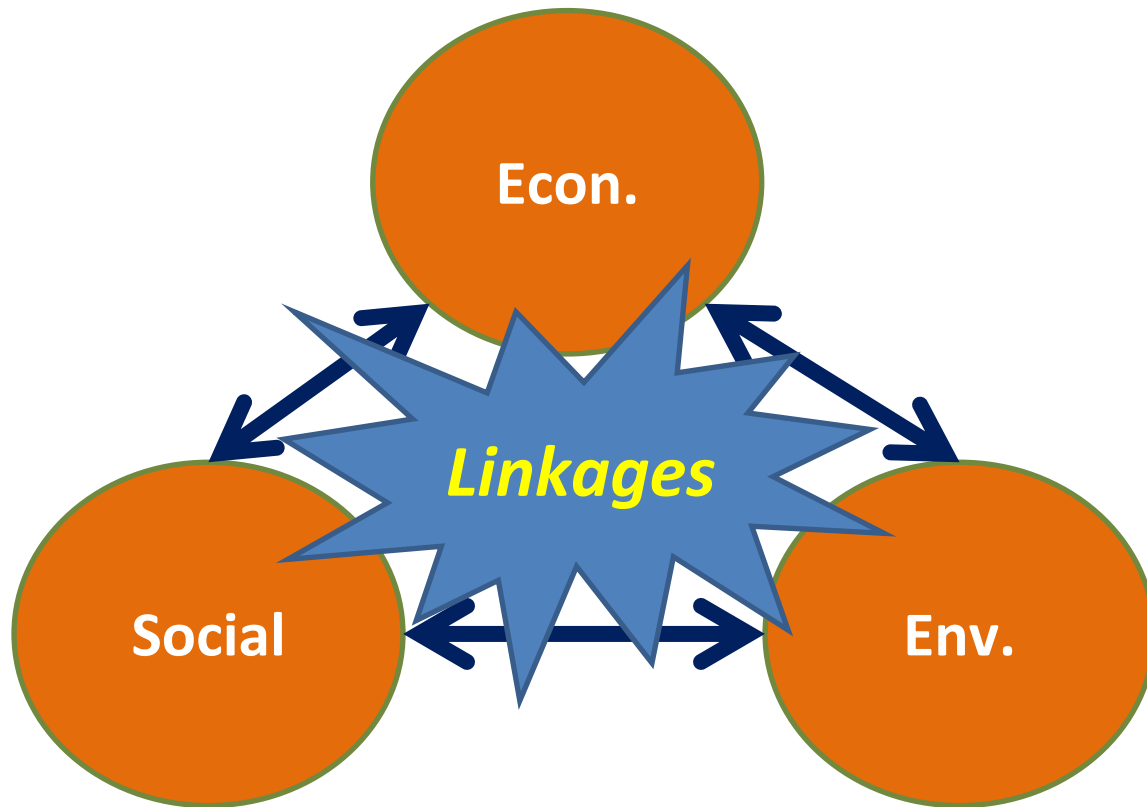
-Sustainable Measures
(<http://www.sustainablemeasures.com/>)

Difficulties in Sustainability Indicators

“There is no perfect sustainability indicators.”

-Sustainable Measures
(<http://www.sustainablemeasures.com/>)

Sustainability / Vulnerability



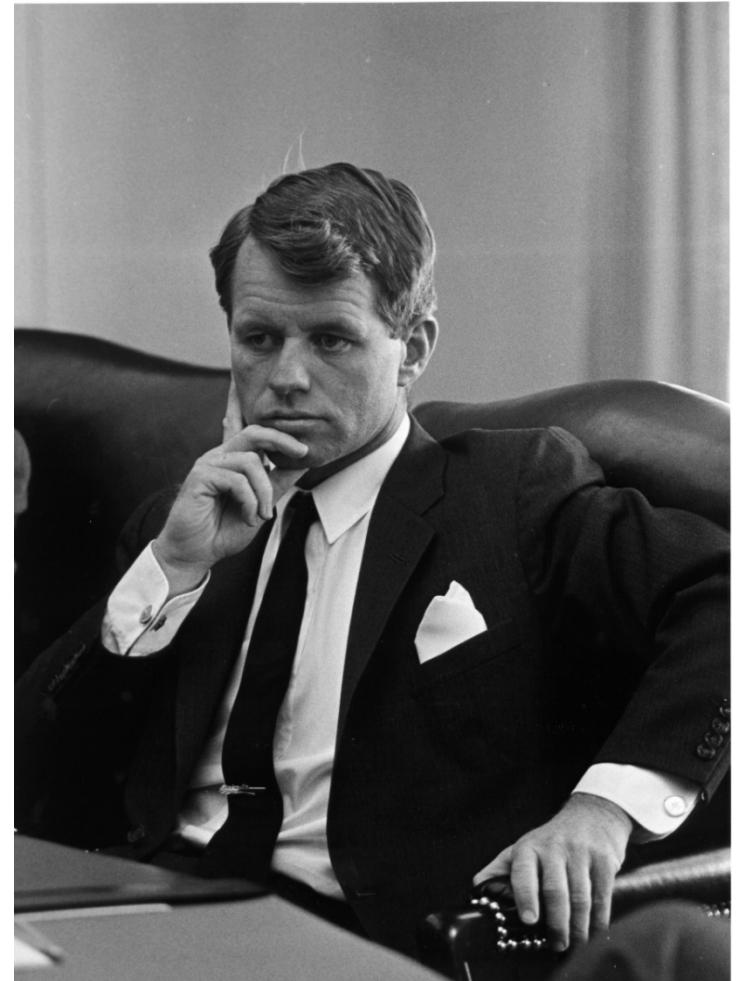


*“The **gross national product** includes **air pollution** and **advertising for cigarettes**, and **ambulances to clear our highways of carnage**. It counts **special locks for our doors**, and **jails for the people who break them....**”*

*It does not include **the beauty of our poetry** or **the strength of our marriages**, **the intelligence of our public debate** or **the integrity of our public officials....**”*

The gross national product measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to country.”

Among RFK’s Speech in 1968



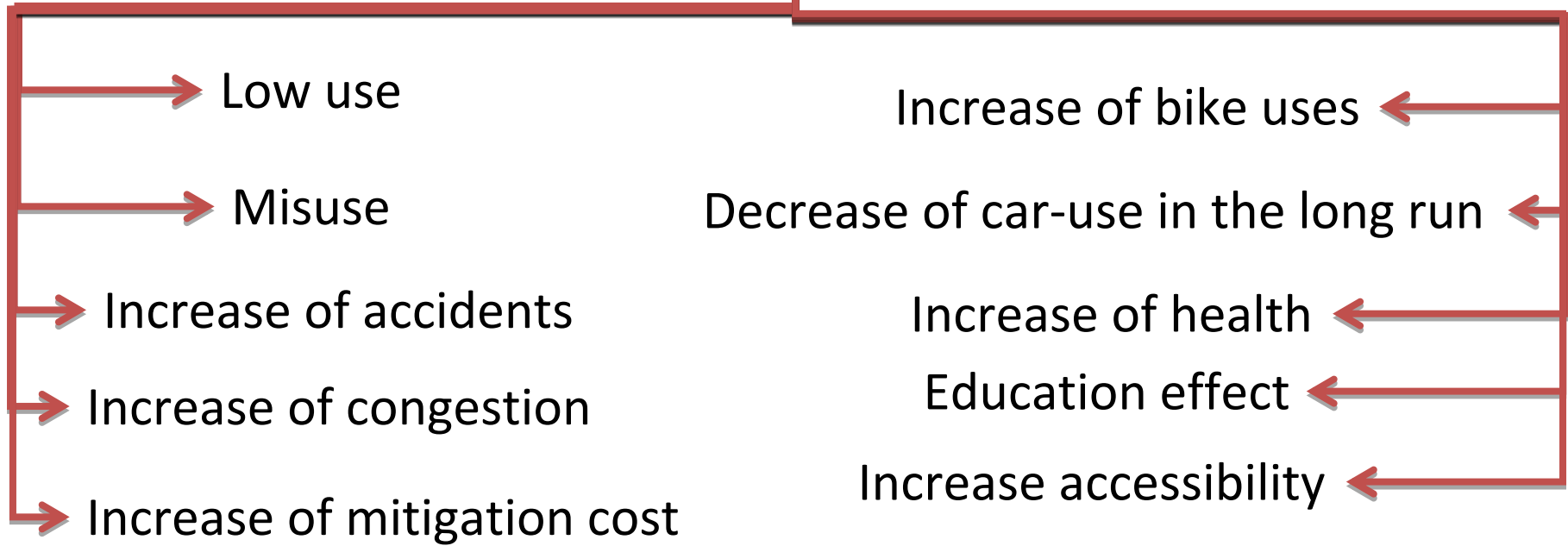
Robert F. Kennedy (1925~1968) : American politician
http://en.wikipedia.org/wiki/File:Robert_F._Kennedy_1964.jpeg

Example: Bike road extension as an indicator

Policy decision to build bike roads

Allocating the budget for the building bike roads and facility

Blocking some roads and converting the roads for car to roads for bikes



Short term and instant result

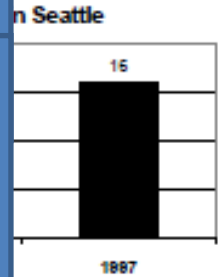
Long term and indirect result

Pedestrian- & Bicycle-Friendly Streets

Pedestrian- and bicycle-friendly streets

This indicator looks at several data sets:

- the percentage of streets within 1,000 feet of urban villages, schools and social services that have sidewalks;
- the number of striped bike lanes;
- the number of pedestrian/vehicle injuries and fatalities.



Linkages

Environmental costs of motorized water and air quality are well. The economic cost of maintaining roads and is a drain on scarce city walking and bicycling neighborhoods, improved and mobility.

- Environment
- Economy
- Education
- Health
- Safety
- Mobility/Accessibility

available to measure pedestrian- and bicycle-friendly streets, it is difficult to discern overall trends either toward or away from sustainability.

Evaluation

Since there is little data available to measure pedestrian- and bicycle-friendly streets, it is difficult to discern overall trends either toward or away from sustainability. The first data set shows major urban centers have a relatively high degree of sidewalks, but it does not address other issues of pedestrian-friendliness such as adjacent vehicle speed or aesthetic qualities such as lighting, or wheelchair access. From a safety perspective, the of pedestrian/vehicle accidents is a relatively stable (though unfortunately high) index.

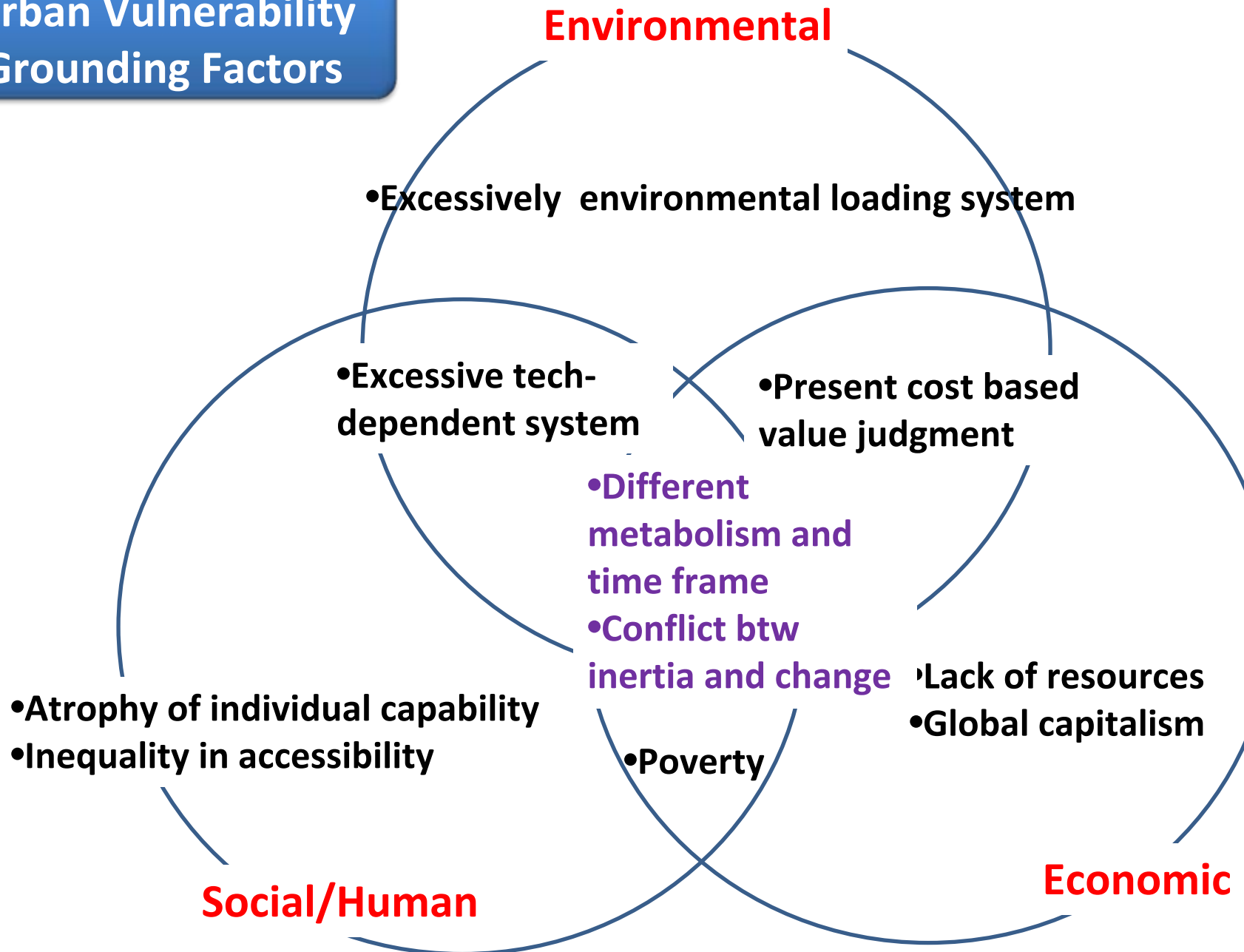
Interpretation

As of 1997, 80% of the streets near urban villages, 87% of the streets near social services such as hospitals, neighborhood service centers, community centers, and libraries, and 78% of the streets near schools have sidewalks. The number of miles of striped bike lanes on Seattle streets has been steadily increasing from 3% in 1985, to 8% in 1990, to 16 in 1997. In 1985, there were 444 injuries and 13 fatalities in pedestrian/vehicle accidents; 476 injuries and 14 fatalities

While local policymakers have a commitment in the City of Comprehensive Plan to provide pedestrian environments in neighborhoods, there needs intensified efforts to enhance expand networks. In addition to improve methods to measure well we are doing to support and bicyclists.

As of 1997, **80%** of the streets near urban villages, **87%** of the streets near social services such as hospitals, neighborhood service centers, community centers, and libraries, and **78%** of the streets near schools have sidewalks. The number of miles of striped bike lanes on Seattle streets has been steadily increasing from **3% in 1985, to 8% in 1990, to 16 in 1997**. In 1985, there were **444 injuries and 13 fatalities** in pedestrian/vehicle accidents; **476 injuries and 14 fatalities** in 1990; and **469 injuries and 10 fatalities** in 1995.

Urban Vulnerability Grounding Factors




Urban Vulnerability Indicator Development

- **Who** : Strategic Study Group on Urban Vulnerability, Center for Urban Sustainable Regeneration, the University of Tokyo

- **Purpose** : Develop the platform to evaluate, analyze, and diagnose the vulnerabilities of the sample cities.

- **Development Process**

1. Gather the suggestions from the experts of each field
 2. Select the indicators with purpose, data availability and credibility
 3. Collect the data
 4. Evaluate the data
 5. Examine the suitability of the indicators
 6. Adjust the indicator set
 7. Evaluate the vulnerability of the cities
 8. Reveal the mechanism of vulnerability in cities
 9. Develop the recommendations
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Vulnerability in Cities

General Indicators		Vulnerable Indicators	
Basic			
Urban	<ul style="list-style-type: none"> •Transportation •Living Environ. •Tourism 	Urban	<ul style="list-style-type: none"> •Transportation •Living Environ.
Structure	<ul style="list-style-type: none"> •Building 		
Nature & Environment	<ul style="list-style-type: none"> •Water 	Nature & Environment	<ul style="list-style-type: none"> •Water •Ground •Atmosphere
Society	<ul style="list-style-type: none"> •Population •Economy 	Society	<ul style="list-style-type: none"> •Population •Economy
<i>34 Indicators</i>		<i>34 Indicators</i>	

Suggestion of vulnerability indicator

Urban	Nature & Environment	Society
<ul style="list-style-type: none"> •Fatal accident rate •Road traffic congestion •Housing insufficient rate •Housing affordability •Number of fire •Water supply coverage •Sewer system coverage 	<ul style="list-style-type: none"> •Completion rate of dyke •Damage from flood •BOD/COD •DO •Total nitrogen •Total phosphorus •General microbe •Bacillus coli •Hg •Cd •As •F •Damage from earthquake •NO_x, SO_x •CO₂ emission 	<ul style="list-style-type: none"> •Birth ratio •Elderly people ratio •Life expectancy •Number of crimes •Poverty ratio •Graduation rate of junior high school •Jobless rate •Mortality of under 5 •Literacy rate •GINI coefficient •<i>Suicide ratio</i>

Strategic Group on Urban Vulnerability, c-SUR, University of Tokyo

To be worked

- New data collection
- How the VIs can be interpreted
- How to discover the underlying vulnerabilities
- How to deal with the duality in resilience

Thank you!

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Reference

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