Project co-financed by the European Regional Development Fund

REMEDIO International Conference:
"HORIZONTAL CONDOMINIUM AS A LIVING LAB FOR URBAN RENEWALS"
1 October 2019, Treviso

Bridging the Gap between Microenvironmental Urban Quality and Participatory Processes: The CENSE Tool for Mobility Options

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Aristotle University of Thessaloniki

Introduction

- **Our session: Assessment for Urban Solutions for Congested Roads.**

- **Air Pollution and Health Effects: Role and Perspectives of Simulation-Based Approaches by Dario Gregory.**

- **LIFE Index-Air: A Decision Support Tool to Reduce the Exposure to Air Pollutants and Improve the Health of Citizens Living in European Cities by Susana Marta Almeida.**

- **Urban areas ⟶ Combination of large number of citizens and their activities. Present high levels of Stressors.**

Apart from air pollution:

- **Physical stressors noise or radiation, is associated with annoyance&reduced quality of life / climate change (e.g. extreme cold or heat stress) / aeroallergens / EMFs, etc…**

Introduction

- **Large number of health stressors yet to be discovered – current state of knowledge still has gaps and numerous uncertainties.**

- **Citizens are often exposed to a MIXTURE of pollutants/stressors, rather than only one.**

- **An urban (micro)environment needs to be characterized according to its HOLISTIC environmental quality.**

- **Exposure to stressors is most meaningful where there is high density of receptors (Congested Roads).**

- **Citizens spend substantial time in spaces where their corresponding activities are likely to induce emission of potentially hazardous stressors.**

High density of emitters and receptors!

NHX 1959

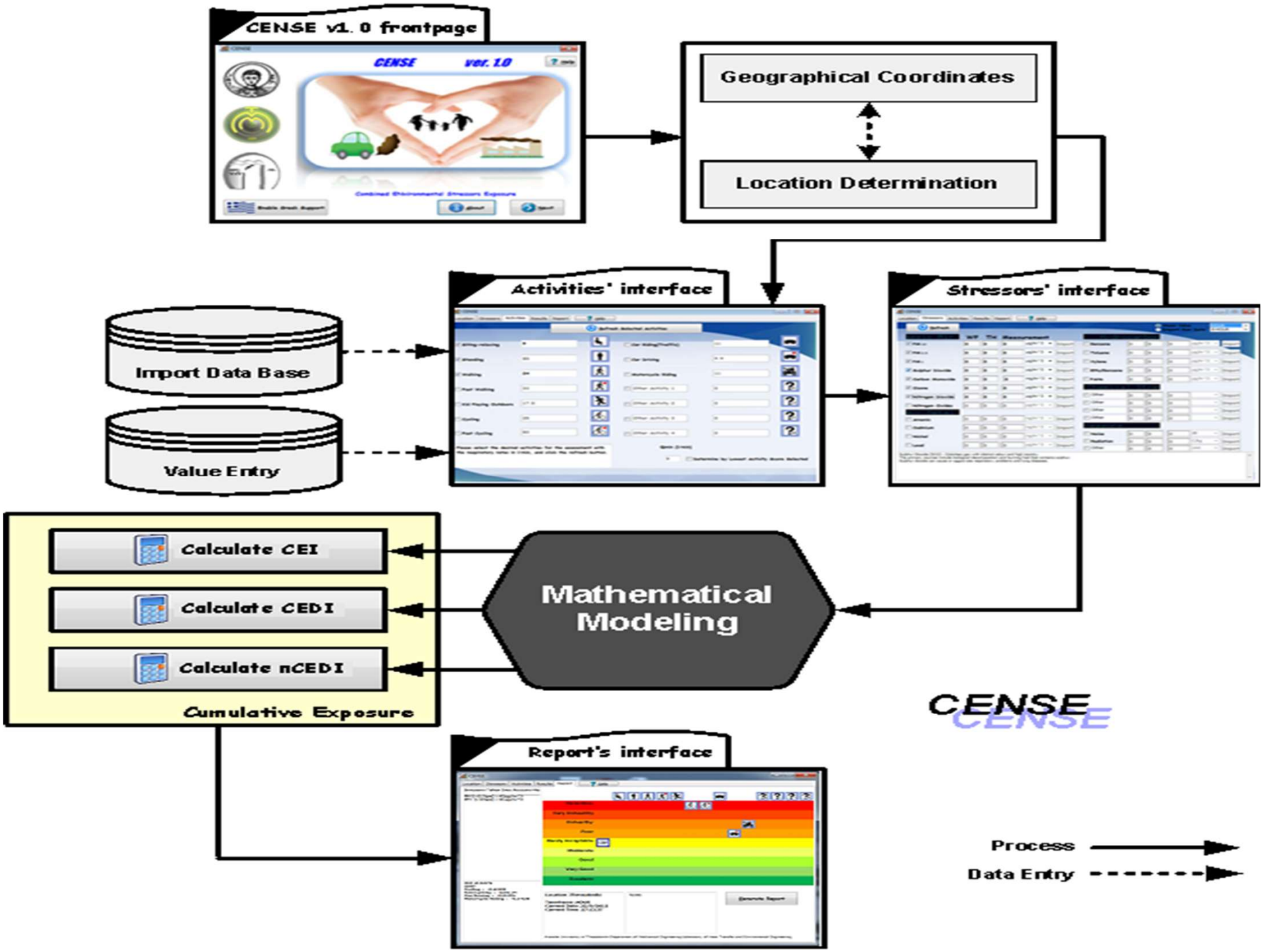
CARNER
NEI 3225

Microenvironments

➢**The Combined ENvironmental Stressors' Exposure (CENSE) tool characterizes (micro)environmental urban quality in a holistic and integrated way.**

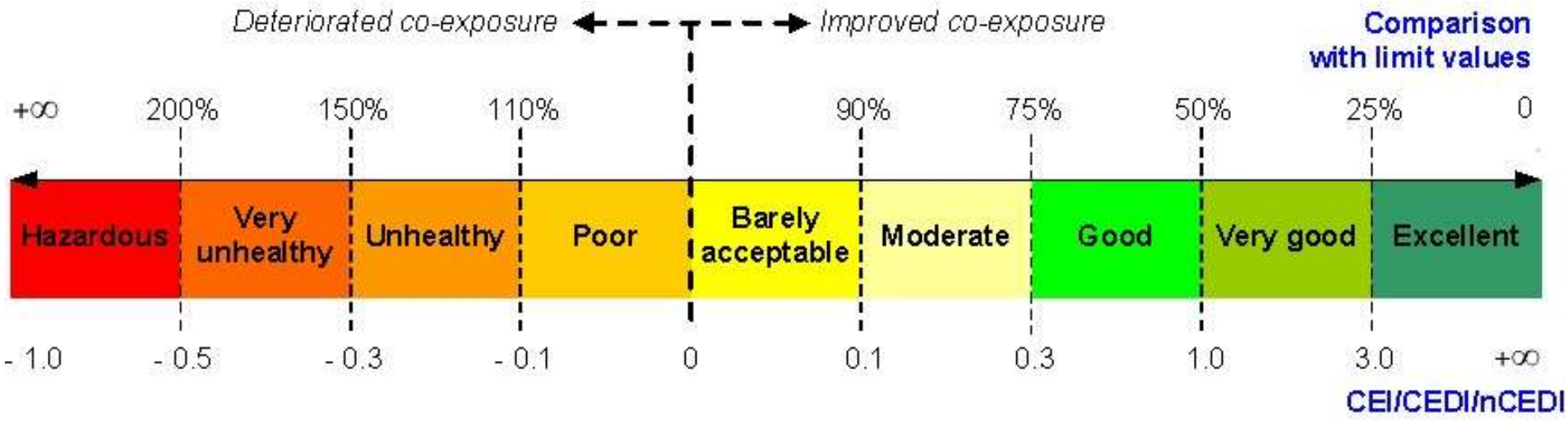
➢**Multi-stressor, multi-modal approach, in discrete urban spaces with specific boundaries such as:**

- ❑ **congested roads, street canyons, squares and pedestrian zones or a combination of those.**
- ❑ **typical urban microenvironments such as the interior of a passenger car, traffic junctions, bus stations, crosswalks.**
- ❑ **paths by taking into account different physical activities (e.g. walking, jogging) and/or different mobility options (e.g. cycling, motorcycling, public bus).**


CENSE v1. 0 frontpage
CENSE
ver. 1.0
Geographical Coordinates
Location Determination
Activities' interface
Stressors' interface
Import Data Base
Value Entry
Calculate CEI
Calculate CEDI
Calculate nCEDI
Cumulative Exposure
Mathematical Modeling
CENSE
Report's interface
Process
Data Entry

Brief Methodological insights

The scale of characterization:



Brief Methodological insights

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journal homepage: www.elsevier.com/locate/envint

Cense: A tool to assess combined exposure to environmental health stressors in urban areas

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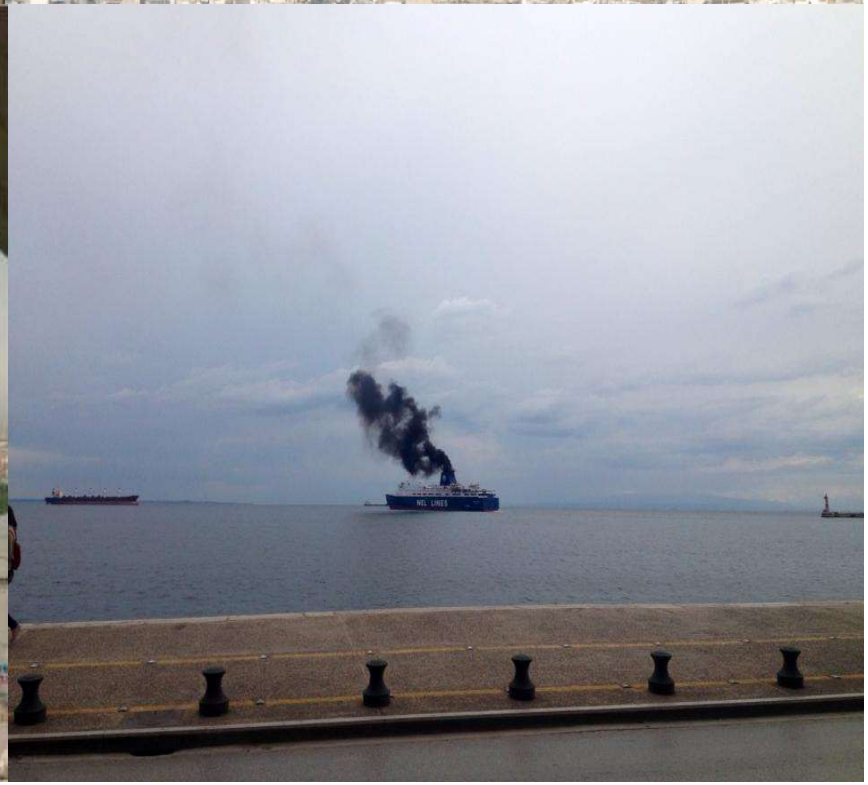

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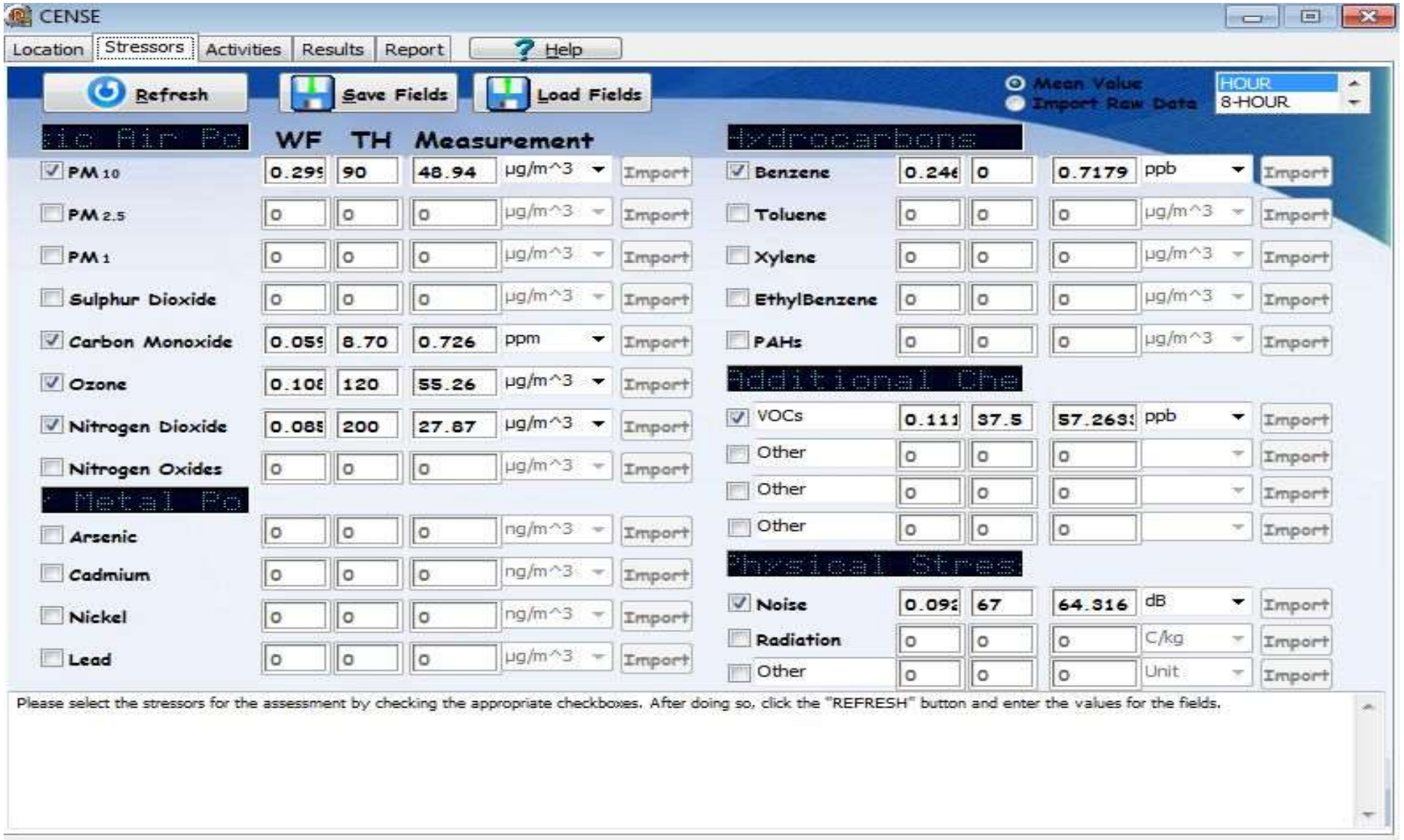
Dragoumi
Ermou
Tsimiski
Ag. Sophias Station
P. Mela
Egnatia
Nikis Avenue
Mitropoleos
Dragoumi Tonos
Komninon
Dimosthenous
Aristotelous
Vassileos Trakliou
Dil Karolou
Vogatsikou
Iktinou
Kastritsiou
Papamarkou
Vatikioti
Dragoumi
Aristotelous
Vlali
Askitou
Spandoni
Fragini
Komninon
Karipi
Pekou
Ermou
Edessis
Katouni
Verias
Diamadi
Orvilou
Egiptou
Toustinianou
Chalkeon
Filippou
Agnostou
Mitseon
Amida
Mitropoliti Gennadiou
Toustinianou
Platonos
Prassakaki
Iktinou
Iktinou
Dil Karolou
Mitropoleos
Vassileos Trakliou
Aristotelous
Dragoumi
Egnatia
Egnatia

Weighting factors and data



Weighting factors and data

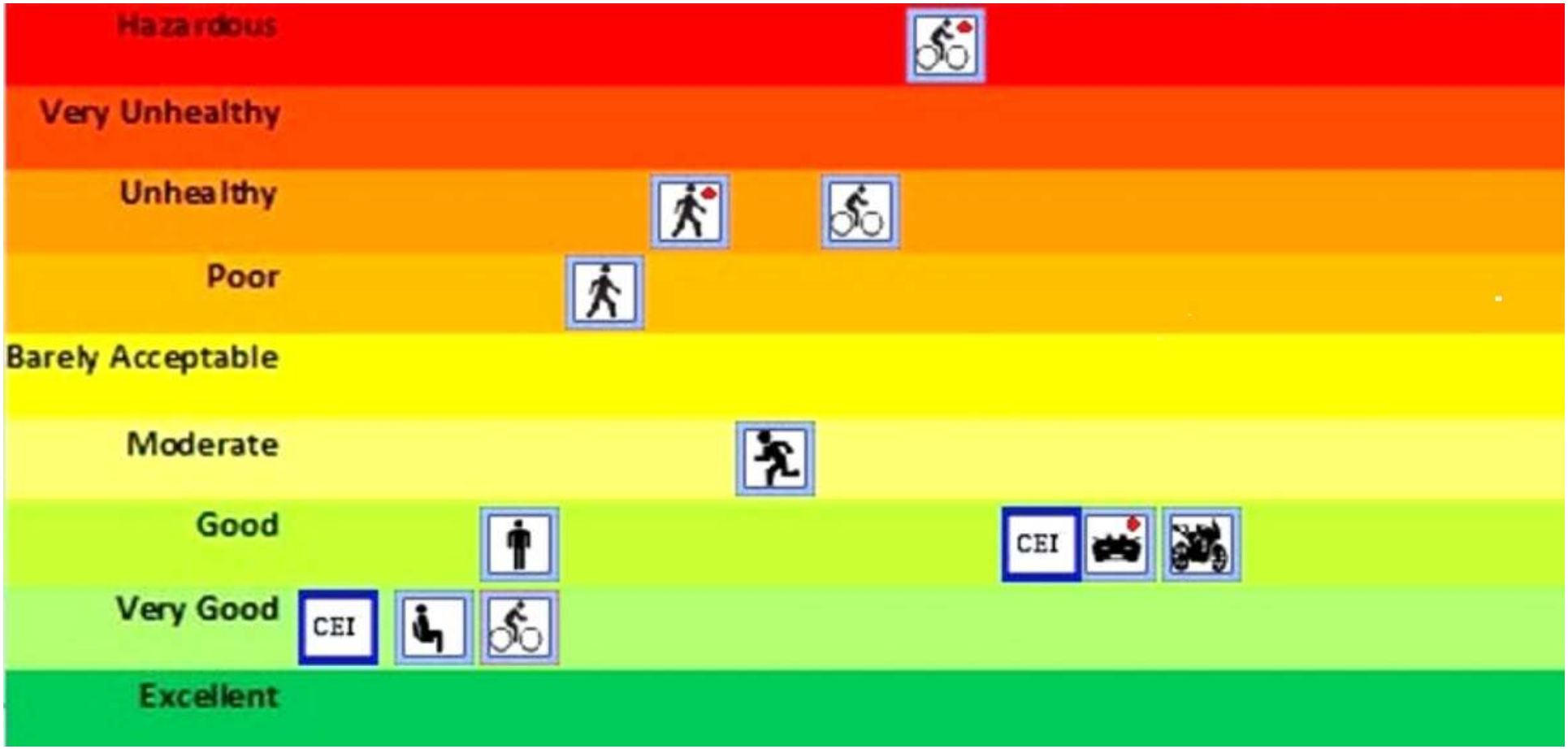
- **WFs: relative importance to each stressor, considering the local characteristics.**

- **An experts' group was set up to decide upon the WFs for this case study.**

- **The decision was made considering:**
  - **The association with specific health endpoints.**
  - **Perceived reliability of the available epidemiological associations.**
  - **Perceived status of each stressor in the area compared to environmental standards.**

Activities tab

Results tab


Hazardous
Very Unhealthy
Unhealthy
Poor
Barely Acceptable
Moderate
Good
Very Good
Excellent
CEI
CEI

Some discussion and impact

- **CDEF for mild physical activities correspond to relatively good results compared to values for intense physical activities (e.g. when standing in a bus stop or sit in a state of rest compared to the jogger or the fast bicycler.)**

- **Counterpart within a local real community. The Bicyclists Union of Thessaloniki raised a question regarding how healthy bicycling is in heavy burdened streets of the urban center.**

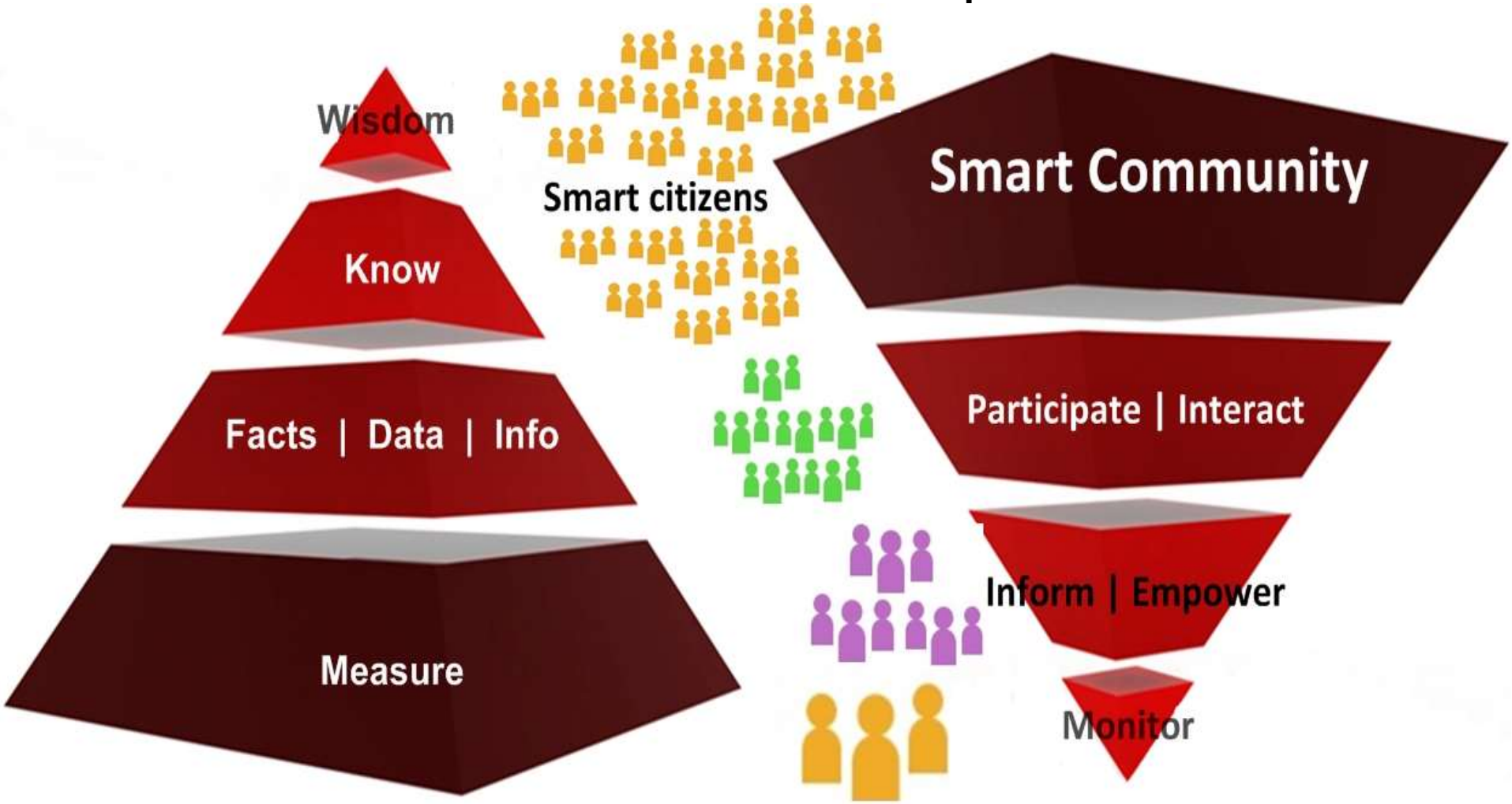
- **This discussion, which was also communicated by the Greek press, led to a protection mask campaign to the members of this community.**

Some discussion and impact

- ✓ **A citizen standing for 10 min in a bus stop: excellent.**
- ✓ **A traffic policeman standing in the cross-road for 3 h: unhealthy to very unhealthy, when a typical residence time in the city center is 60 min.**
- ❑ **35-55 min of bicycling and 20-27 min of fast bicycling: Good to barely acceptable.**
- ❑ **Car driving: very good both for with heavy (45 min) and normal traffic (20 min) conditions mainly due to low air volume rates that characterize the car driver inhalation.**
- ❑ **Motorcycling which is characterized by flexibility inside the traffic of the center: Very good for 25 min.**
- ❖ **Characterization of streets&urban paths (better to Walk in Ermou than P. Mela).**

CENSE input data and the participatory dimension

- **Do we measure what we...breath or what we are exposed to?**

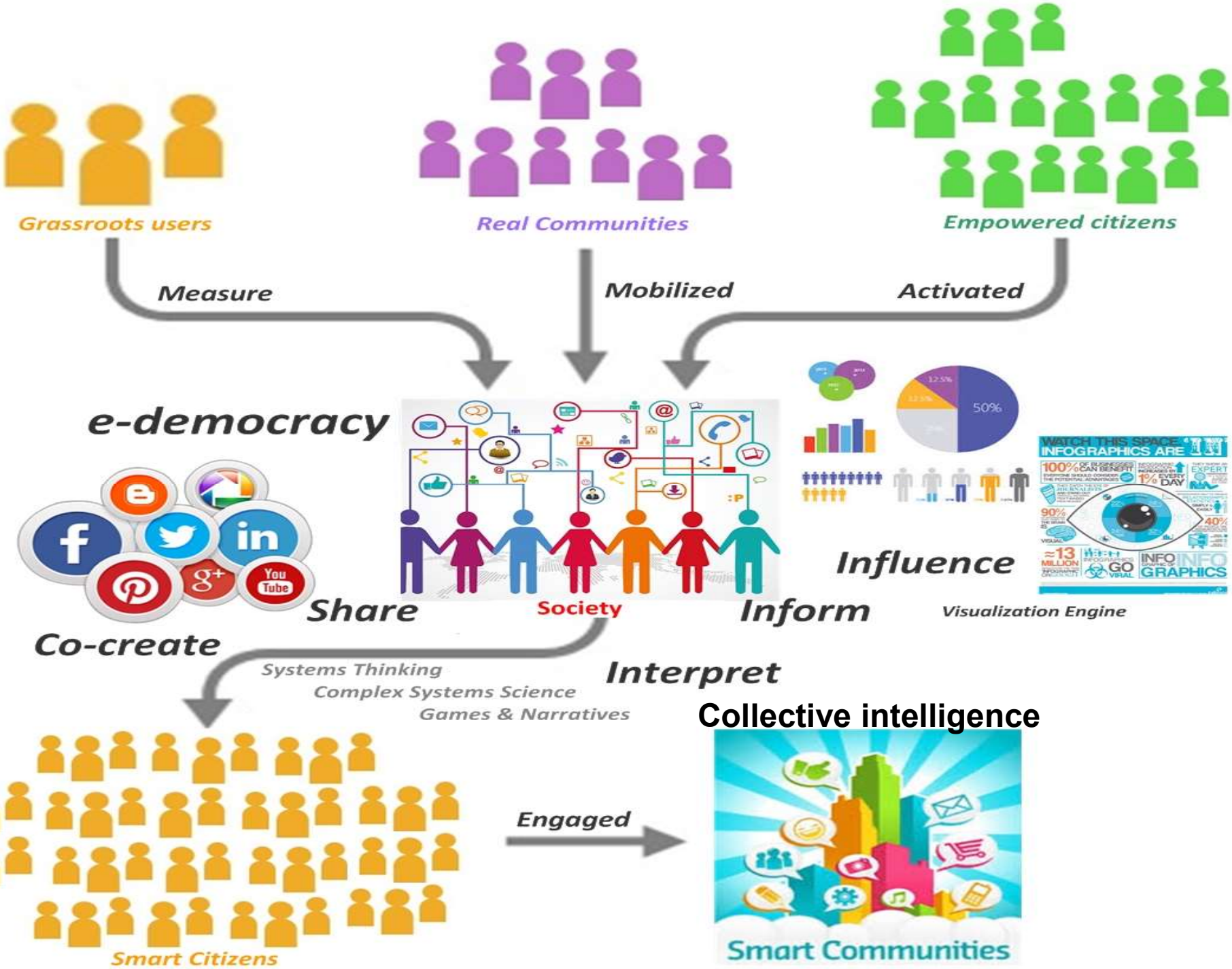


CENSE input data and the participatory dimension

- **Crowd-sourcing techniques to engage citizens in sharing knowledge and expertise and improve their quality of life.**

- **Tackle citizens' opinions, willingness and knowledge regarding alternative behaviors/possible solutions (link to a CAP).**

- **Encounter sustainability threats: The combination of networks of people, knowledge and sensors.**


Grassroots users
Real Communities
Empowered citizens
Measure
Mobilized
Activated
e-democracy
Share
Co-create
Society
Inform
Influence
Visualization Engine
Interpret
Systems Thinking
Complex Systems Science
Games & Narratives
Collective intelligence
Smart Citizens
Engaged
Smart Communities

This is crucial, because problems still exist…

- **Research has shown that an improvement of the individual and collective behavior can be obtained if citizens are more exposed to information, and engaged as part of a community.**

- **However, the participation of citizens is not sufficient enough.**

Meet-in-the-middle approach!

- **Problems are usually addressed separately, with a top-down approach.**
- **Smart citizens approach is a bottom-up approach.**

Main conclusions

✓**User friendly design, making it possible for inexperienced users.**

✓**Authorities can determine priorities to decrease the impact of environmental stress on the urban population, based on the CENSE output.**

✓ **Decision to promote localized urban solutions: i.e. pedestrianization of the heavy burdened streets, designing of bicycle lanes, assess different mobility options in dense urban areas, etc.**

✓ **Beneficial to citizens, since it provides the basis for the selection of less polluted urban paths, where the individuals' co-exposure will be minimized.**

Main conclusions

✓**The CENSE tool promotes a "socially-oriented" hybrid approach / ICT is crucial for such an approach.**

✓**The importance of micro-environmental monitoring and characterization.**

✓**The necessity of considering environmental pollution in urban areas in a hybrid, holistic and micro-environmental way.**

✓**Motives and tools to enable citizens to become "smart movers".**

✓**As the world population mobilizes - Smarter and more energy-efficient mobility options.**

✓**Inform, Empower, Participate, Interact towards collective intelligence…**

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Thank you for your attention!

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