

A New framework for Integrated Care:  
***Use of the new paradigm of healthcare ecosystem research  
in mental health planning***

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# ANU Visual and DEcision Analytics Lab

1

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Centre for Mental Health Research <https://rsph.anu.edu.au/research/groups/visual-and-decision-analytics-vid-ea-lab>

# Healthcare Ecosystem Research

- Part of Implementation Sciences that incorporates systems dynamics, context analysis, health economics & knowledge discovery from data.
- Facilitates analysis of environment and context, and its knowledge translation to policy, for decreasing research waste and to guide decision making in complex questions in health care.

## RESEARCH ARTICLE

Open Access

### Healthcare ecosystems research in mental health: a scoping review of methods to describe the context of local care delivery



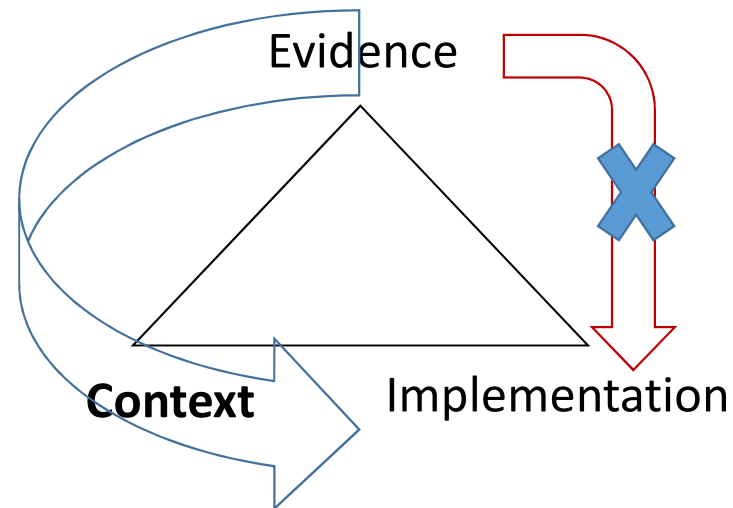
Mary Anne Furst<sup>1\*</sup>, Coralie Gandré<sup>2,3,4</sup>, Cristina Romero López-Alberca<sup>5</sup> and Luis Salvador-Carulla<sup>1</sup>

BMC Health Services Research

## CONTEXT

In health care it includes all sources of evidence of the local system: geography, social and demographic factors, other environmental factors, service availability, capacity, use and costs. It also includes legislation and expertise on the milieu (e.g., the historical account current state of the art)

# CONTEXT ANALYSIS



*Context: totality of circumstances that comprise the milieu of a given phenomenon: geography, social and demographic factors, other environmental factors, service availability, capacity, use and costs.*

# ANALYSIS OF HEALTHCARE ECOSYSTEMS

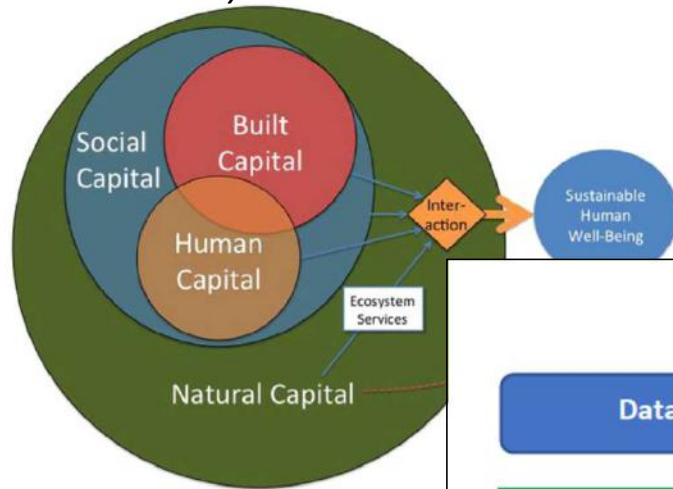
## Modified Care Matrix of the Organizations

*Process of Care (A. Donabedian)*

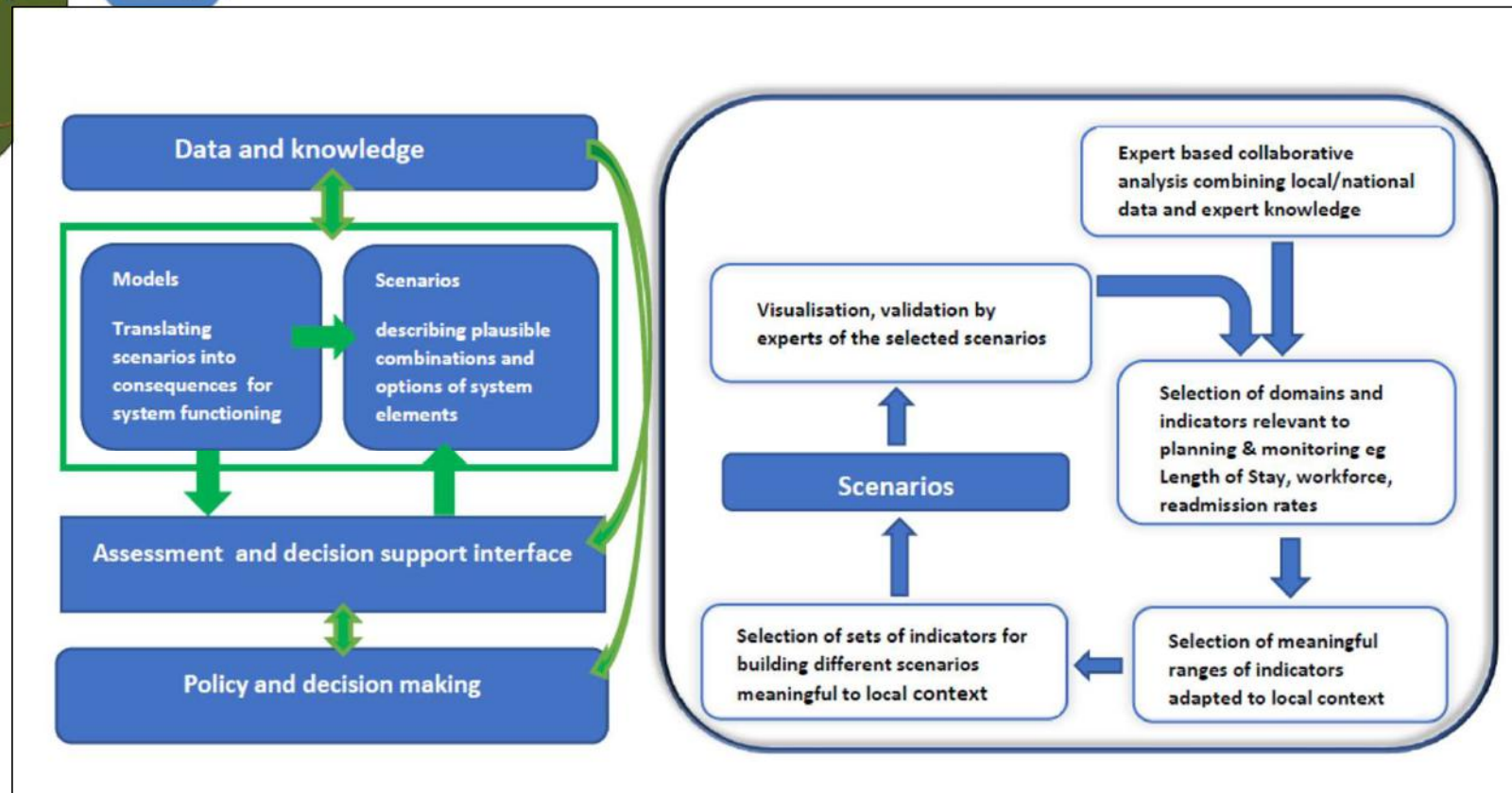
ORGANISATIONAL LEVELS	INPUT (UC)	THROUGHPUT (RUM)	OUTPUT	
	Resources (e.g. staff (BSIC), facilities, equipment, consumables, medication, overheads)	Activities (e.g. contacts, institutionalised days, procedures/ interventions)	Intangible Consequences (e.g. stigma, pain, suffering)	Tangible Consequences (e.g. QoL, survival, productivity)
<b>MACRO</b> Large NGO/ Health corporation	1A	1B	1C	1D
<b>MESO</b> Hospital	2A	2B	2C	2D
<b>MICRO</b> Service (e.g. BSIC)	3A*	3B	3C	3D
<b>NANO</b> Individual agents (e.g. Professional)	4A	4B	4C	4D

\* Modified from Thornicroft & Tansella (1999) *The Mental Health Matrix*, Cambridge Univ. Press

## Service Ecosystems Model

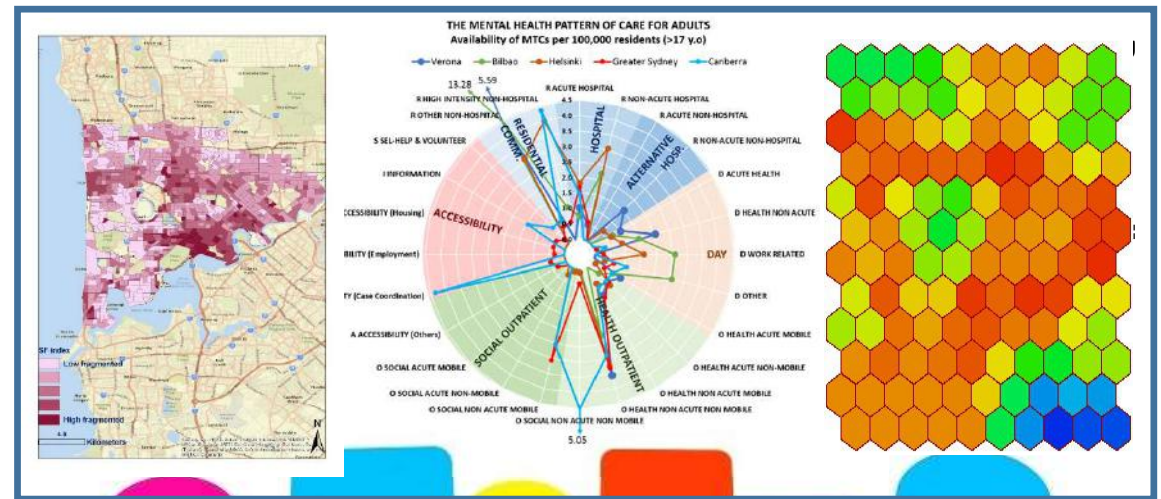
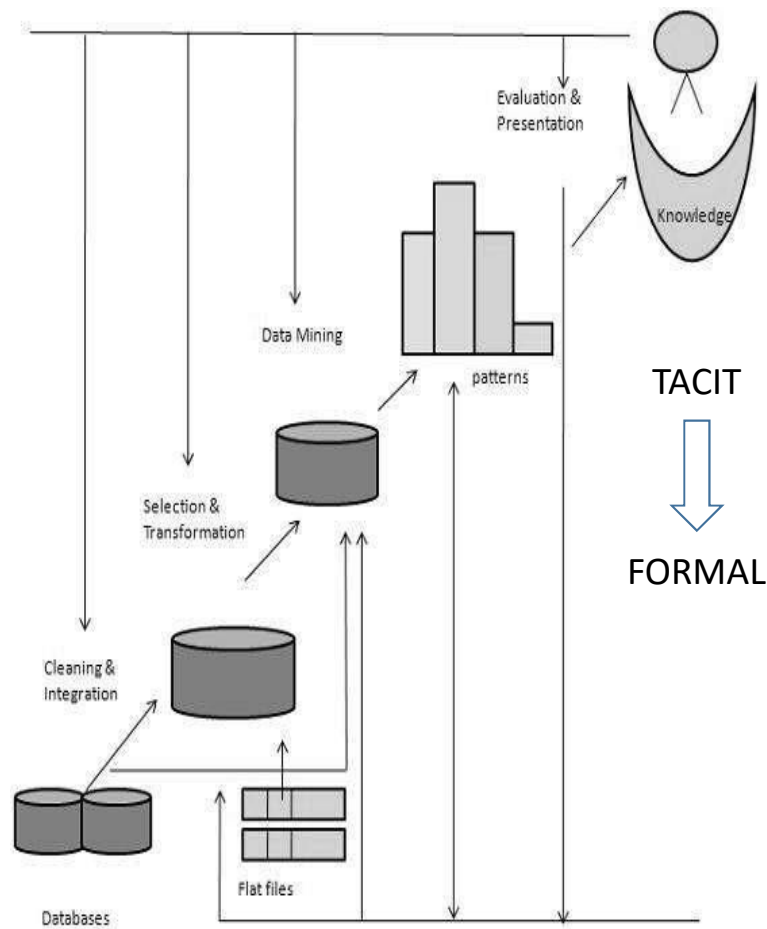


## BUILDING SCENARIOS AND MODELLING FOR HEALTHCARE ECOSYSTEM RESEARCH



Adapted from Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2016)

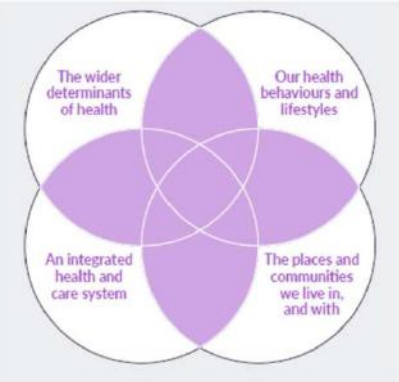




## DECISION ANALYTICS

Domain  
Experts

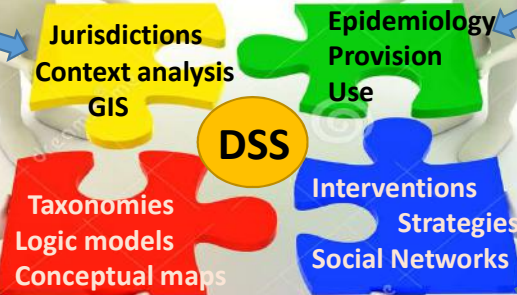
Knowledge discovery  
End-users  
Experiencers



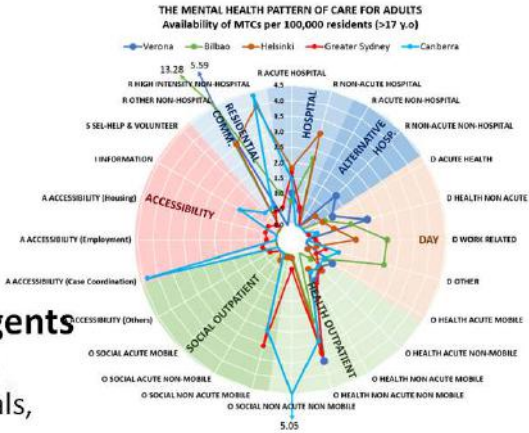
# Complex health systems: TOOLS & ANALYTICAL TECH.

**Health ecosystems**  
Systems, subsystems,  
nested systems  
Boundaries and  
Population determinants

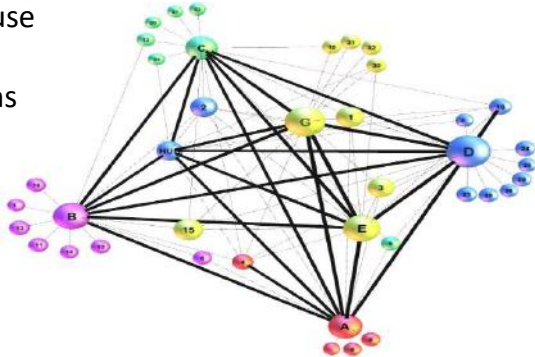
## LOCAL ATLAS OF CARE



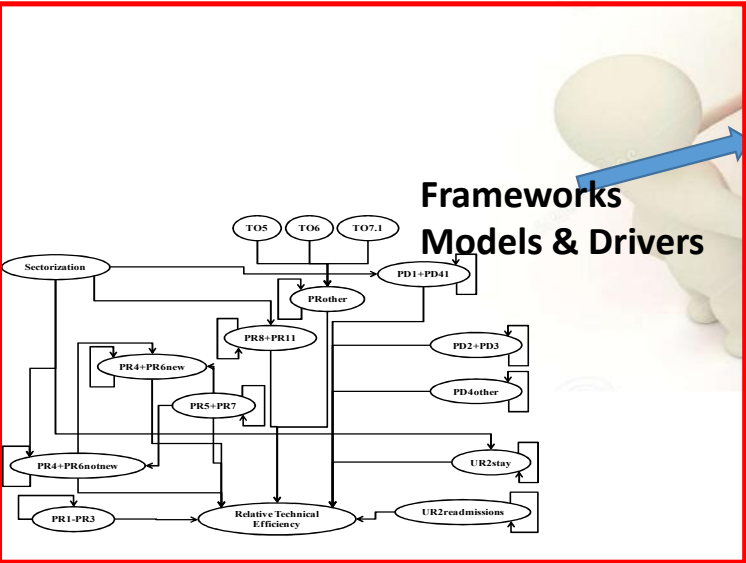
**Target Agents**  
Consumers  
Professionals,  
Teams,  
Organisations



**Connections**  
Resource use  
Networks  
interactions



**Frameworks  
Models & Drivers**





# Main Problems when Assessing Services

- **Commensurability:** Diff. units of analysis, lack of comparison like with like .  
We cannot merge:



- Service Providers
- Clinical teams
- Interventions
- Activities



# MH Atlas Solutions

1<sup>st</sup> We identify the minimal unit of production or care (Basic Stable inputs of Care-**BSIC**) or **TEAMS**



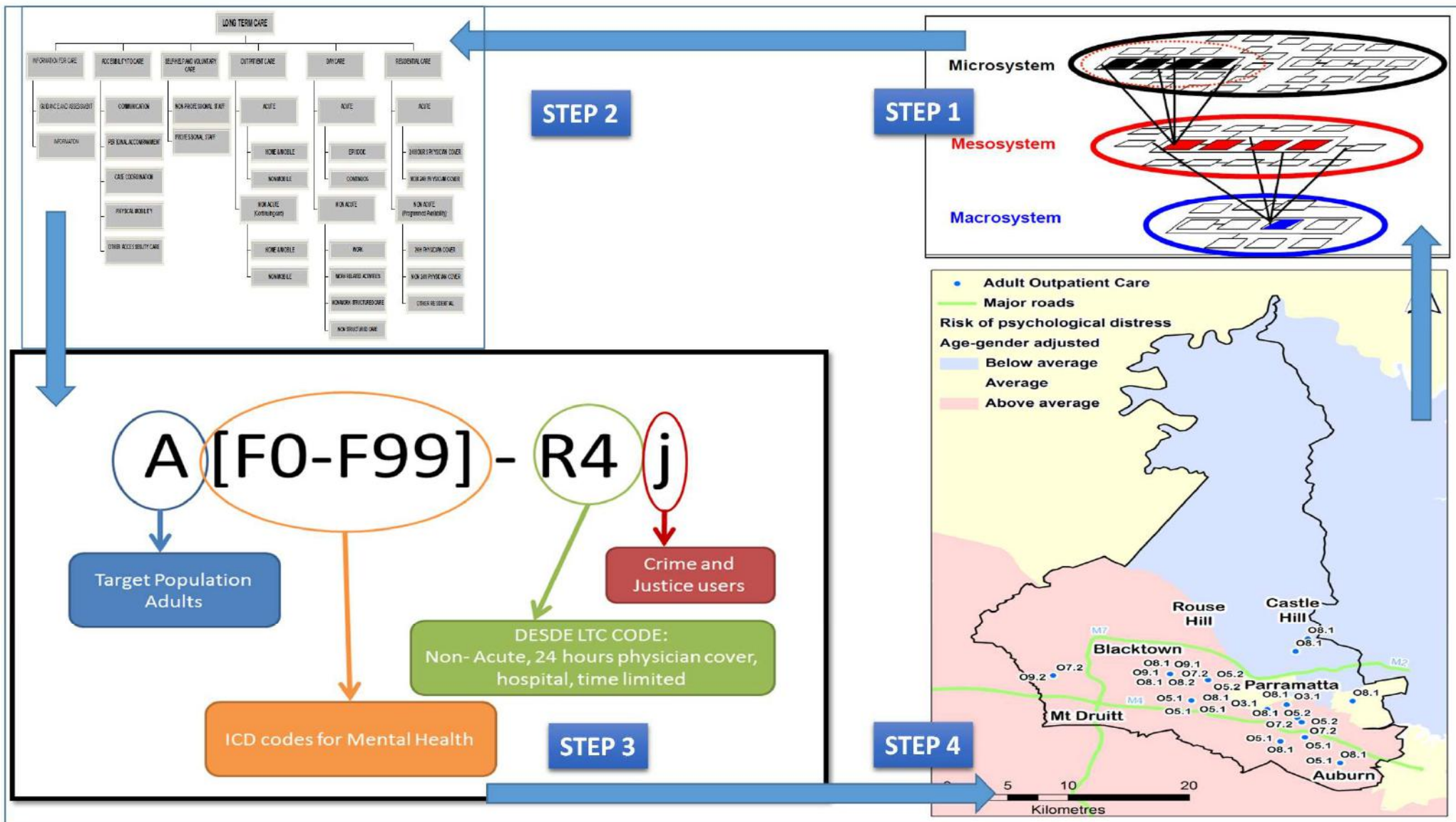
2<sup>nd</sup> We label them according to their Main Type of Care (**MTC**) they provide



## Transferability and terminological variability:



- Names of the services do not always reflect their main activity (Hospital – Outreach services- Crisis houses-medical homes)
- Names of same services vary across jurisdictions (Day care)





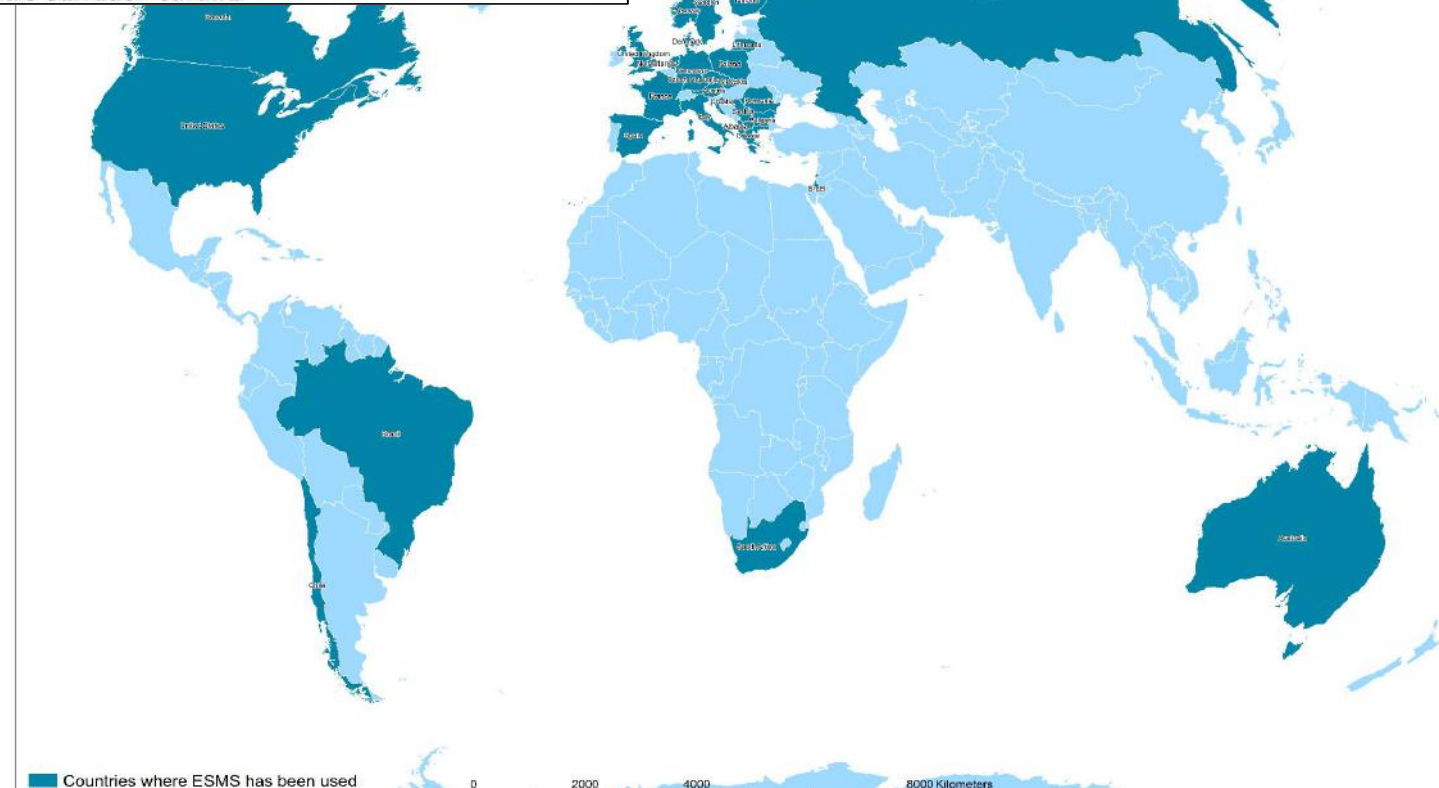
## Glocal Mental Health Atlas Project

Ref. in 151 scientific papers

71 studies using ESMS/DESDE  
Since 2000

34 Countries

- *Service mapping*  
(Standardised description of services)
- *Costs*
- *Context analysis*
- *Models of care*
- *Analysis of interventions*
- *Analysis of MH care indicators*





# AUSTRALIAN ATLASES OF MENTAL HEALTH CARE

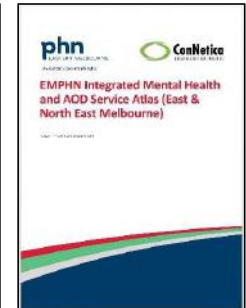
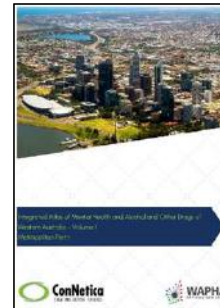
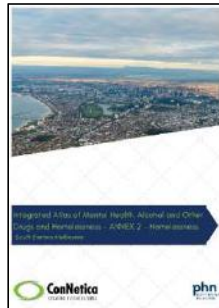
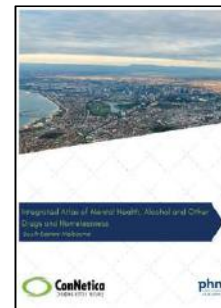
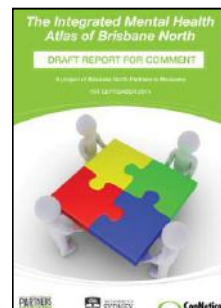
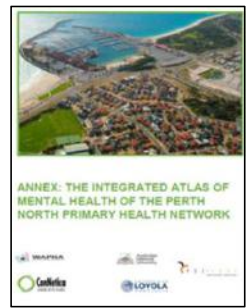
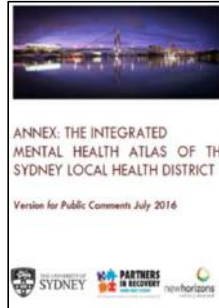
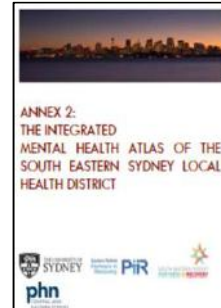
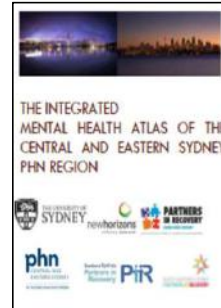
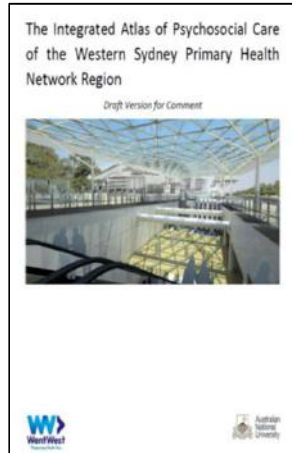
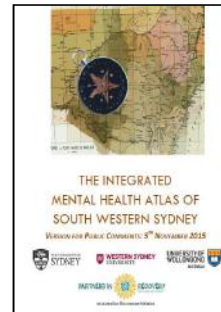
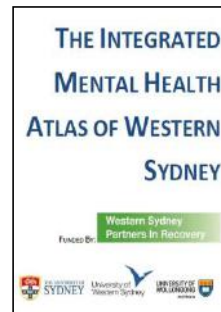
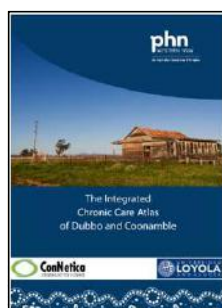
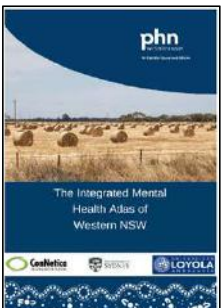
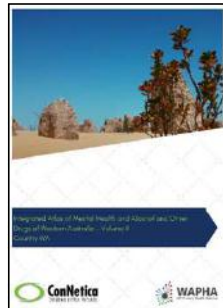
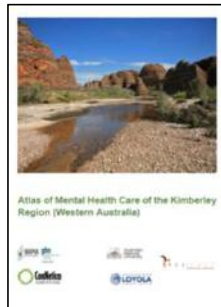
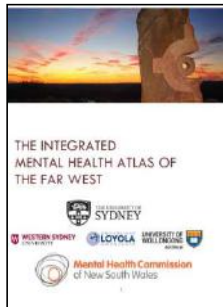
(<https://rsph.anu.edu.au/research/projects/atlas-mental-health-care>)

## THEMES

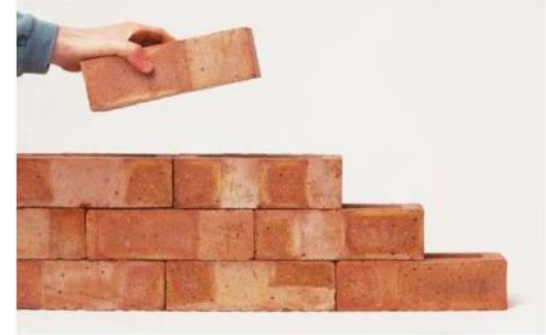
Mental Health  
AOD  
Homeless  
Chronic Care  
Social Care

URBAN

RURAL



A collaborative strategy based on systems research has been implemented to regional mental health planning



- Development of the conceptual model,
  - Atlases of regional Mental Health Care,
  - Integrated resource utilisation analysis
  - Cost of illness of sentinel conditions,
  - Financing of mental health care,
  - Geospatial analysis
  - Modelling of efficiency and organisational improvement.
- **CATALONIA (Spain)**
  - **BASQUE COUNTRY (Spain)**
  - **FINLAND**
  - **FRANCE**
  - **ENGLAND (Support Accommodation)**
  - **ACT (Australia)**



# HEALTH ECOSYSTEM ANALYSIS for Regional MH Planning

1.- Atlas of Mental Health (context, service delivery)

- Salvador-Carulla, 2002, 2006, 2010; Fernandez et al 2015)

2.- Service utilisation

- Ferrer M, et al, 2015

3.- Cost of Illness

- Salvador-Carulla et al, 2011

4. Financing (Financing of Illness)

- Salvador -Carulla et al, 2010

5.- Spatial analysis (hot and cold-spots)

- Rodero-Cosano ML et al, 2016

6- Smart and relational indicators

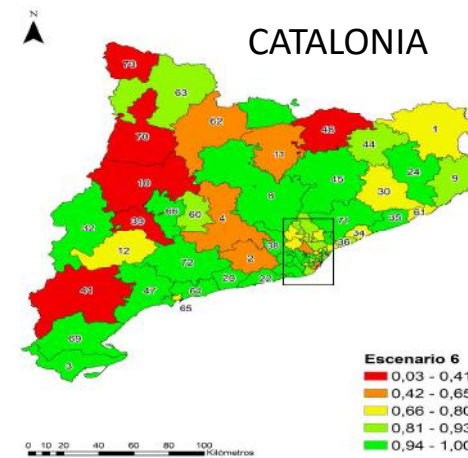
- Salinas-Pérez JA, et al, 2010

7.- Technical efficiency analysis of small health areas

- Torres-Jimenez et al, 2016

8.- Analysis of management interventions

- Garcia-Alonso et al, 2019



DESDE-LTC (Tool for Coding and Mapping): <http://www.edesdeproject.eu/>

MAPPING OF SERVICES IN EUROPE: <http://www.refinementproject.eu/>

ATLASES OF MH CARE IN AUSTRALIA: <http://cmhr.anu.edu.au/research/projects/atlas-mental-health-care>

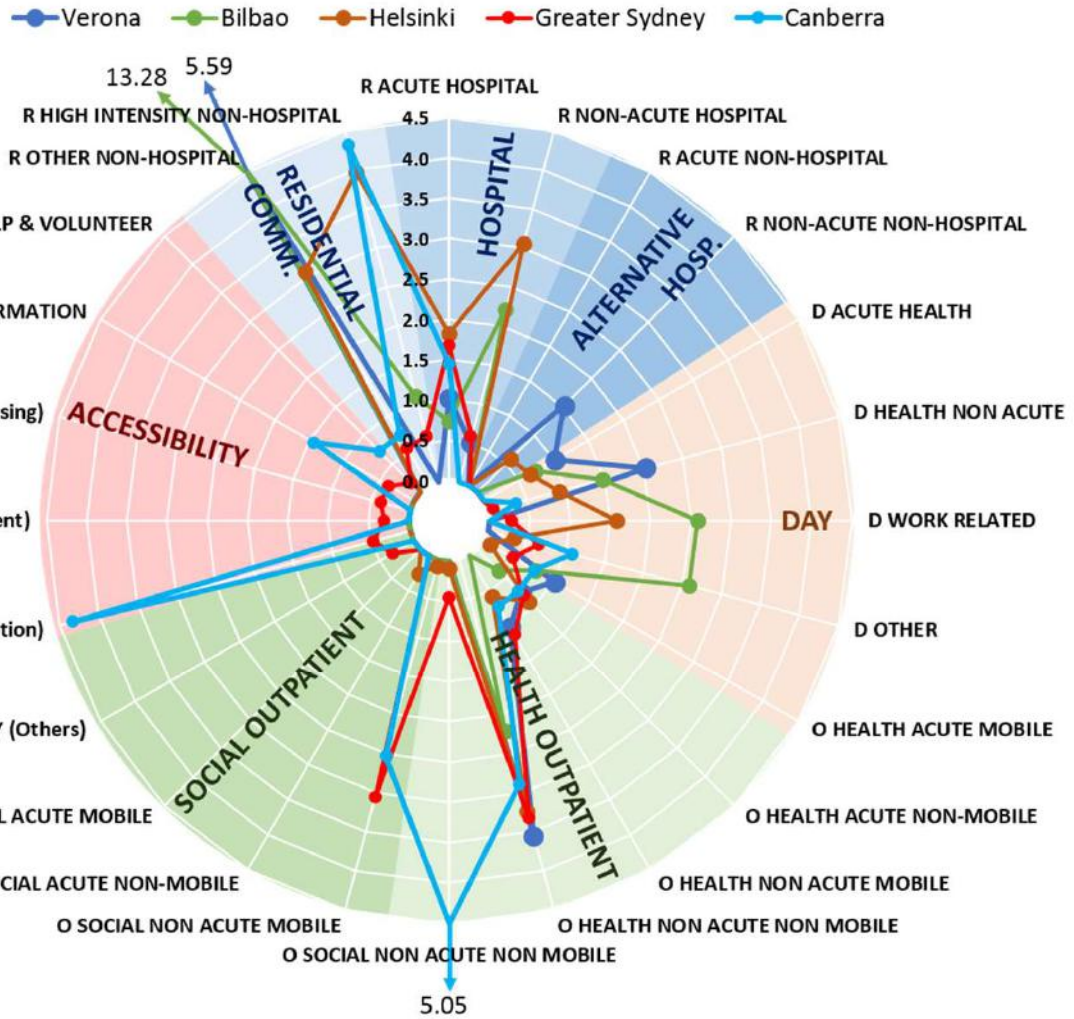
ATLASES OF MH Care in Catalonia and Bizkaia

[http://canalsalut.gencat.cat/web/.content/home\\_canal\\_salut/professionals/temes\\_de\\_salut/salut\\_mental/documents/pdf/memoria\\_integral\\_atles\\_sp.pdf](http://canalsalut.gencat.cat/web/.content/home_canal_salut/professionals/temes_de_salut/salut_mental/documents/pdf/memoria_integral_atles_sp.pdf)

[https://www.osakidetza.euskadi.eus/contenidos/informacion/rsmb\\_difusion\\_conocimiento/es\\_rsmb/Atlas%20Salud%20Mental%20Bizkaia.pdf](https://www.osakidetza.euskadi.eus/contenidos/informacion/rsmb_difusion_conocimiento/es_rsmb/Atlas%20Salud%20Mental%20Bizkaia.pdf)

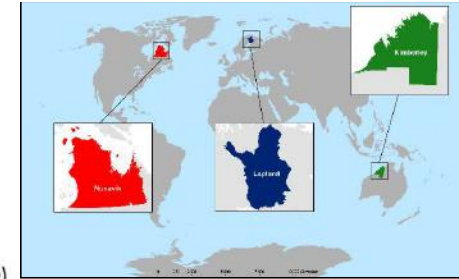


# THE MENTAL HEALTH PATTERN OF CARE FOR ADULTS Availability of MTCs per 100,000 residents (>17 y.o)



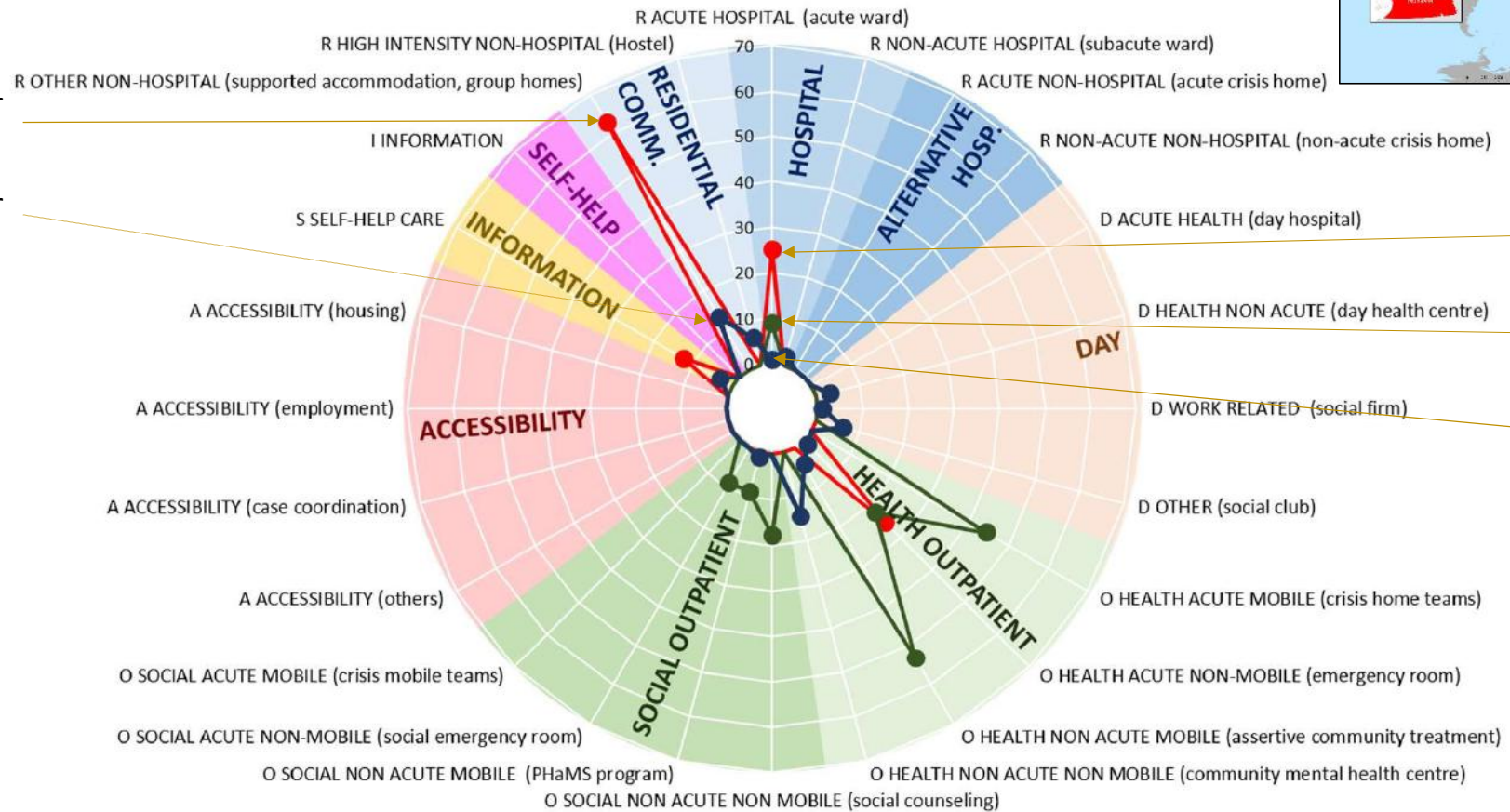
# Adult mental health care in three remote areas Rates of groups of care for adults per 100,000 adult population

—●— Nunavik —●— Kimberley —●— Lapland



188,1 beds per  
100,000 pop.

137,5 beds per  
100,000 pop.



25,1 beds per  
100,000 pop.

57,3 beds per  
100,000 pop.

14,5 beds per  
100,000 pop.

Preliminary data



# Access to Allied Psychological Services (ATAPS) program

## Spatial clustering analysis

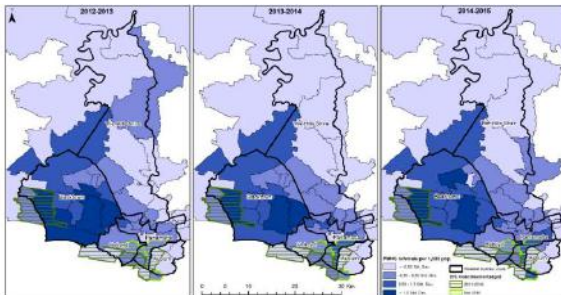
Method: spatial autocorrelation indexes

Spatial units: postcode areas in Western Sydney health district

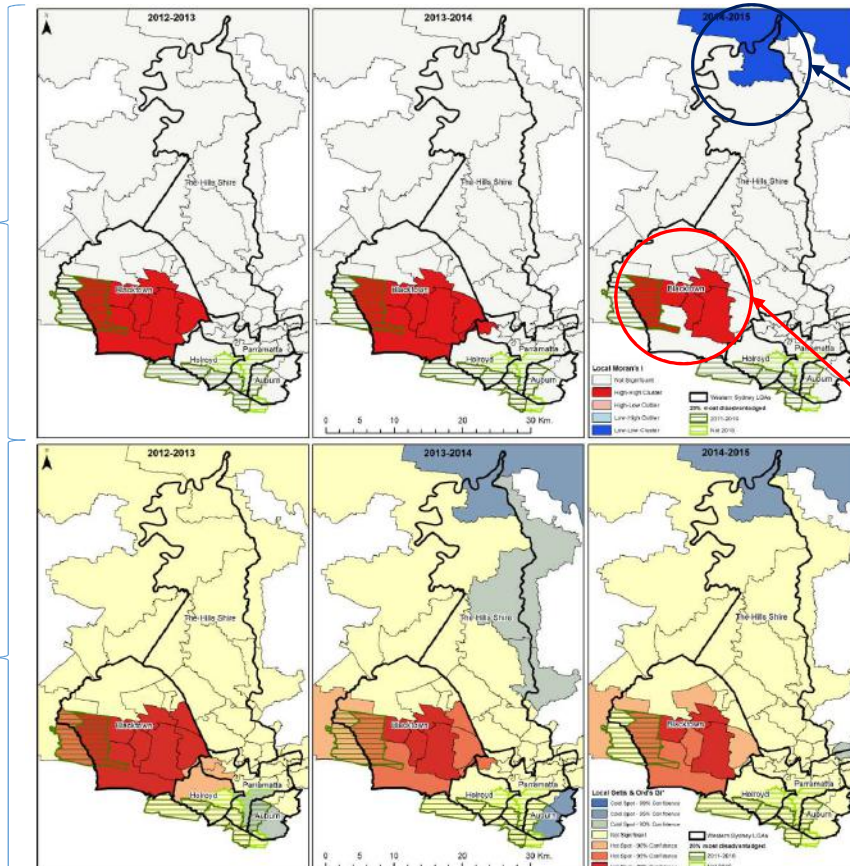
Study variables:

- Rates of referrals to a primary mental Health program (ATAPS) per 1,000 inhabitants (2012-2015)
- Neighbourhood between pairs of units.

Distribution of the referral rates



Moran's I



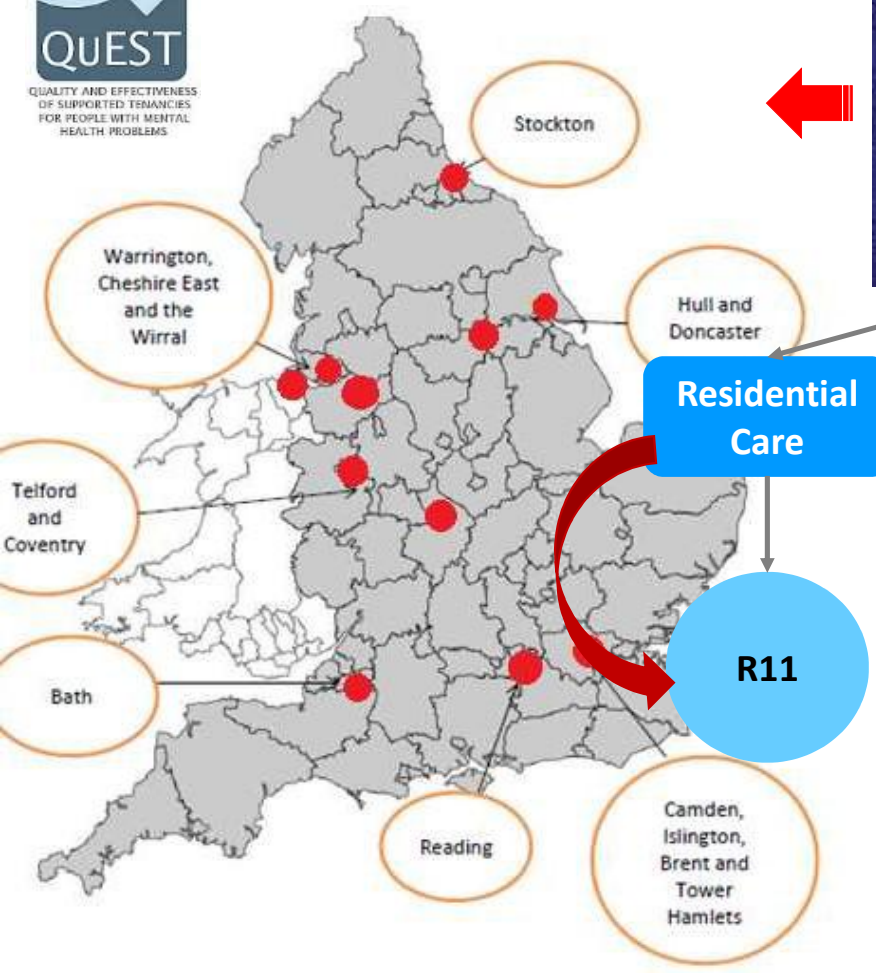
Getis & Ord's G

**Cold spot:**  
statistically significant cluster of low values

**Hot spot:**  
statistically significant cluster of high values



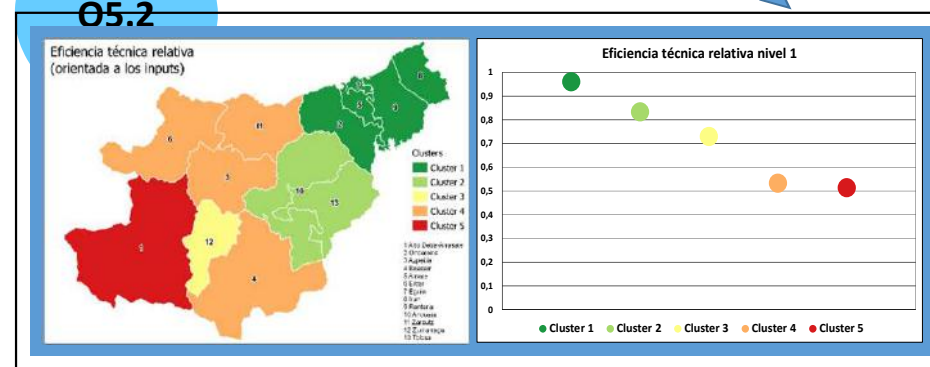
# RTE S.A. England



Residential Care      Supported Housing      Floating Outreach

R11      R8.2      05.2

# RTE MI Basque Country





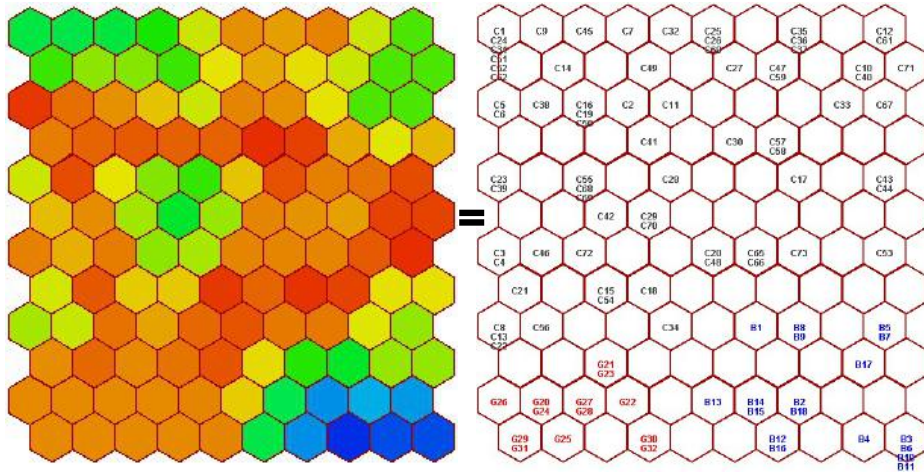
# Comparative Effectiveness Analysis of Mental Health Care Areas

Health System Engineering in the Basque Country



## INPUT (WOF SOM)

Individual **W1**



**Do you know where variation exists? SOMNeT – Machine Learning**

Evaluation of system efficiency using the Monte Carlo DEA: The case of small health areas

Mercedes Torres-Jiménez<sup>a,\*</sup>, Carlos R. García-Alonso<sup>b</sup>, Luis Salvador-Carulla<sup>c</sup>, Vicente Fernández-Rodríguez<sup>d</sup>

*European Journal of Operational Research* 242 (2015) 525–535

Small health areas (mental health centres)	Input management (Input oriented DEA)	Output management (Output oriented DEA)
Ajuriaguerra	Inefficient	Likely efficient
Barakaldo	Efficient	Efficient
Basauri	Likely efficient	Efficient
Bermeo	Likely efficient	Efficient/Likely eff.
Derio	Efficient/Likely eff.	Efficient/Likely eff.
Durango	Likely inefficient	Efficient/Likely eff.
Erandio	Efficient	Efficient
Ercilla	Efficient/Likely eff.	Efficient
Etxaniz	Likely inefficient	Efficient/Likely eff.
Galdakao	Likely efficient	Efficient/Likely eff.
Gernika	Efficient/Likely eff.	Efficient/Likely eff.
Ortuella	Likely efficient	Efficient/Likely eff.
Otxarkoaga	Likely eff./Likely ineff.	Likely efficient
Portugalete	Efficient	Efficient
Santurtzi	Likely efficient	Efficient/Likely eff.
Sestao	Efficient	Efficient
Uribe	Efficient/Likely eff.	Efficient
Zalla	Likely eff./Likely ineff.	Efficient/Likely eff.
Recalde	Likely eff./Likely ineff.	Inefficient

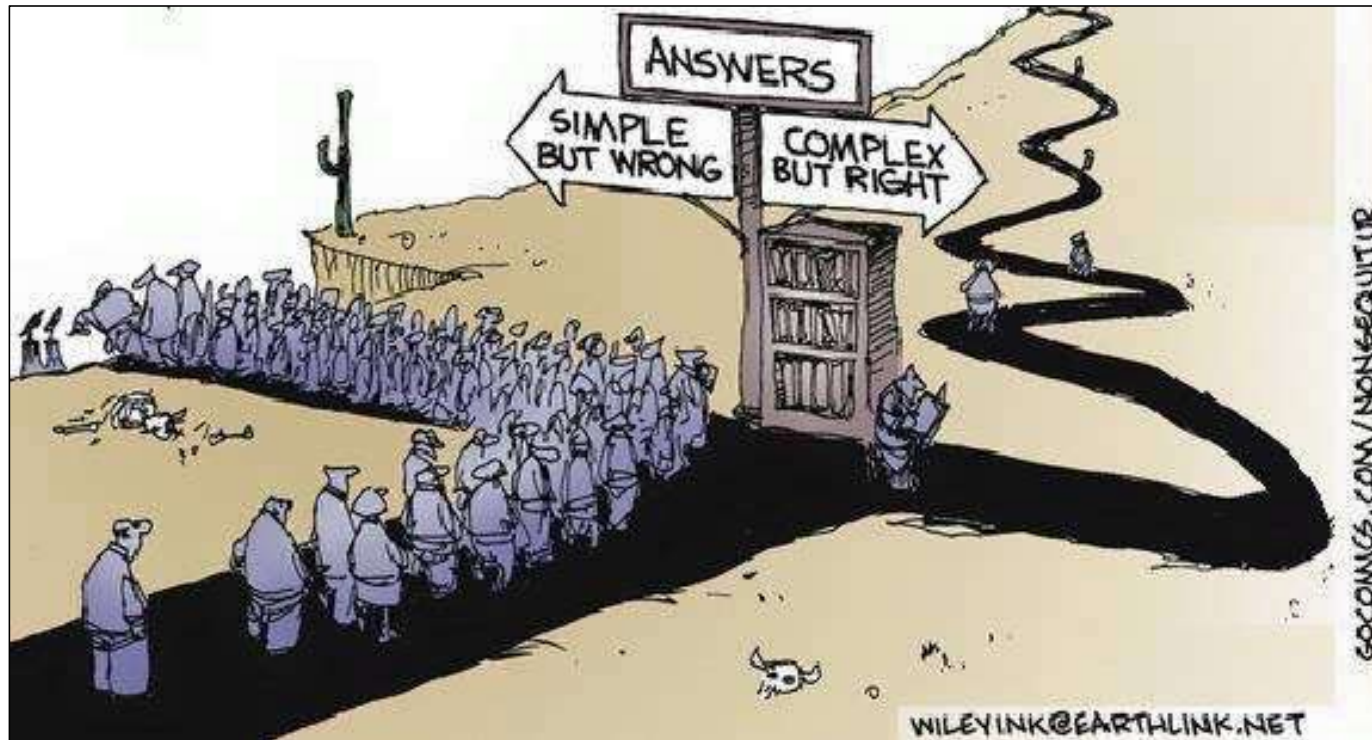


**Do you know where you stand relative to the best? Benchmarking RTE-CEA**

## Major challenges for implementation of the ecosystems research approach

- Need to accommodate the global strategy to specific short-time policy demands
- Lack of continuity of research funding and research teams
- Difficulty of information generated for practical use by decision makers and stakeholders without expert guidance
- Political cycles
- Structural and administrative constraints in the Spanish public and research systems.

Thanks!



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