



Explorations on alignments and misalignments between research agendas and societal needs

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This visit: OpenRAM MSCA Staff Exchange (UoE PI -Niki Vermeulen)

- Towards “Multiversatories” (contextualized STI Observatories) methods, tools and case studies for pluralizing research assessment
 - Work towards more contextualized and inclusive evaluation
 - Establish federated and open infrastructures
 - Develop context-sensitive indicators and mappings together with inclusive and participatory approaches

WP3

- Study epistemic inequities (IR in lead)
- Explore equitable collaborations (Niki in lead)

Meeting scheduled for Tuesday Aug. 25th 14:00-15:00

Where I am coming from

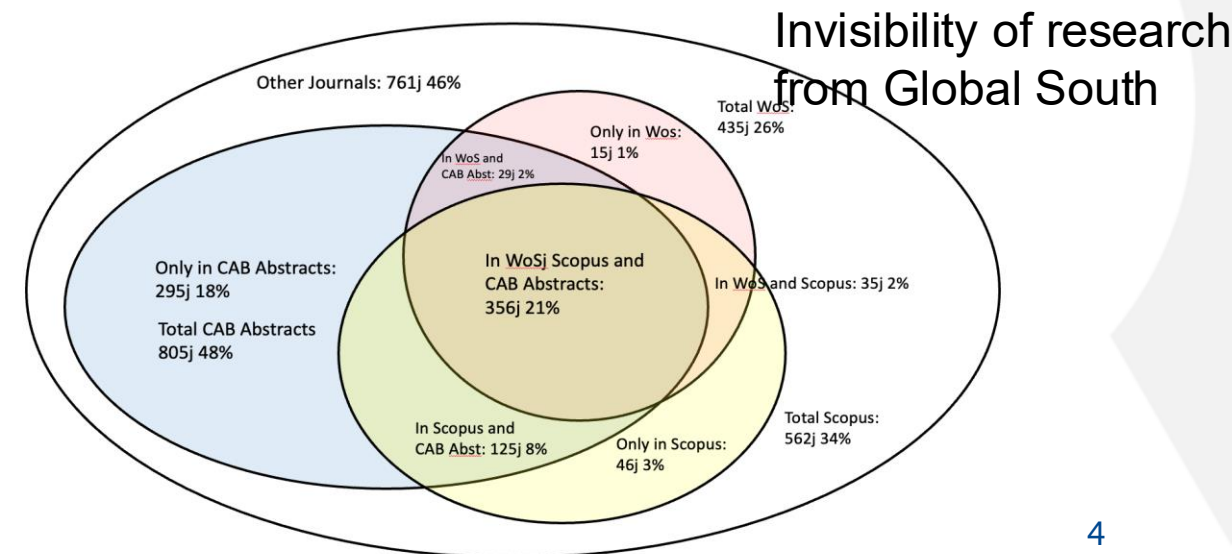
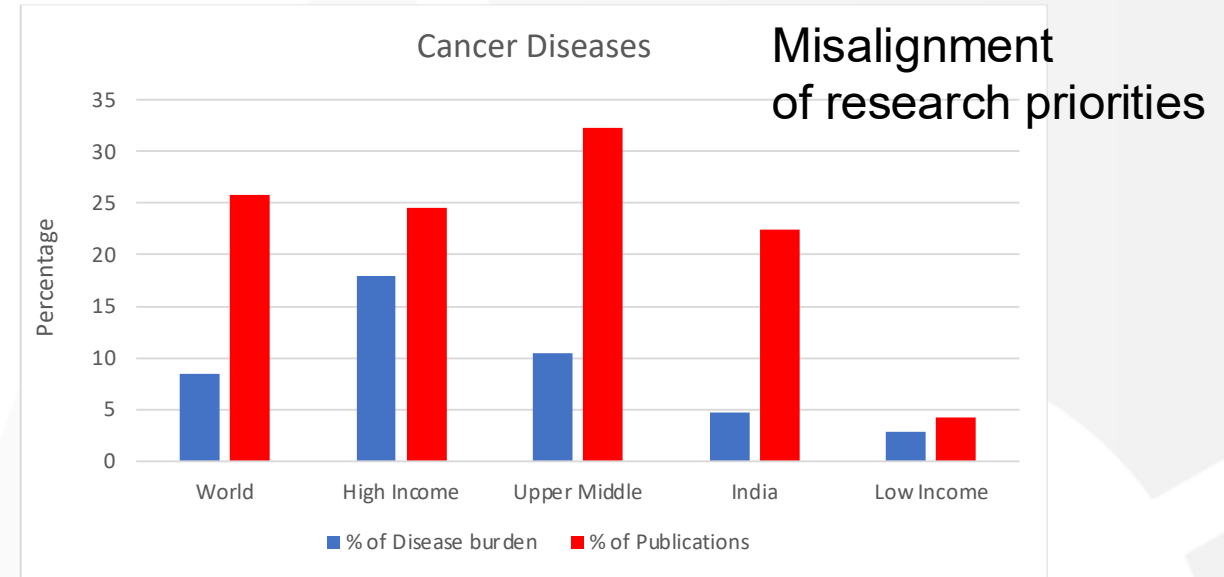
- Biophysics PhD in Japan and postdoc at Cornell in Nanobiotech
- Mapping interdisciplinary research (SPRU, 2004-2012)
- Mapping Dynamics of Emergent Techs: taking RRI perspectives, i.e. risks and benefits and societal needs
- Reversing the question: Given a societal issue, which research options can help address it? Which are preferred?
- Active in Research Evaluation Reform (Leiden Manifesto, 2015) and Open Science (UNESCO broader, RRI related framework).

UNESCO Chair on Diversity and Inclusion in Global Science

With Rodrigo Costa (new chairholder),
Ingeborg Meijer André Brasil, Louise
Bezuidenhout (CWTS, Leiden)

Three main lines

- Investigate epistemic/topic diversity:
e.g. health priorities
- Studies on (in)visibility of scientific
research from non-hegemonic
spaces (e.g. Global South)
- Supporting UNESCO in developing
monitoring for (countries)
commitments to science (e.g. OS)



Outline

1. The notion of misalignment (15')
2. Research priorities across diseases (selection of problems) (10')
3. Research priorities in mental health (selection of agendas) (15')
4. Learning and next steps (10')

Please - interrupt me during the presentation

1. The notion of misalignment

Motivation of the research agenda

1. Increasing evidence that current Science, Technology and Innovation tends to benefit more the richest countries, communities and social strata – reinforces inequalities (Barry Bozeman)
2. Science policy (funding instruments) can address these inequalities by supporting under-studied issues (e.g. neglected diseases) that would benefit disenfranchised communities (Dan Sarewitz, David Hess)
3. The purpose of our analysis is **to map epistemic inequalities** in order to help how to re-shape funding instruments that ALSO address the needs of poor populations.

Research supports forms of innovation that lead to questionable or harmful outcomes... RRI

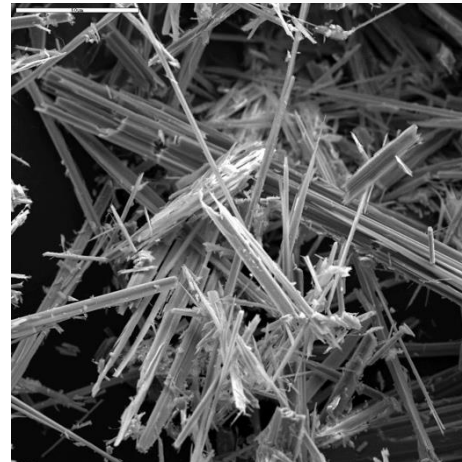
Climate change



AI for manipulation



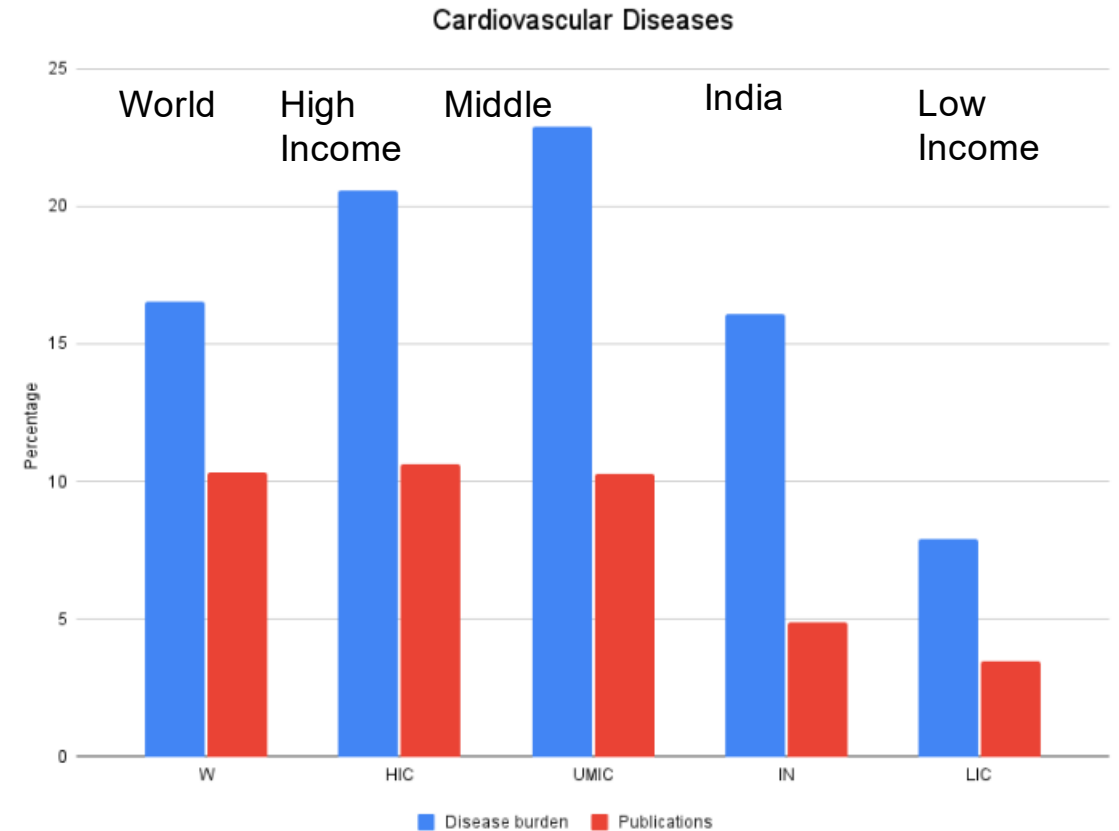
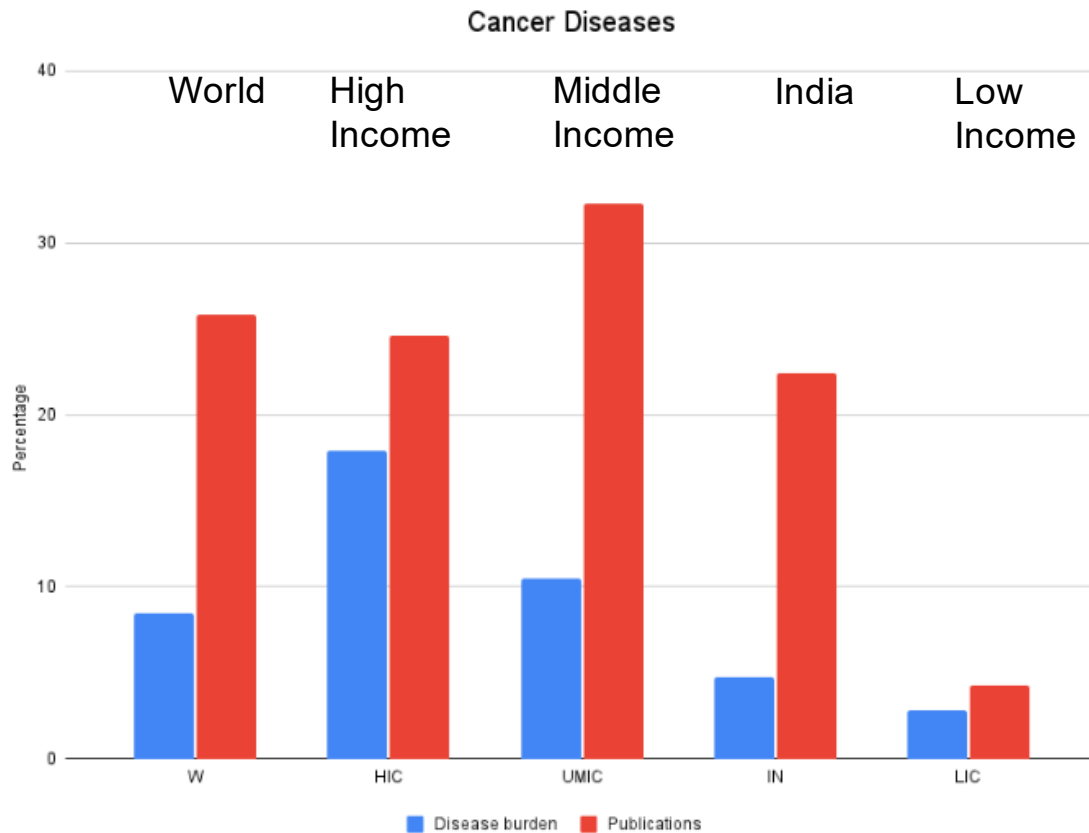
Asbestos



Instabilities in financial innovation

Misalignment (I): research agendas that help improve outcomes... but increase inequalities

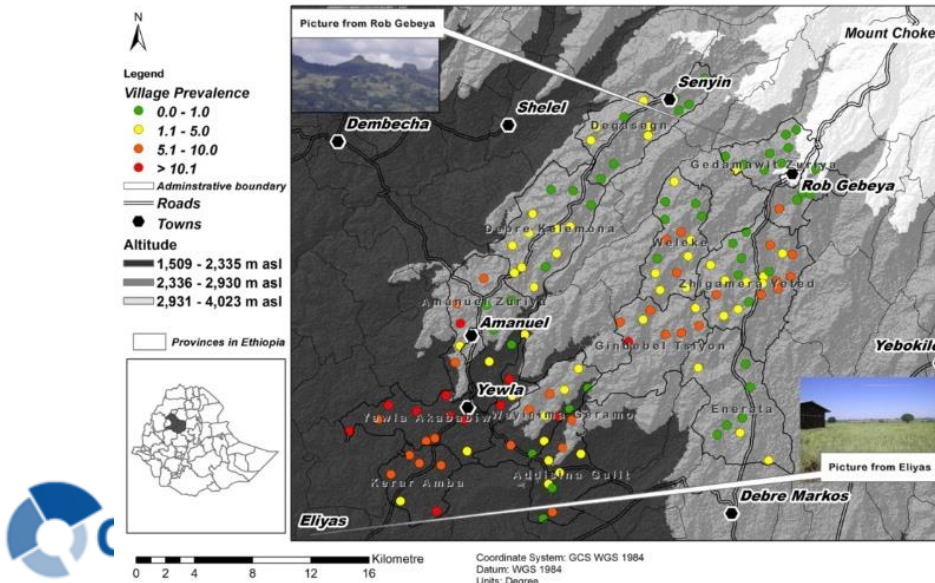
Comparison between disease burden and research focus



Misalignment (II): on topic of need, but of questionable social relevance

Research on Podoconiosis: genetics, soils or shoes?

Podoconiosis (non-falarial elephantiasis) is a neglected tropical disease recognised by the swelling it generates to the feet or lower part of the leg. The disease is due to people walking barefoot on irritant minerals that can be found in clay soil in Cameroon and Ethiopia.



A research project may involve:

- Genetic predisposition analysis
- Soil analysis
- Geo-statistical mapping of the areas most affected

→ However: would access to shoes would highly reduce the problem?

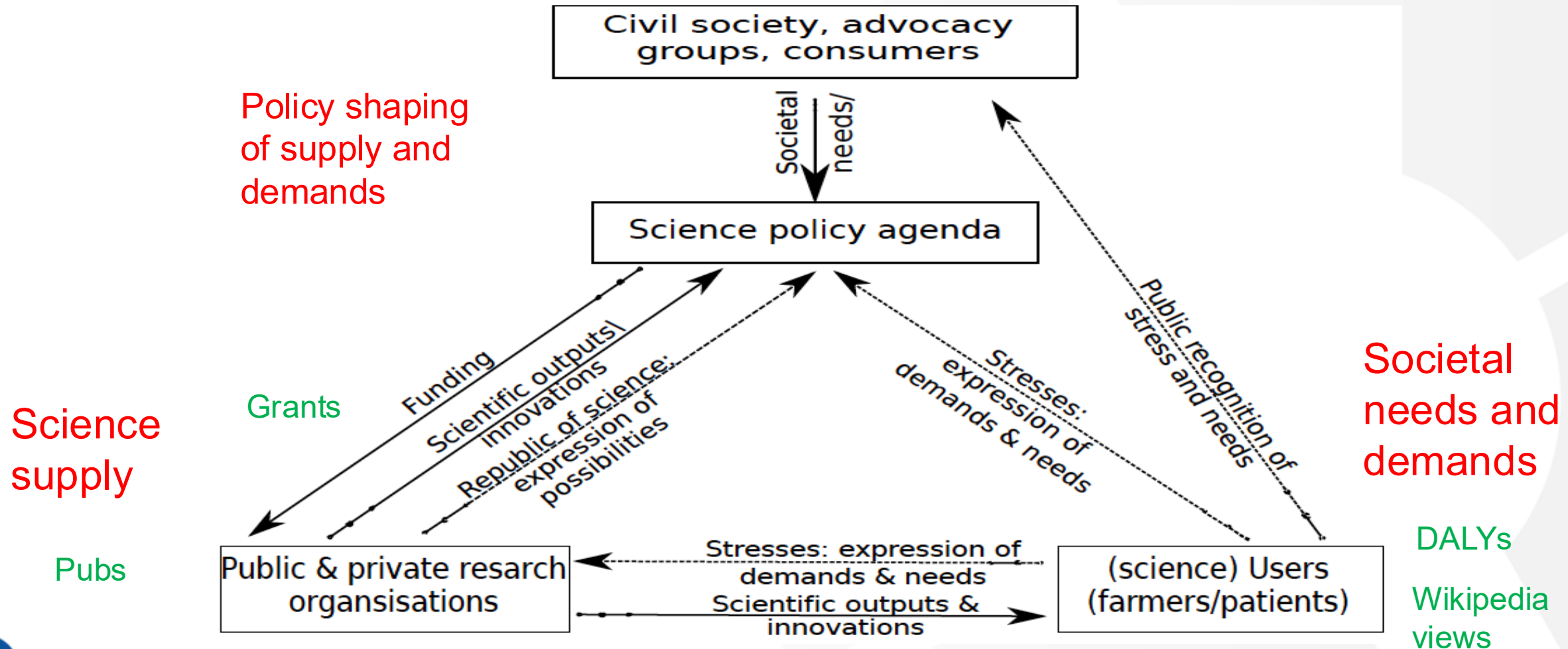
Coburn, Chataway and Ohid (2022)

Sarewitz and Pielke (2007): The neglected heart of science policy: reconciling supply of and demand for science

The funding of scientific research is almost always justified in terms of the potential for achieving beneficial societal outcomes. (...) In this paper we conceptualize:

- (1) science in terms of a “supply” of knowledge and information,
 - (2) societal outcomes in terms of a “demand” function that seeks to apply knowledge and information to achieve specific societal goals, and
 - (3) science policy decision-making as a process aimed at “reconciling” the dynamic relationship between “supply” and “demand.”
- (...) “better” science portfolios (...) would be achieved if science policy decisions reflected knowledge about the supply of science, the demand for science, and the relationship between the two.”

A non-linear model on the shaping of research priorities.

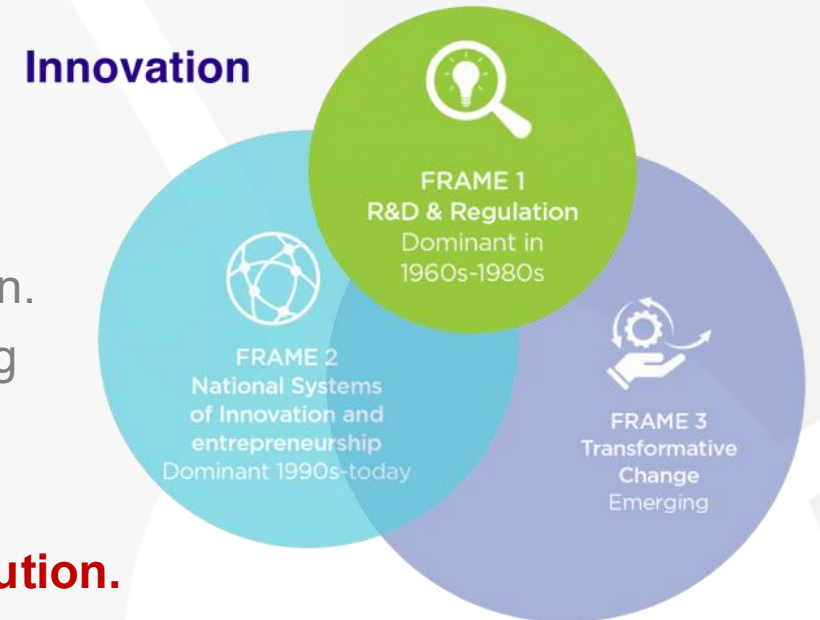


Directionality in research agendas

- Undone science (David Hess, Frickel et al., 2010)
 - Research that is not conducted in formal science institutions
 - Social movements, stakeholders may succeed in making it happen (e.g. in environmental science)
- Not to impose an agenda, but to pluralise research agendas
- Directing, direction and directionality (Stirling, 2009)
 - (a) **‘the directing of innovation’** – driving and accelerating processes of adoption and acceptance.
 - (b) **‘the direction of innovation’** – steering selected particular possible pathways rather than others.
 - (c) **‘the directionality of innovation’** – grasping irreducible pluralities of possibility in balanced ways. Directionality: “(...) about balancing multiple social agencies concurrently across diverse alternative orientations” (Stirling 2007).

Three frames of innovation policy (Schot and Steinmueller, 2018)

1. Linear model (postwar until 1980s)
 - Science → Technology → Innovation → Well-being
2. Innovation Systems (early 1990s until late 2000s)
 - Interactions between stakeholders are key to produce innovation.
 - STI interactions → Innovation → Economic Growth → Wellbeing
3. **Inclusive or transformative innovation (2010s...)**
 - **Innovation NOT necessarily positive – climate change, pollution.**
 - **Situated and contextual: what? where? who? for whom?**
 - **Attention to diverse types of knowledge -- given uncertainty**
 - **Plural views on directions/goals of research and innovation**
 - **Mission-orientation, grand challenges, SDGs...**



Transformative Innovation
Policies Consortium
<https://www.tipconsortium.net>

Priorities and epistemic diversity:

What should be the balance between research options?

ONTOLOGY:

What are, who defines options?

What type of technological interventions for energy?

- Wind turbines?
- Biofuels?
- Nuclear plants?
- Solar panels?
- Network managements (centralised? decentralised)?
- Thermic isolation materials?
- Reduction of transportation?

Portfolio – managing diversity Stirling (2007).



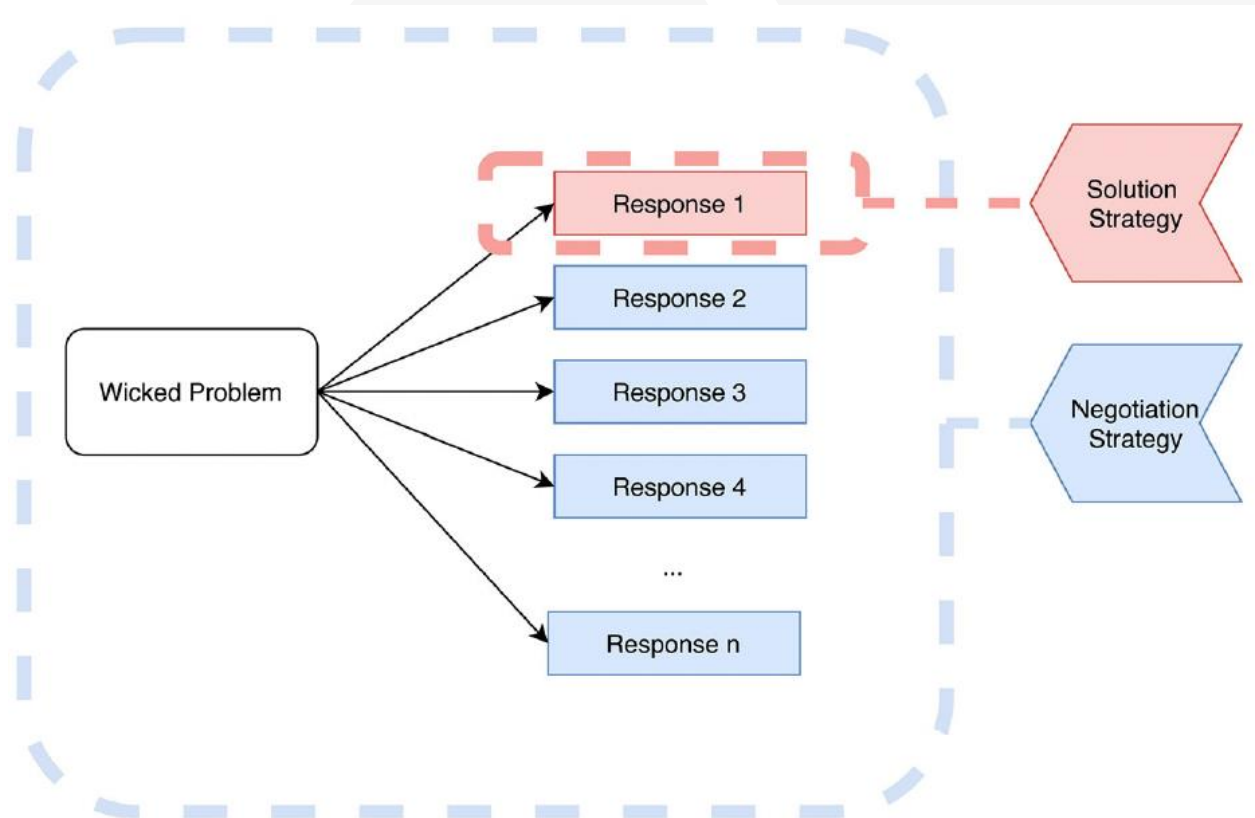
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Social inclusion:

Stakeholder engagement on directions and balance

- Avoiding ‘solutionism’
- Which directions to pursue in complex (wicked) problems?
 - Contested framings and responses
- Engagement as a way to negotiate understandings and perceptions of societal needs and demands
- Knowledge of local context - avoid *one-fits-all* solutions
- Lay and non-academic expertise, not only driven by vision of elite scientists or technocrats



Prioritisation: capabilities, uncertainty and values

- **Research does not yield solutions → Capabilities for solutions**
 - Depending on type of research → orientation towards certain interventions / solutions
 - The linear model (science-technology-innovation) is FALSE
 - Multidisciplinary consensus (economists, sociologists, historians of science and innovation)
 - **Uncertainty** on what research options can lead to “solutions”
 - Malaria: thousands of studies on vaccines and drugs but most improvement has come from low-tech (Insecticide nets)
 - **Values and social contexts (political economy)** influence the preferences for certain interventions / solutions
 - Obesity: diet, drugs, physical exercise or bariatric surgery?
- Research options can be prioritised in many different ways depending on contexts, values and interests

Methodology... in the making

1. MappingS of current research focus / priorities

- Publications (e.g. using WoS, with PubMed descriptors for disease)
- Funded projects (grant databases -- e.g. Dimensions)

Various
studies
conducted

2. MappingS of societal needs and demands

- Qualitative methods
 - Interviews, focus groups (mental health, obesity)
- Quantitative estimates of needs/demands:
 - WHO data on Global Disease Burden at country level
 - DALYs (Disability Adjusted Life Years), ICD-10
 - Use of (FAO data on rice use / demand)
 - Prevalence, costs (from healthcare databases, ICD-10)

Exploratory
studies

3. Deliberative processes on misalignment → INEQUALITIES

- Experts & stakeholders (patient groups) informed by priorities (1) and needs (2) -- influencing informing policy decisions.

Future
work

Case 1:

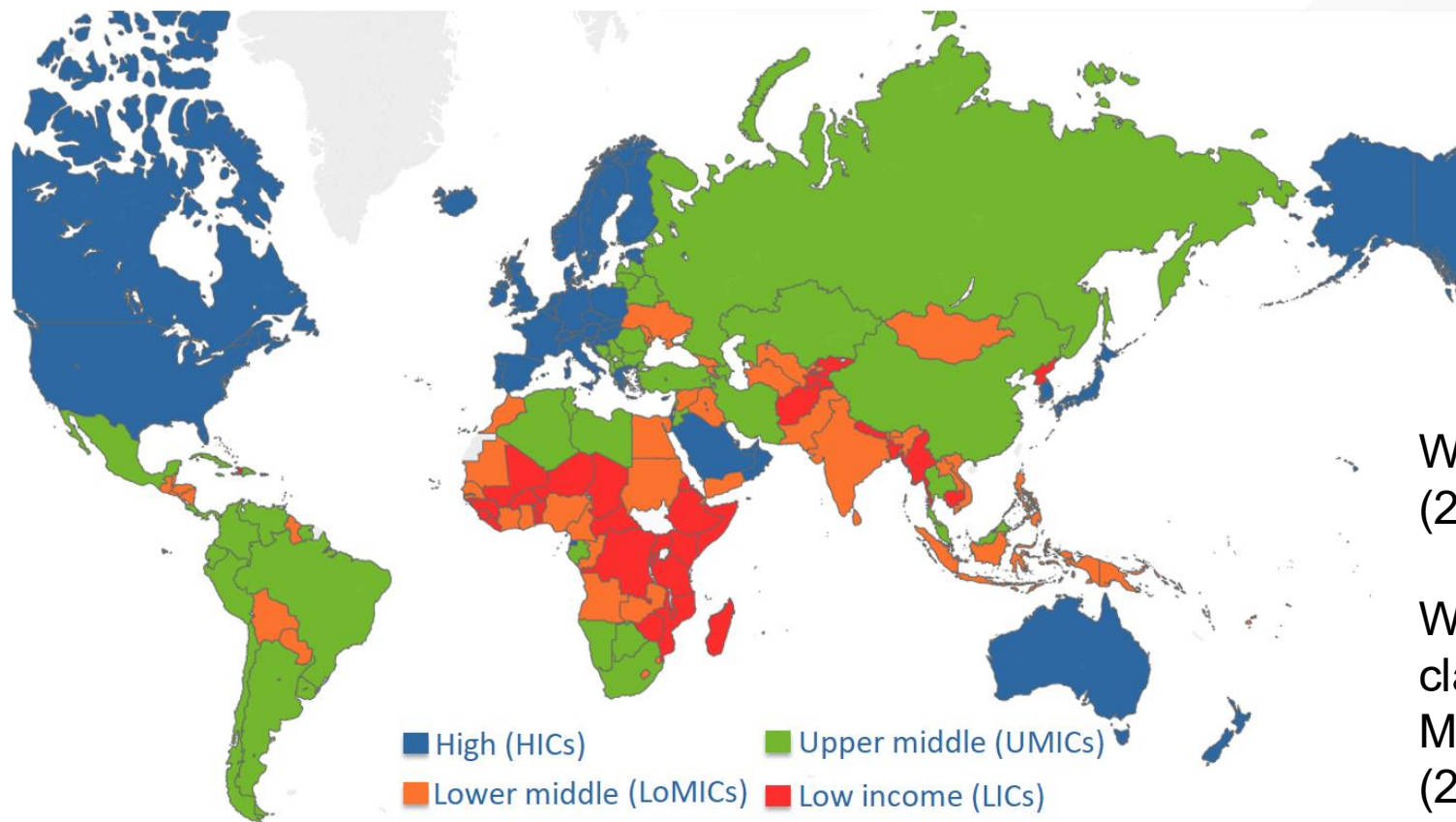
Priorities across ‘problems’

Misalignment across diseases

(Yegros et al., 2020; Kumar et al. 2024)



Data and methods



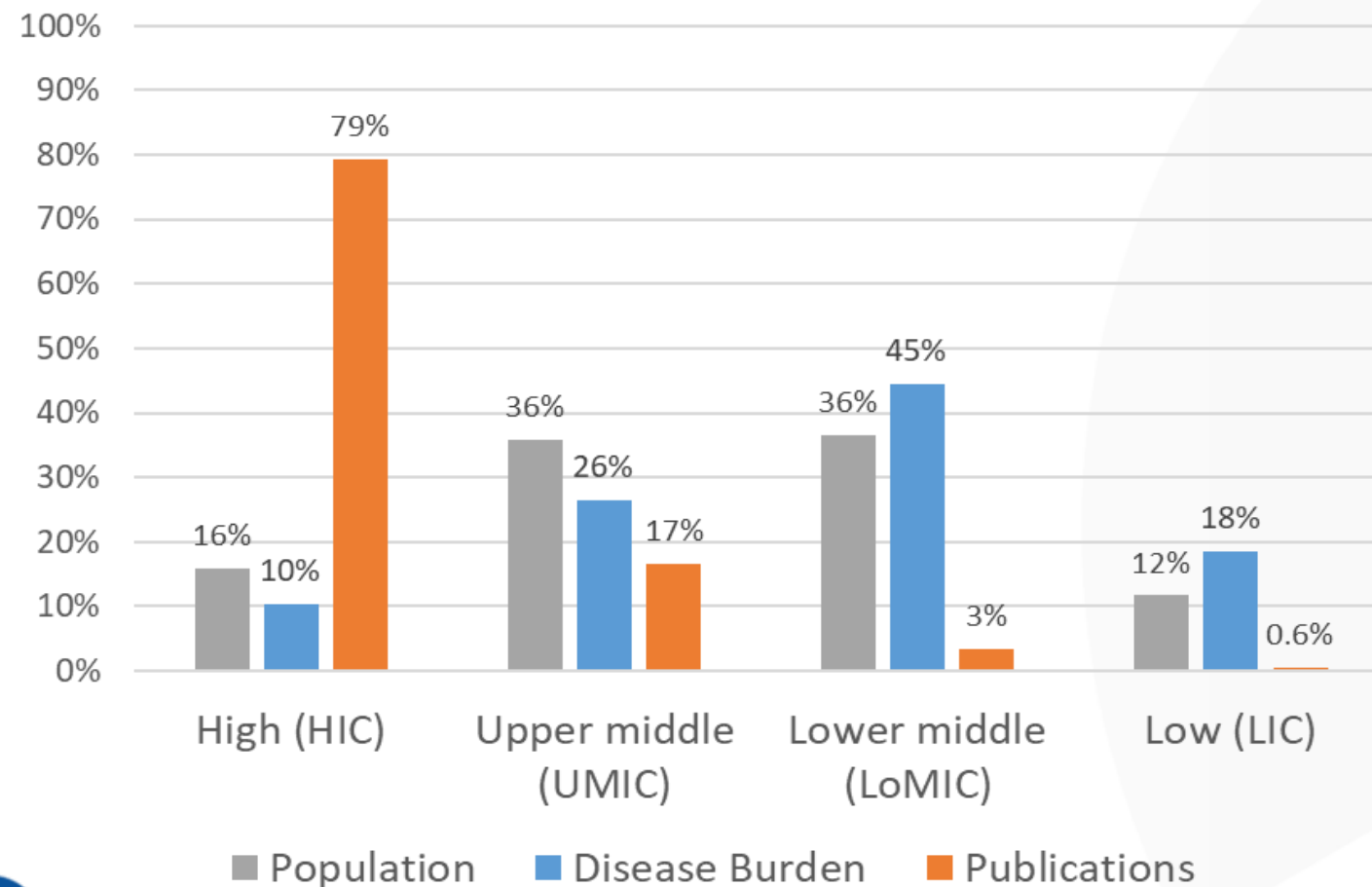
WHO data on disease burden
(2010)

WoS pubs according to
classification of Pubmed
MeSH into diseases
(2010-2014)

Notice medical-centred ontology

Global burden vs Global research

Population, disease burden (DALYs) and publications by country income level



WHO data on disease burden

WoS pubs according to
classification of Pubmed
MeSH into diseases

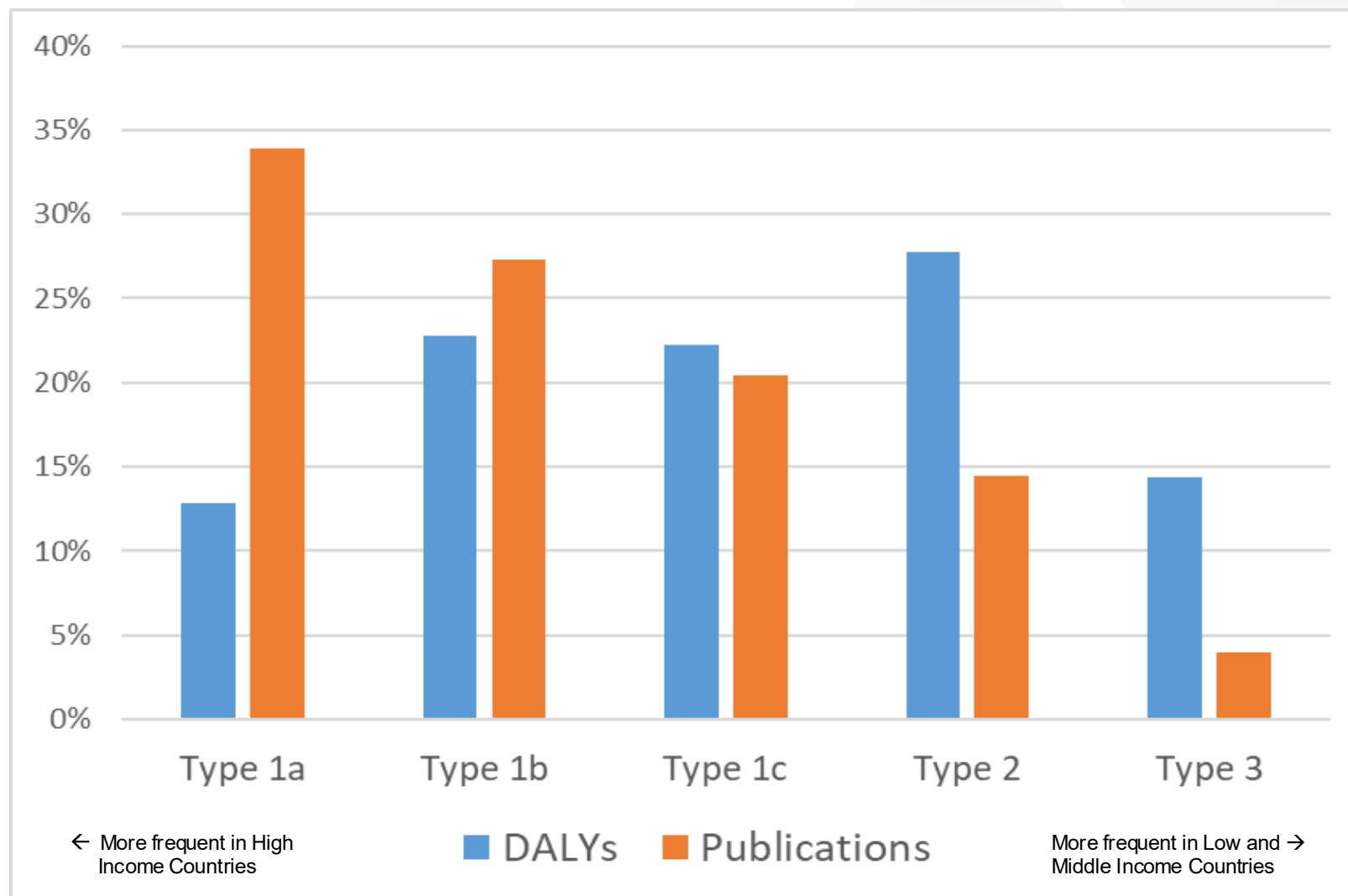
-- Many pubs missing,
particularly in LMICs.

Data and methods

Type	Relative disease burden per capita ¹	Description	# Diseases	Exemplary cases
1a	< 0.75	More burden in HICs	34	Colon cancer, breast cancer, Alzheimer's disease
1b	$0.75 \leq x < 1.25$	Equal burden	28	Depression, schizophrenia, ischemic heart disease
1c	$1.25 \leq x < 3.00$	A bit more burden in LMICs	26	Cirrhosis, stroke
2	$3.00 \leq x < 35.0$	More burden in LMICs	22	Maternal conditions, HIV
3	≥ 35.0	Quasi exclusive of LMICs	24	Malaria, diarrhoeal diseases

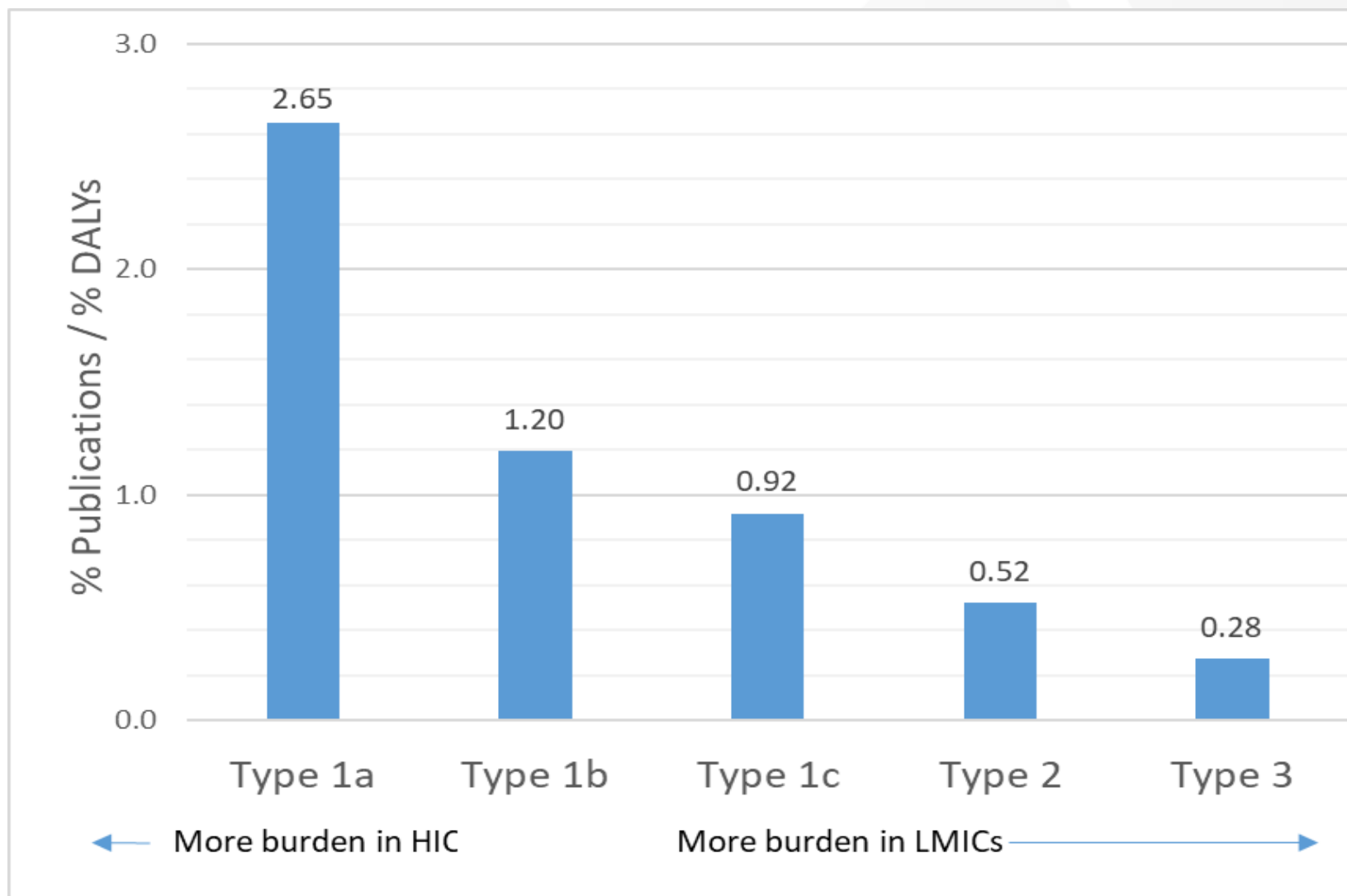
Global burden vs Global research

Global percentage of DALYs and publications by disease type



Global burden vs Global research

Relative effort in relation to disease burden by disease type

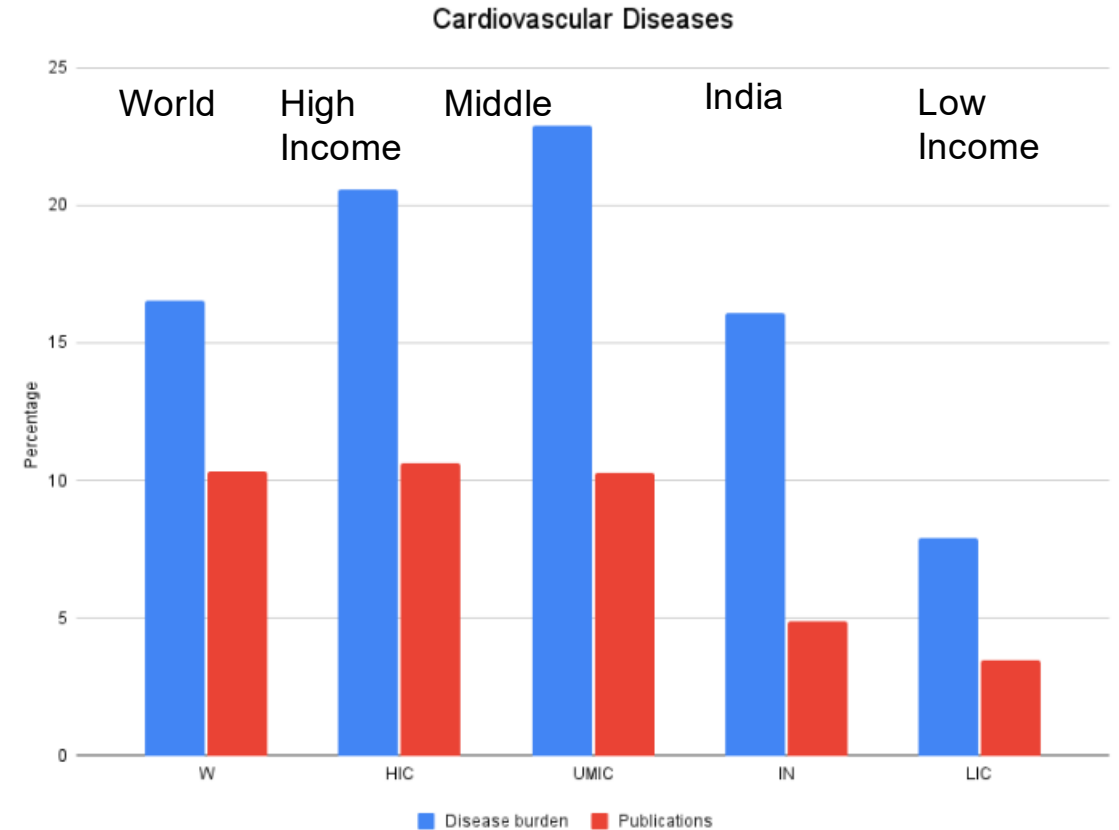
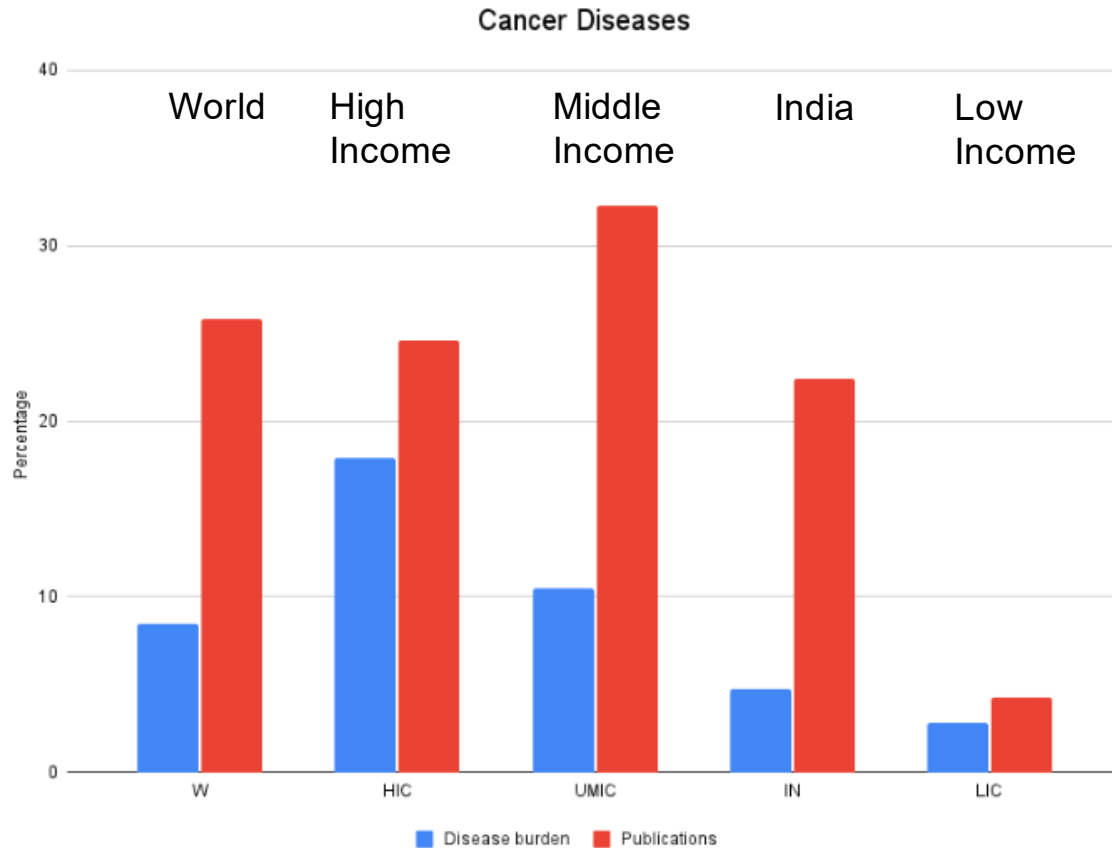


The focus of pharma research

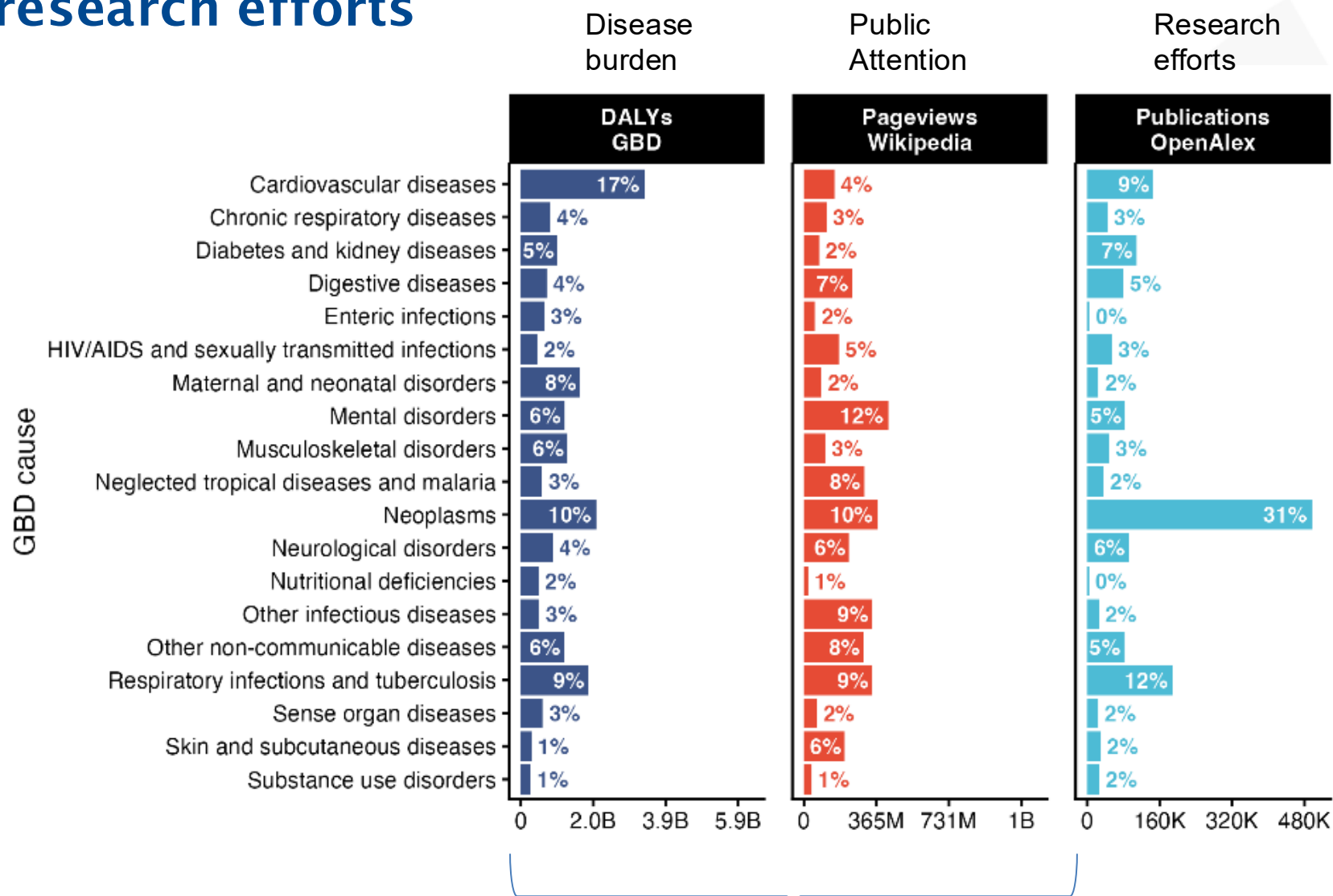
Relative research effort by disease type by big pharma



The difference is not between communicable and non-communicable diseases.
It depends on specific diseases.



Health demands in burden and public attention vs. research efforts



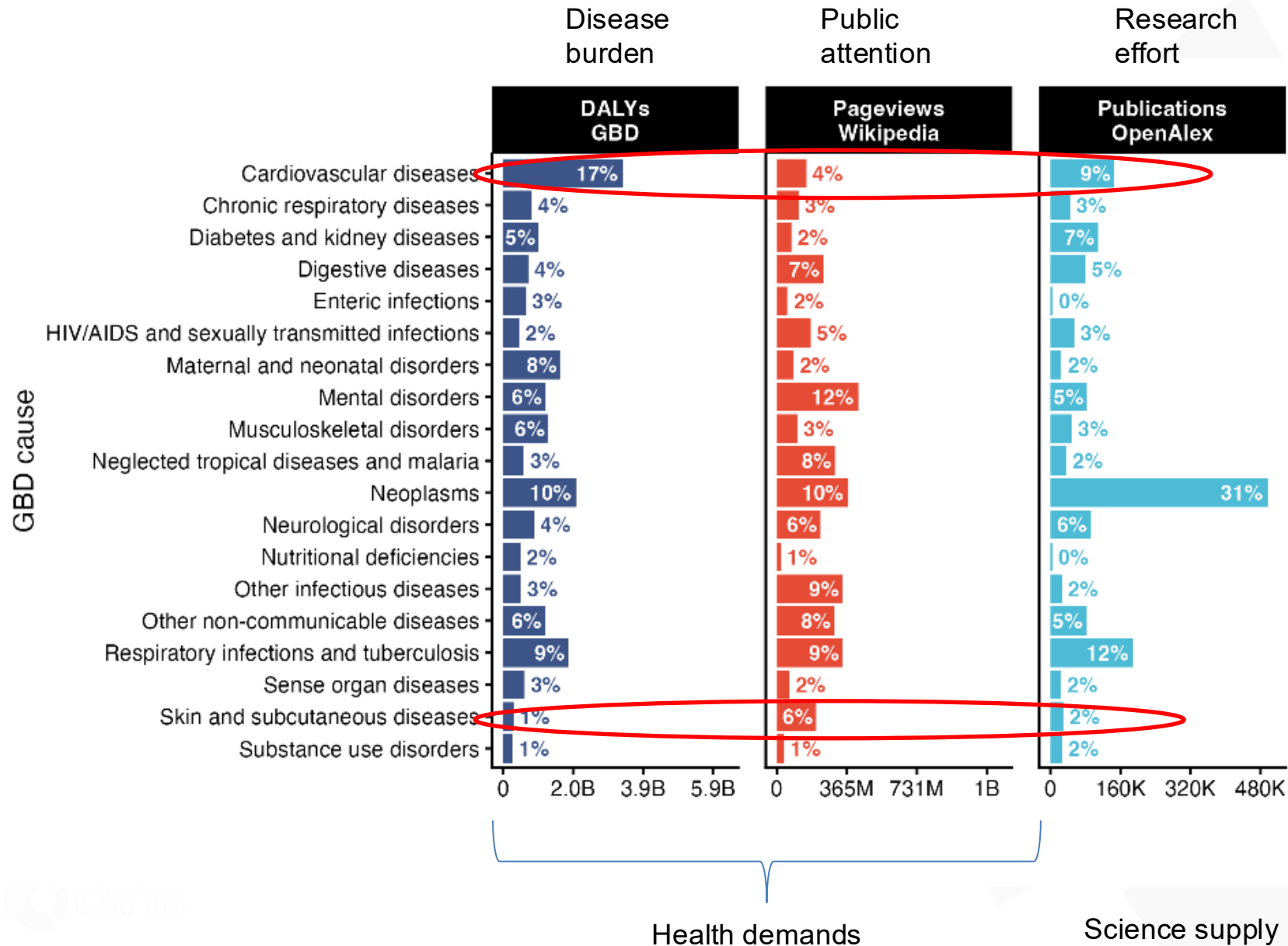
3335.1M	154.8M	146k
802.7M	113.4M	45k
993.7M	76M	109k
703.3M	241.4M	80k
637.5M	55.9M	5k
450M	175M	54k
1602.3M	86.7M	25k
1183.7M	423.9M	84k
1260M	106.8M	48k
573.3M	304M	36k
2035.8M	372.6M	496k
864.2M	227.1M	91k
484.9M	20.6M	4k
493.5M	343.1M	26k
1173.1M	300.8M	82k
1810.1M	343.4M	189k
591.9M	65.1M	25k
280.8M	205.7M	30k
264.3M	37.6M	27k
DALYs GBD	Pageviews Wikipedia	Publications OpenAlex

Arroyo, Diaz-Faes and Rafols (2026)

Estimates of health needs

Science supply

Other health demands/needs: public attention



3335.1M	154.8M	146k
802.7M	113.4M	45k
993.7M	76M	109k
703.3M	241.4M	80k
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Case 2:

**Misalignment in research
trajectories / agendas**

Priorities in mental health

**A study conducted for Vinnova
to inform Swedish Mental Health
strategy (Klippe et al., 2023)**



Research priorities according to experts (3 focals groups & 10 interviews)

Gap between research and practice

- gap between scientific communities and practitioners
- difficult adoption of research results
- need for more research oriented to intervention and implementation

Growing needs and demands of prevention and contextualization

- higher awareness and visibility of mental health problems,
- more demands to address subclinical mental discomfort
- emphasis in prevention and rehabilitation, would require the transfer of research from clinical to non-clinical settings, such as schools, the family or jobs

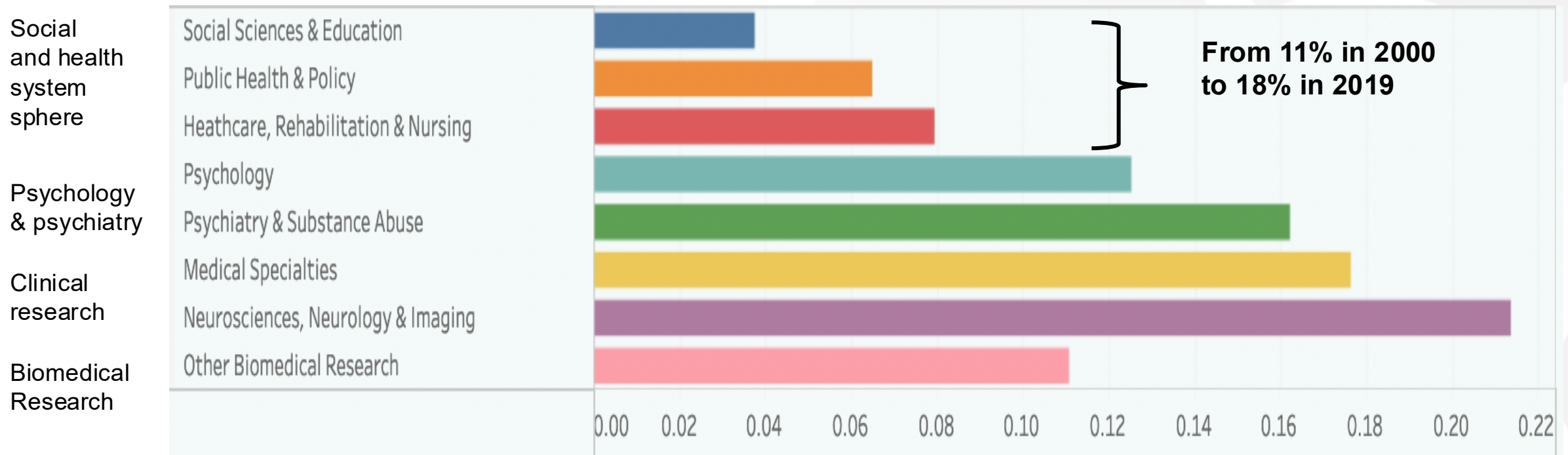
Research on shared tasks requires plural and transdisciplinary approaches

- To conduct research in non-clinical environments, multiple disciplines are needed such as education, sociology, occupational psychology, urban planning, social work, etc.
- Research for the promotion of wellbeing as a shared task between diverse disciplines and social sectors requires broad and transdisciplinary approaches

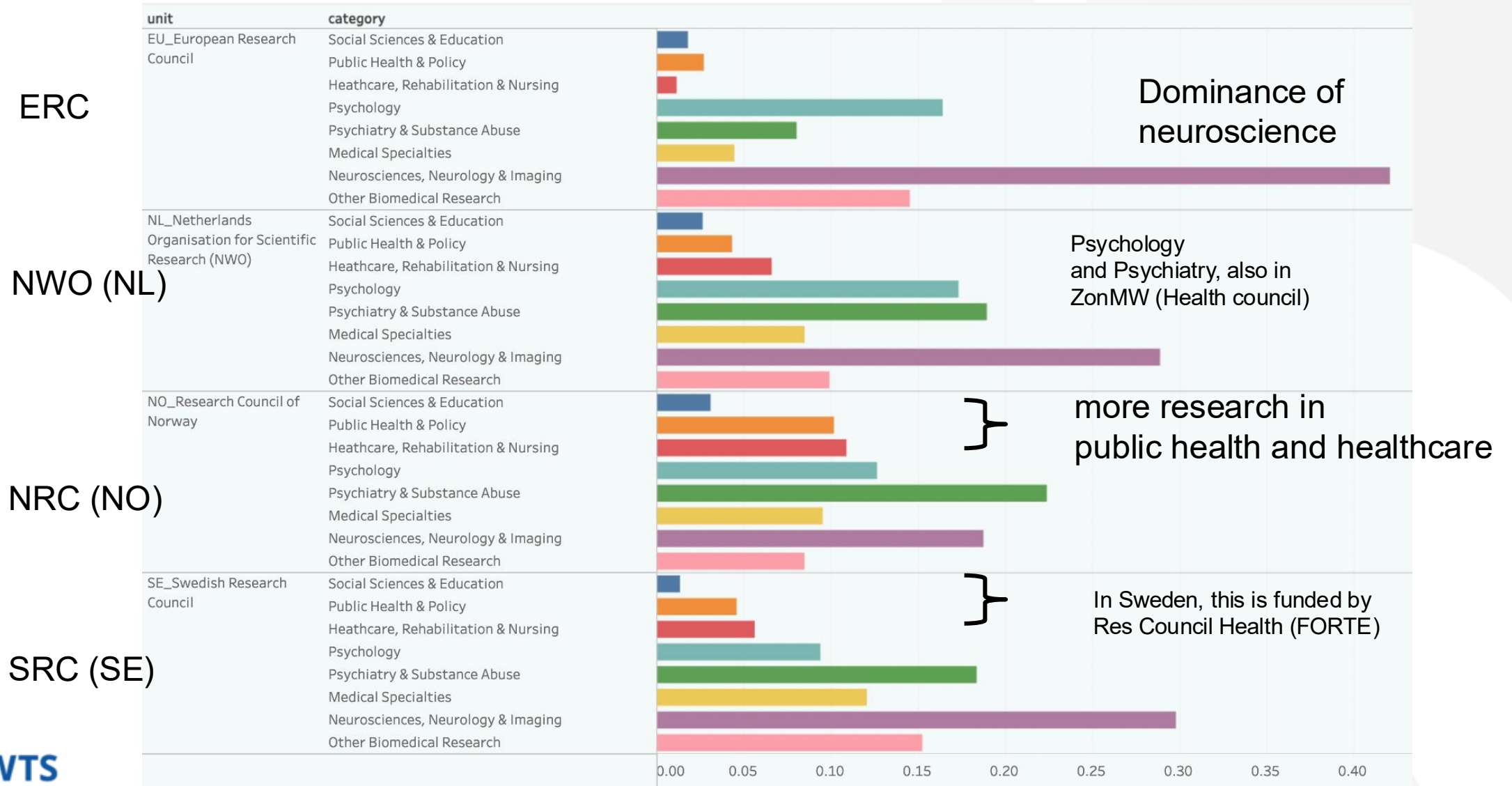
Disciplinary description

Assignment based in groupings of *Web of Science categories*, according to journal of publication.

Not accurate– but a first insight. It does not reflect prevention, but it helps in guessing trends.



Disciplinary distribution of by general research councils



Epistemic dimensions

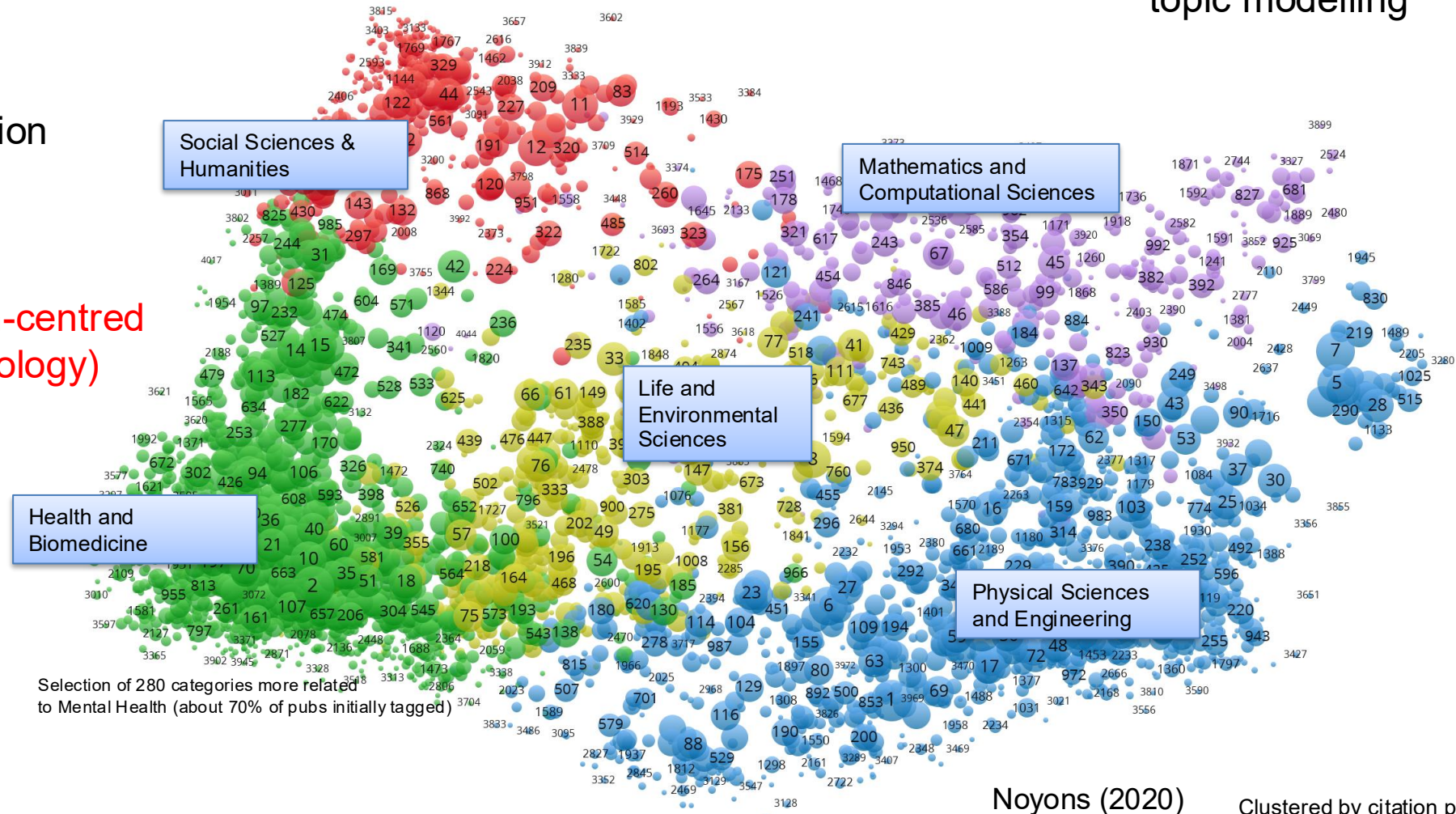
The use of epistemic networks to map research agendas and choices

Methods:

co-occurrence
citation-clustering
topic modelling

It shows the position of certain orgs. in research topics

This is a research-centred classification (ontology)

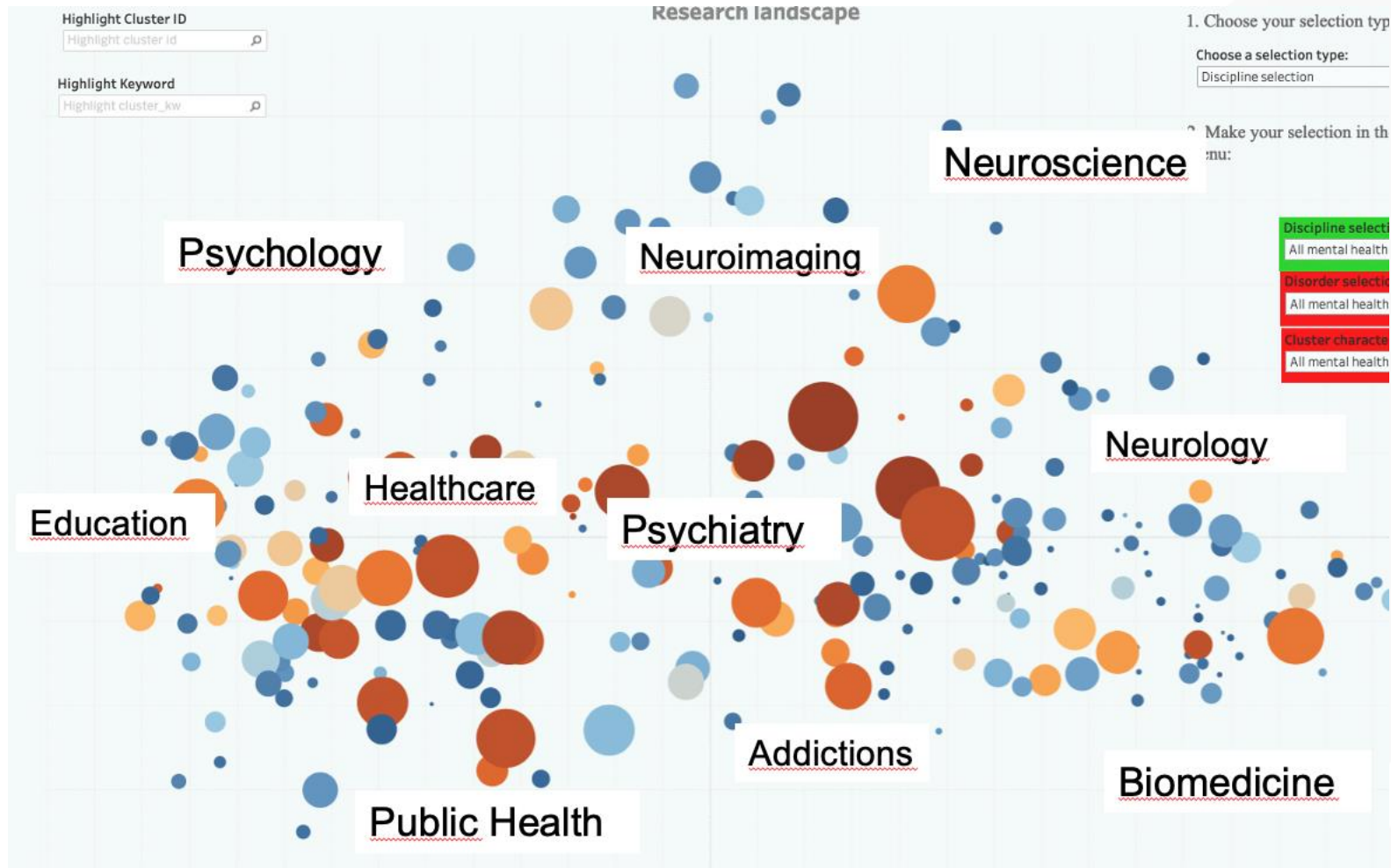


Noyons (2020)

Clustered by citation patterns



The research landscape: an inclusive and graded approach (instead of a hard inclusion/exclusion)



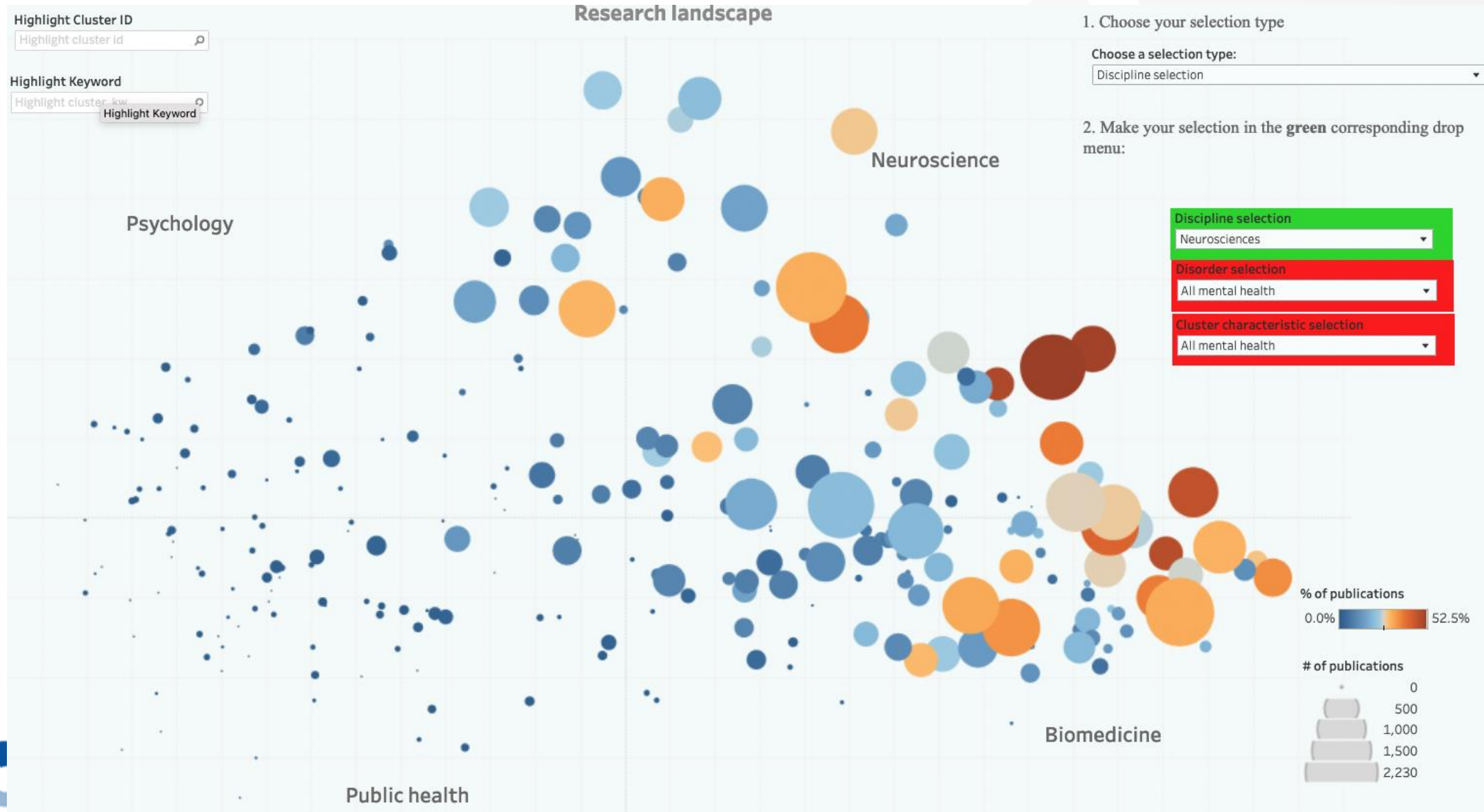
The use of clusters aims to capture both:

- Clusters specialised in MH (e.g. autism, schizophrenia, with >90% related to MH)
- Clusters where MH is a secondary but relevant topic (e.g. HIV stigma, child overweight and counselling, with about 10-20% related to MH)
- Number of pubs – size
- Colour: % of pubs related to MH

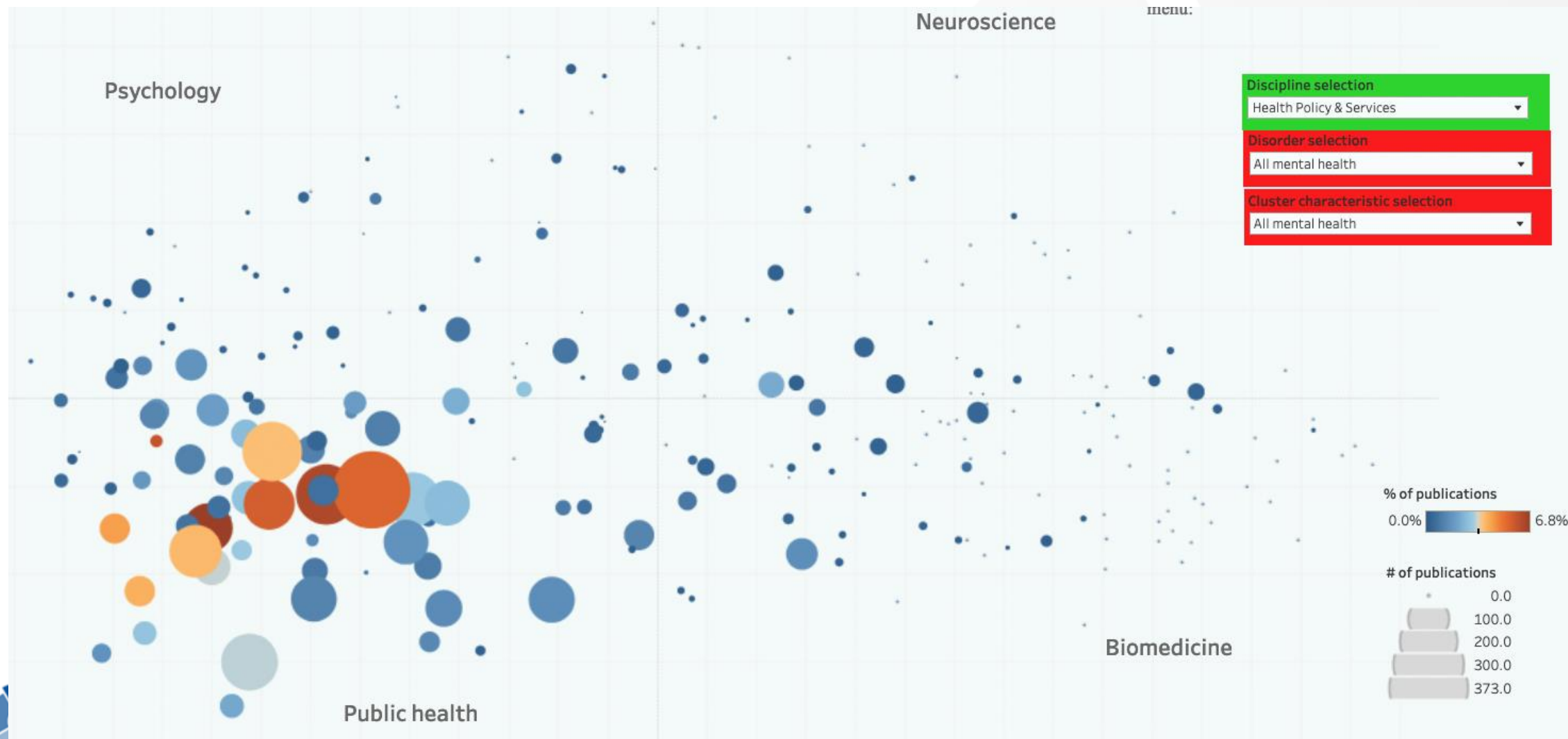
This depiction allows to create a graded research landscape

Some stakeholders will consider a narrower 'mapping' (this is fine!)

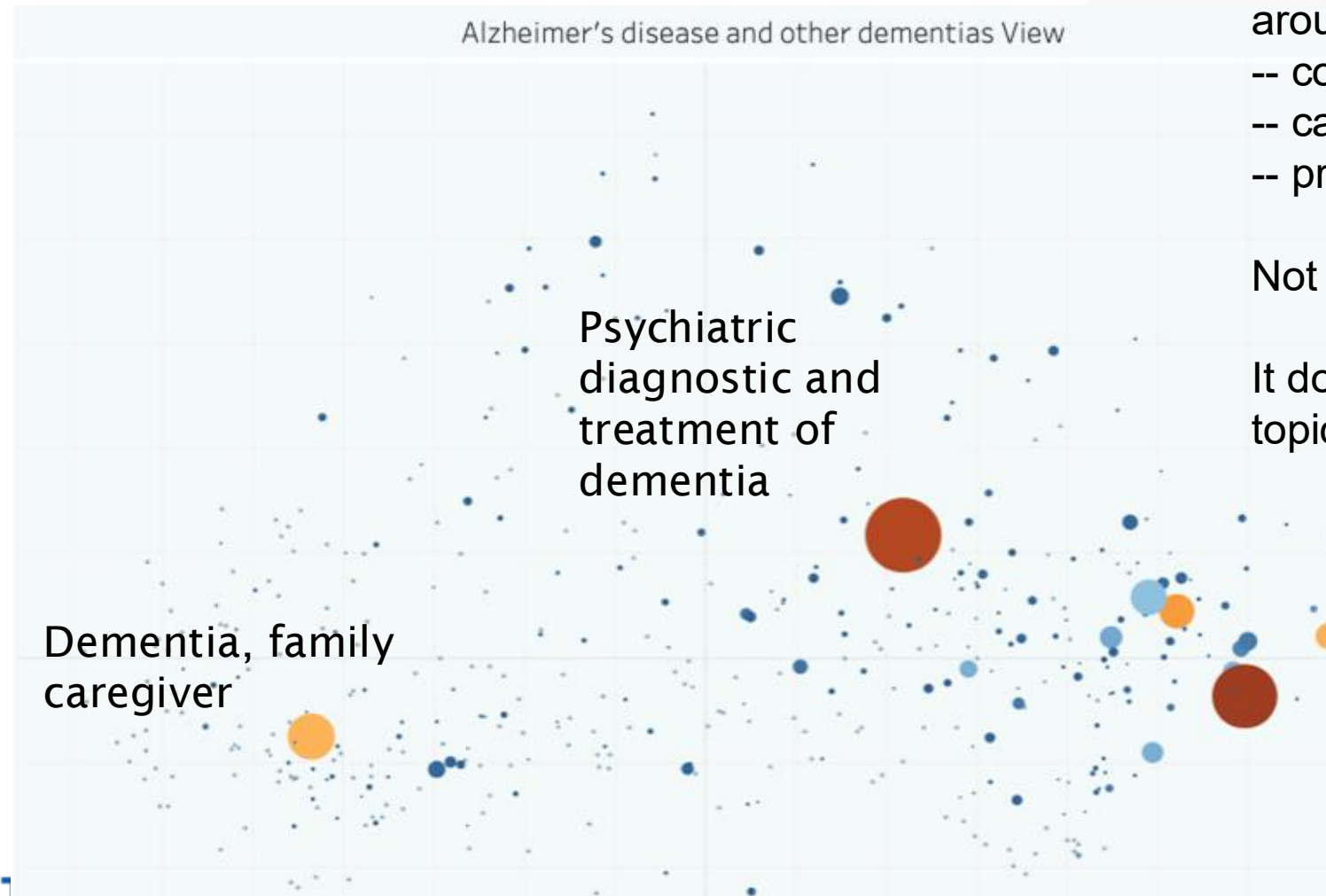
Disciplinary Category WoS: 'Neurosciences'



Disciplinary Category Was: 'Health Policy and Services'



Identification of specific disorders: Alzheimer and other dementias



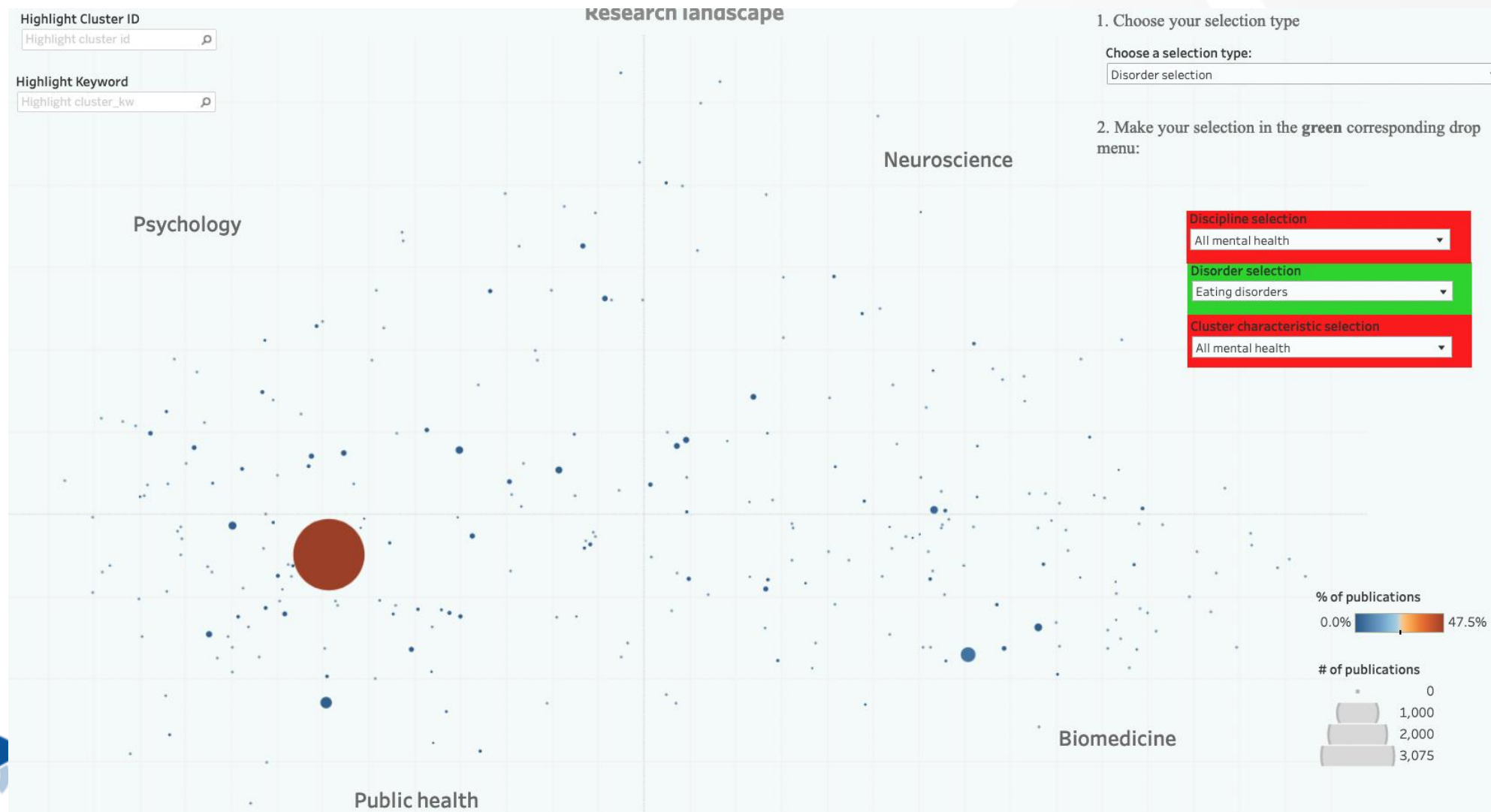
Citation-based clusters group around different types of topics:

- condition (dementia)
- caregiving
- protein

Not a systematic classification

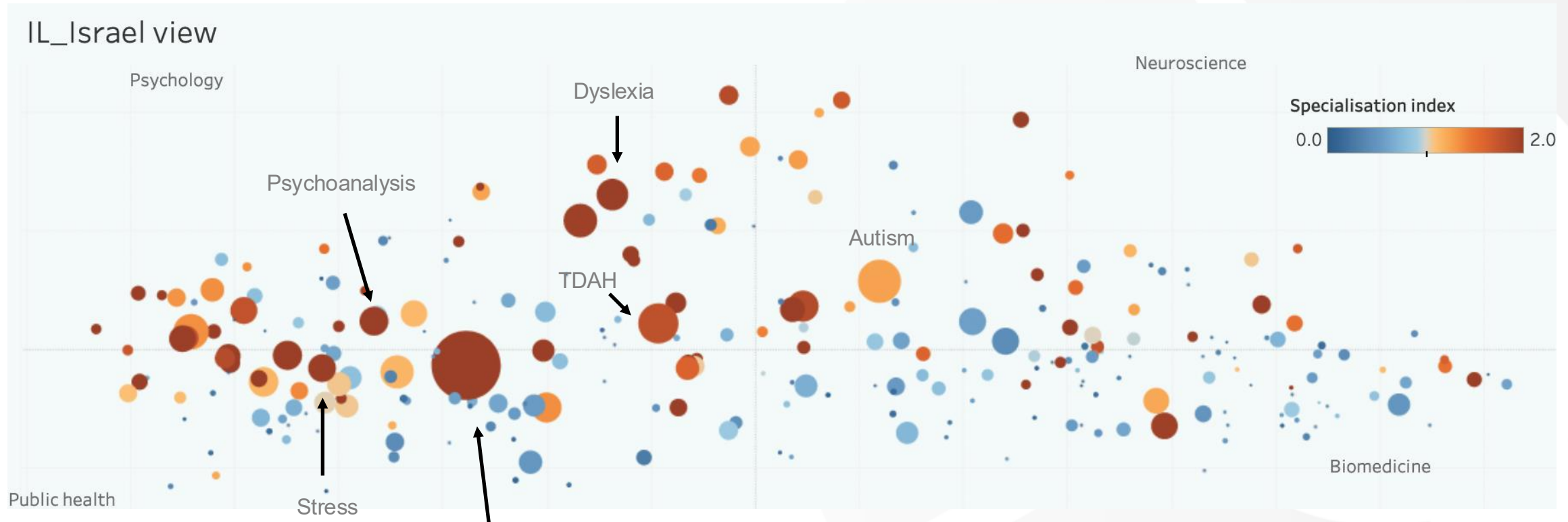
It does not account for belonging to various topics

Identification of specific disorders: Eating disorders

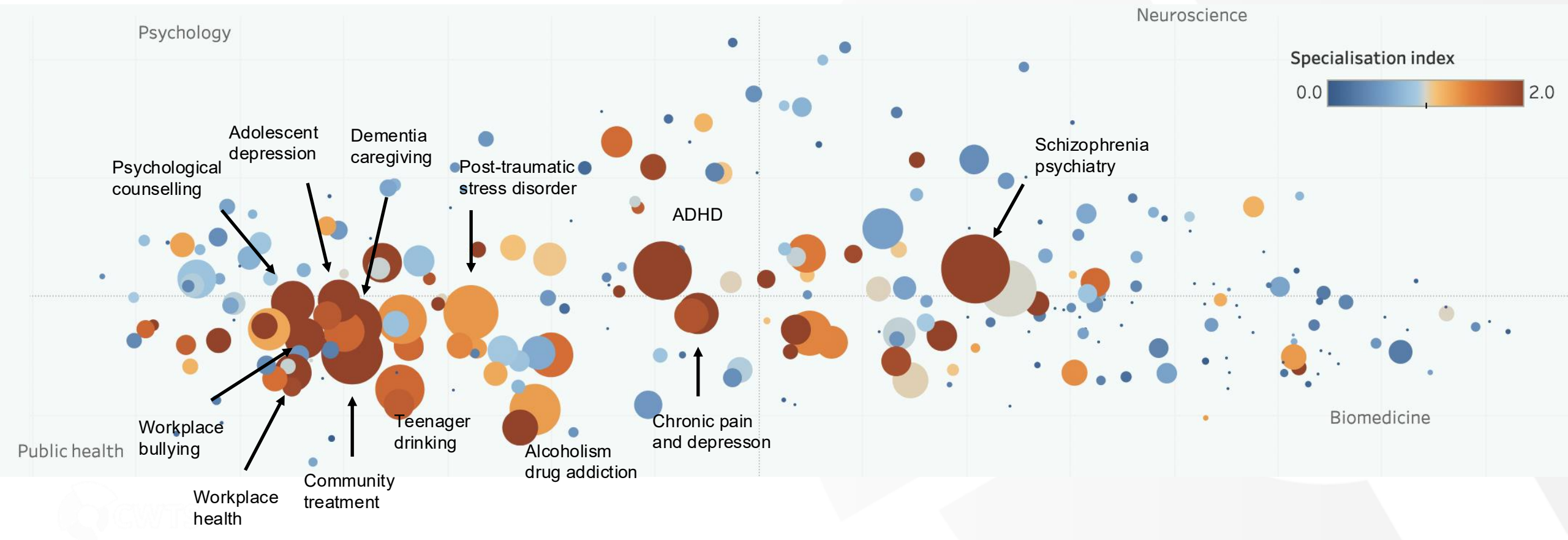


Thematic specialisation of countries: Israel

Colours now reflect specialisation index



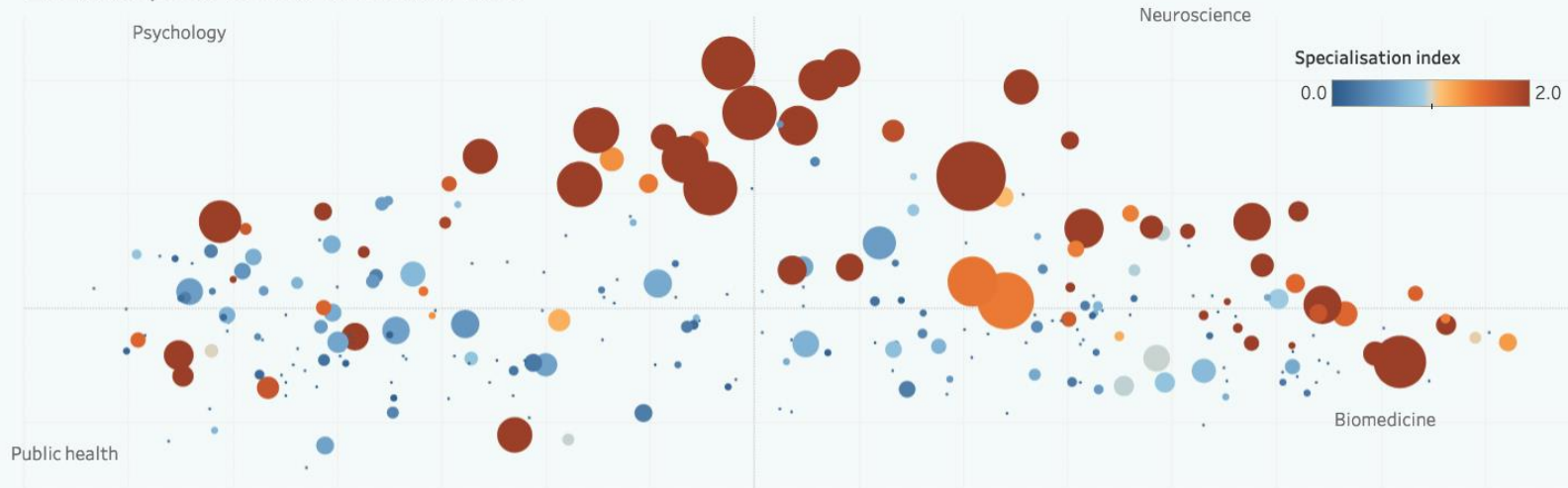
Thematic specialisation of Norway



Comparing funding agencies

Portfolios over the research landscape

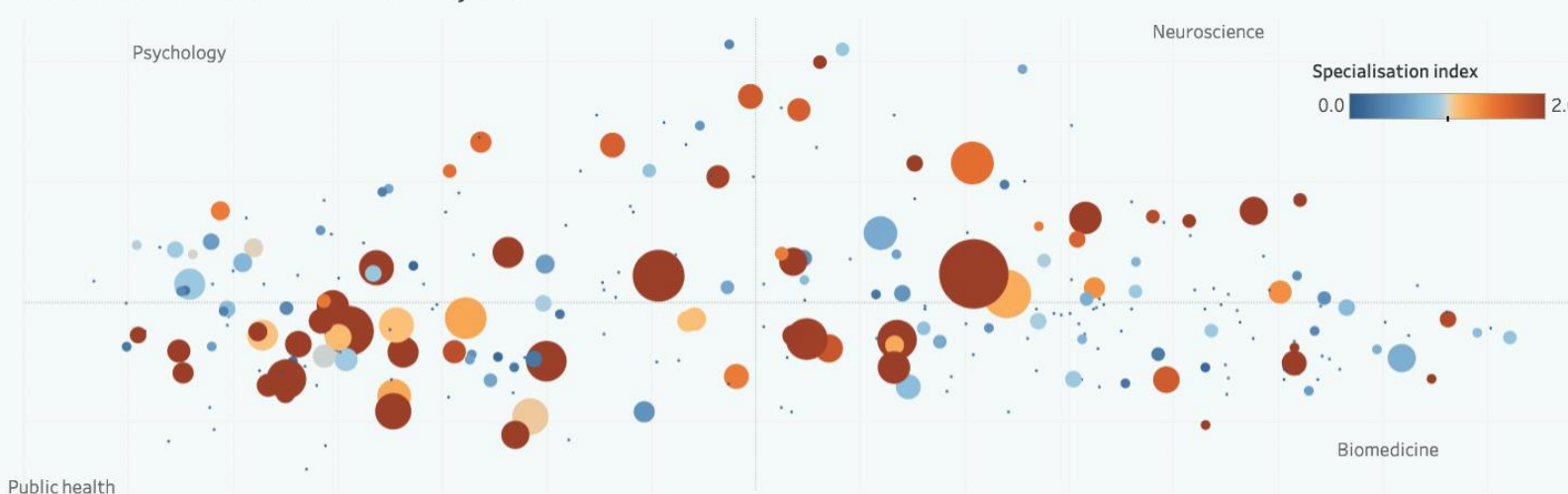
EU_European Research Council view



European Research Council:

- Neuroimaging
- Neuroscience

NO_Research Council of Norway view

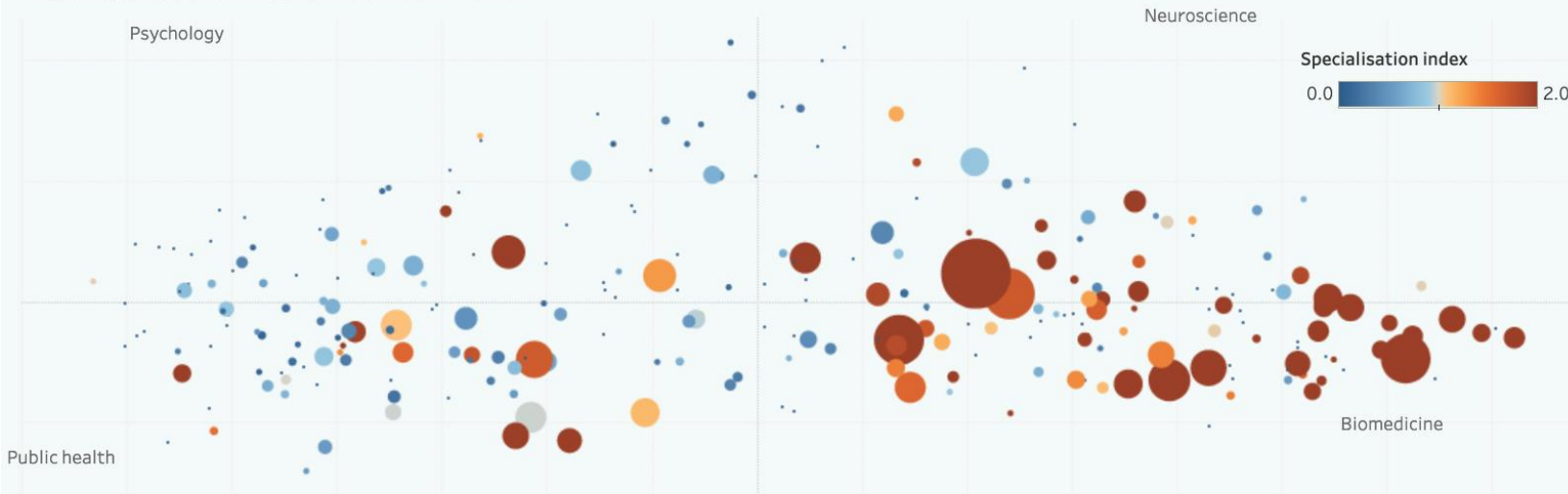


Research Council of Norway:

- Schizophrenia, psychiatry
- Public Health
- Healthcare system

Comparing health funding agencies

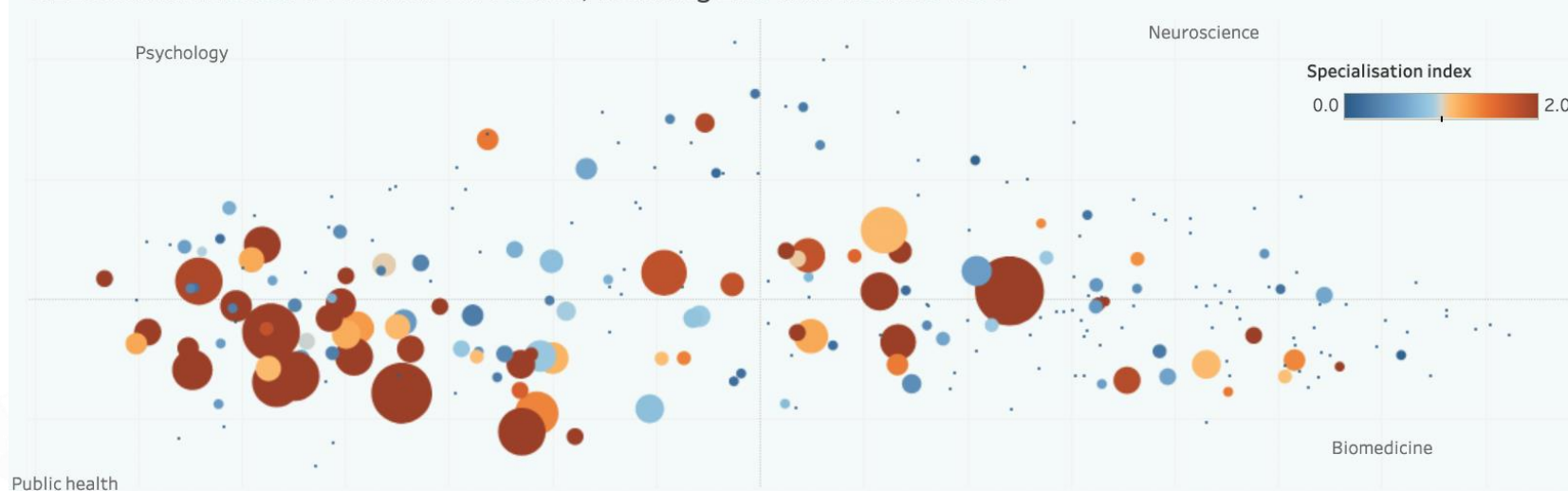
ES_Institute of Health Carlos III view



Health Research Council (Spain):

- Biomedicine-neuroscience
- Schizophrenia and bipolar
- Psychiatry

SE_Swedish Research Council for Health, Working Life and Welfare view



Health Research Council (Sweden):

- Alzheimer, Psychiatry
- Addictions
- Youth alcoholism
- Job burnout
- Bullying
- Job insecurity

Summary:

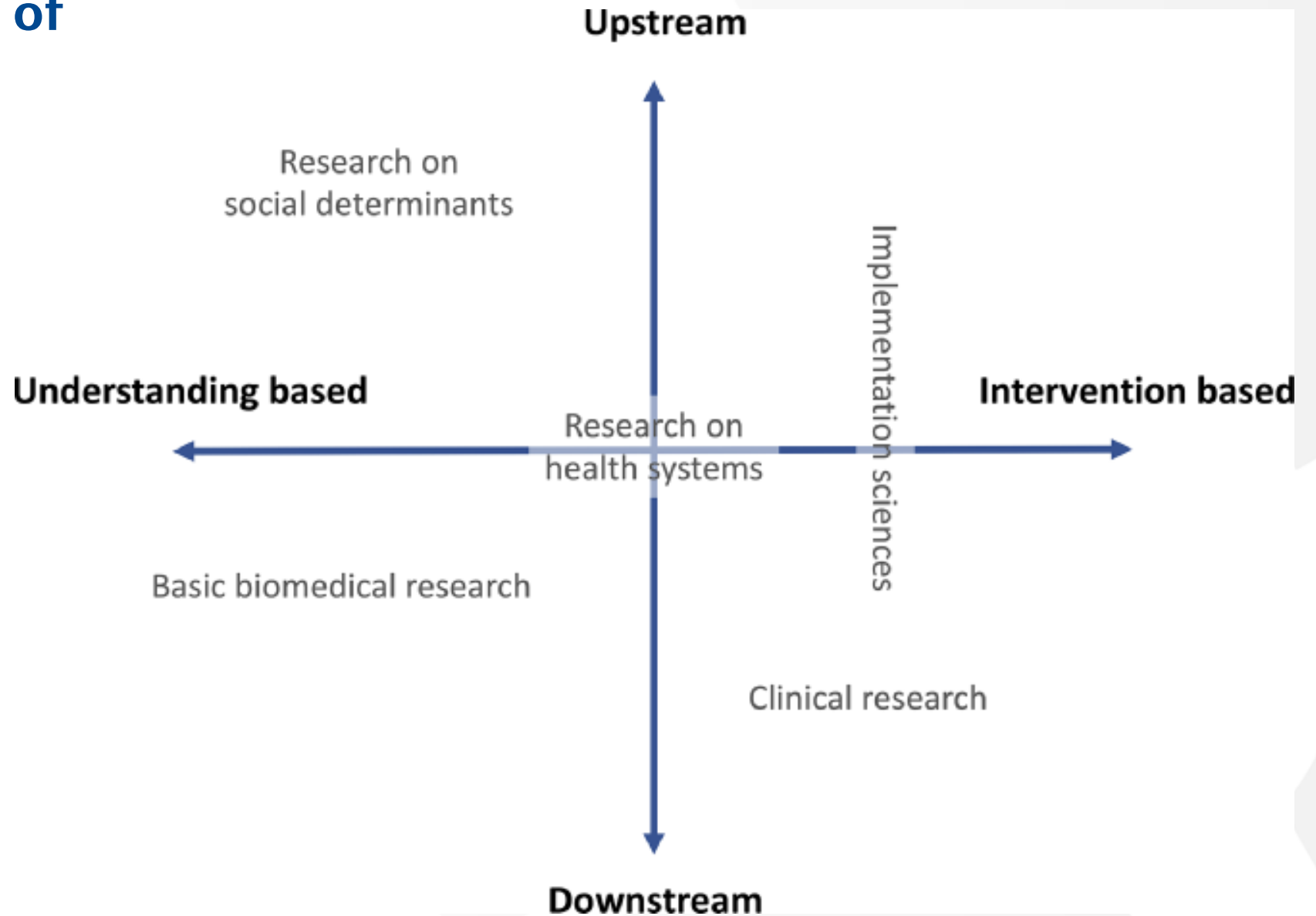
- Current research:
 - Globally: focused on psychiatry, medical research and neuroscience
 - Relative little effort in public health, social sciences and healthcare systems.
 - More concentration in funding than in overall publication distribution
 - Nordic countries more balanced portfolio towards public health and social determinants.
- Contrasting with expert opinion:
 - Gap between research and healthcare
 - Propose more systemic research, including social and environmental factors
 - ... more transdisciplinary research for 'shared tasks', in contrast to a biomedical model focused on clinical treatment

Heuristics on types of research

Mental health:

Less research mid- and upstream, particularly in intervention-based areas

More research downstream in both understanding and clinical areas



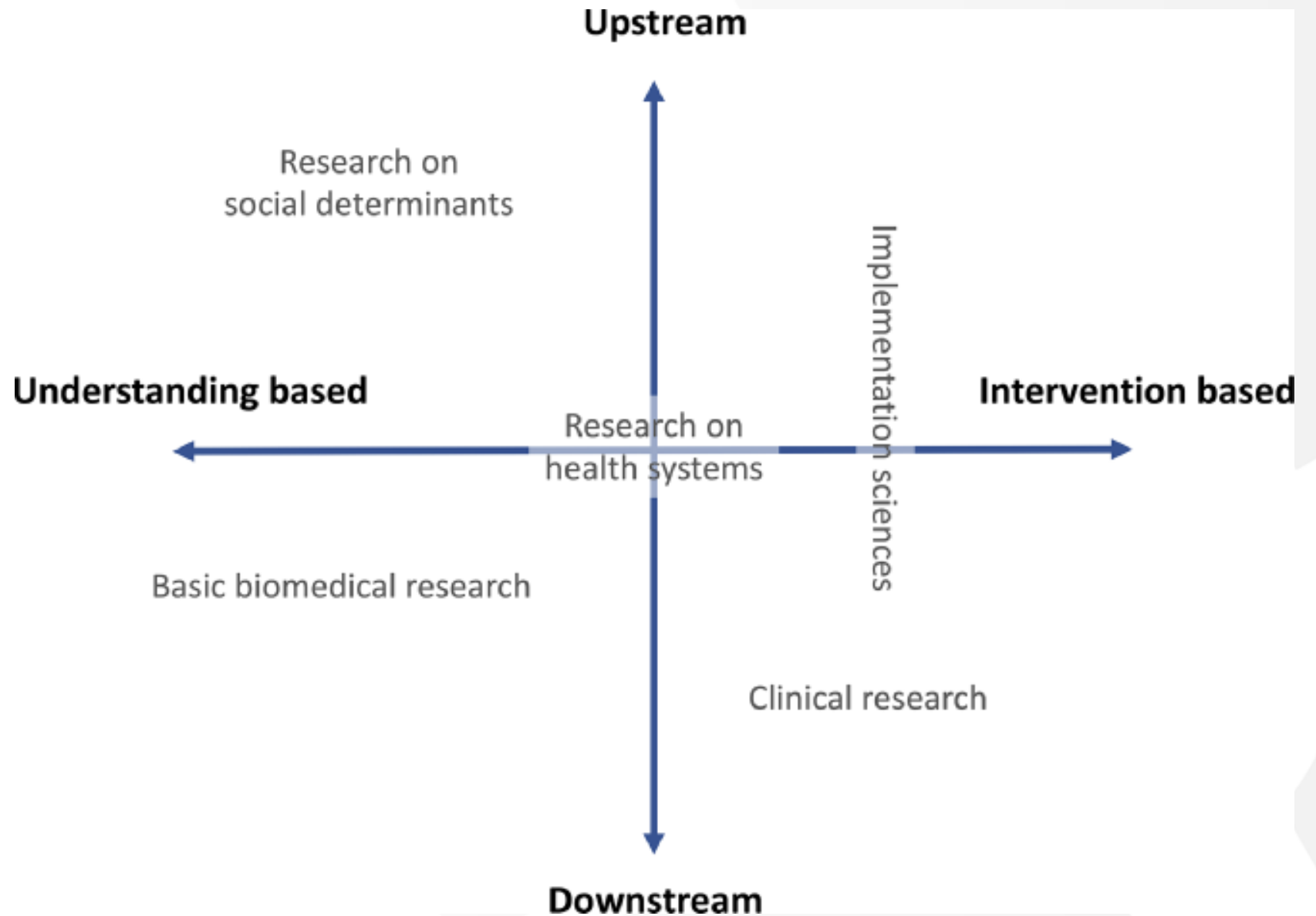
Problems with classifications

Different areas need different classifications.

If focus on “Disease”:

Many social determinants to one disease

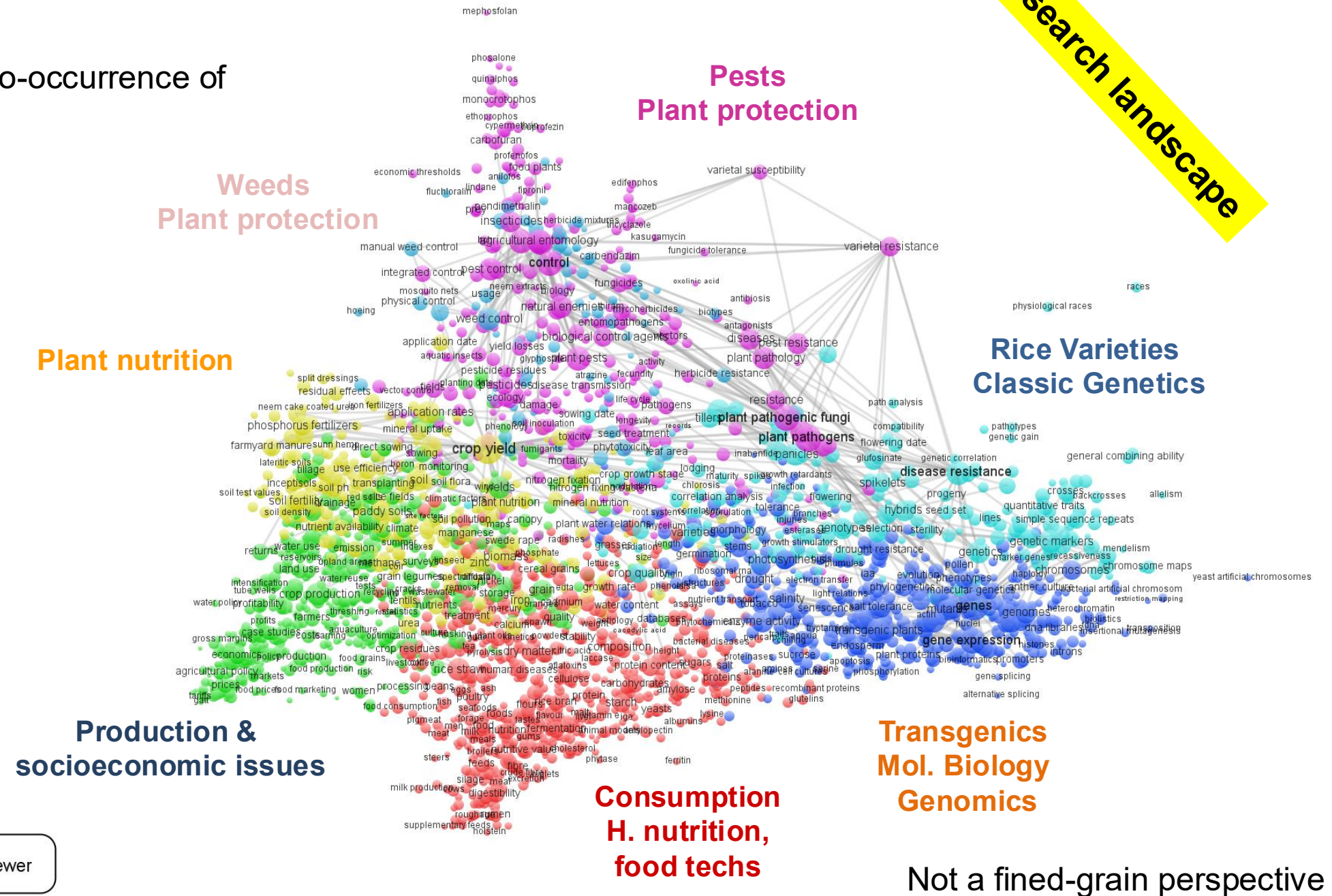
Many disease benefits from one determinant



**Case 3:
inequalities in rice research
(Ciarli and Rafols, 2019, RP)**

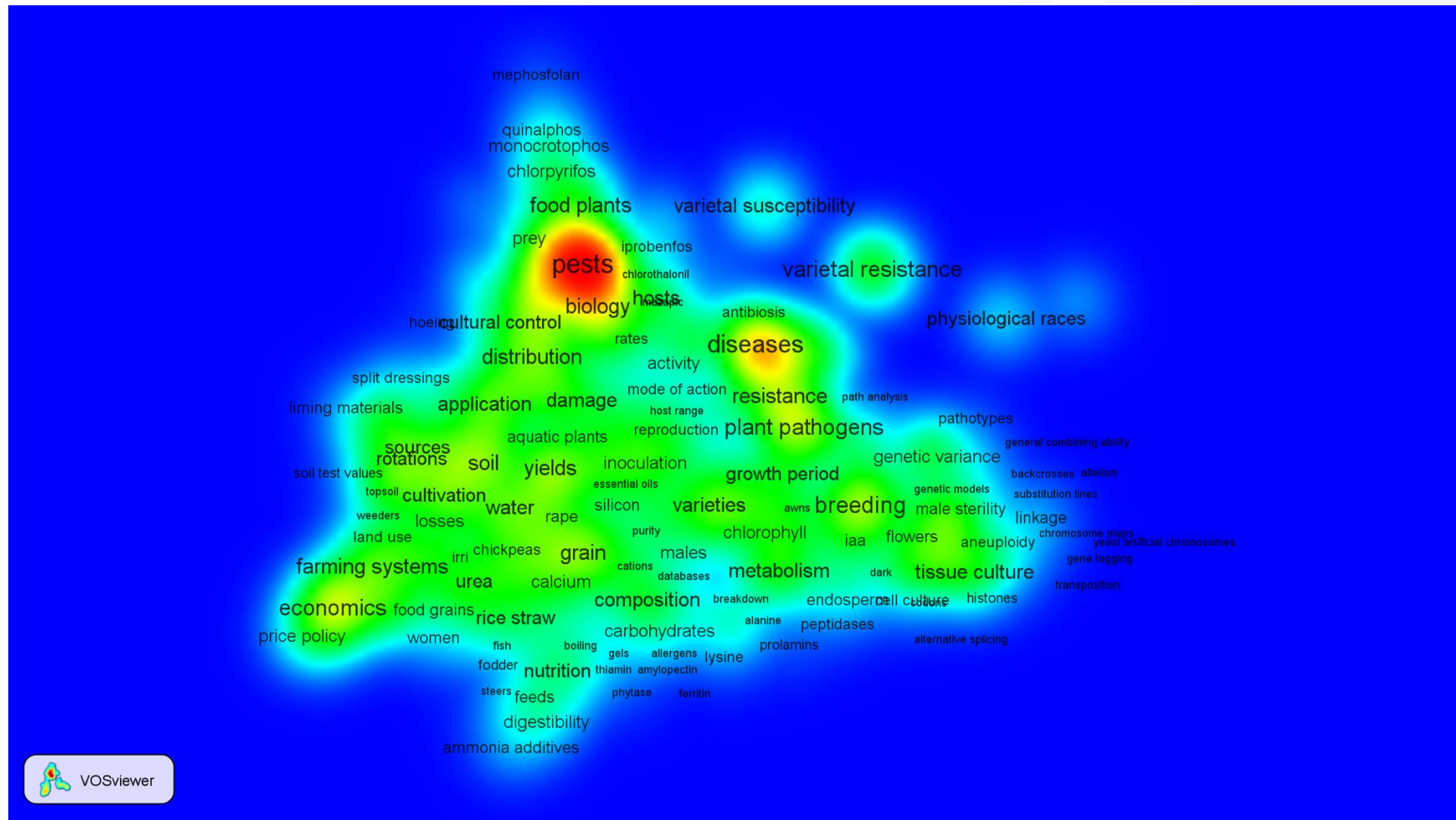
What are the “options” in rice research?

Base on co-occurrence of

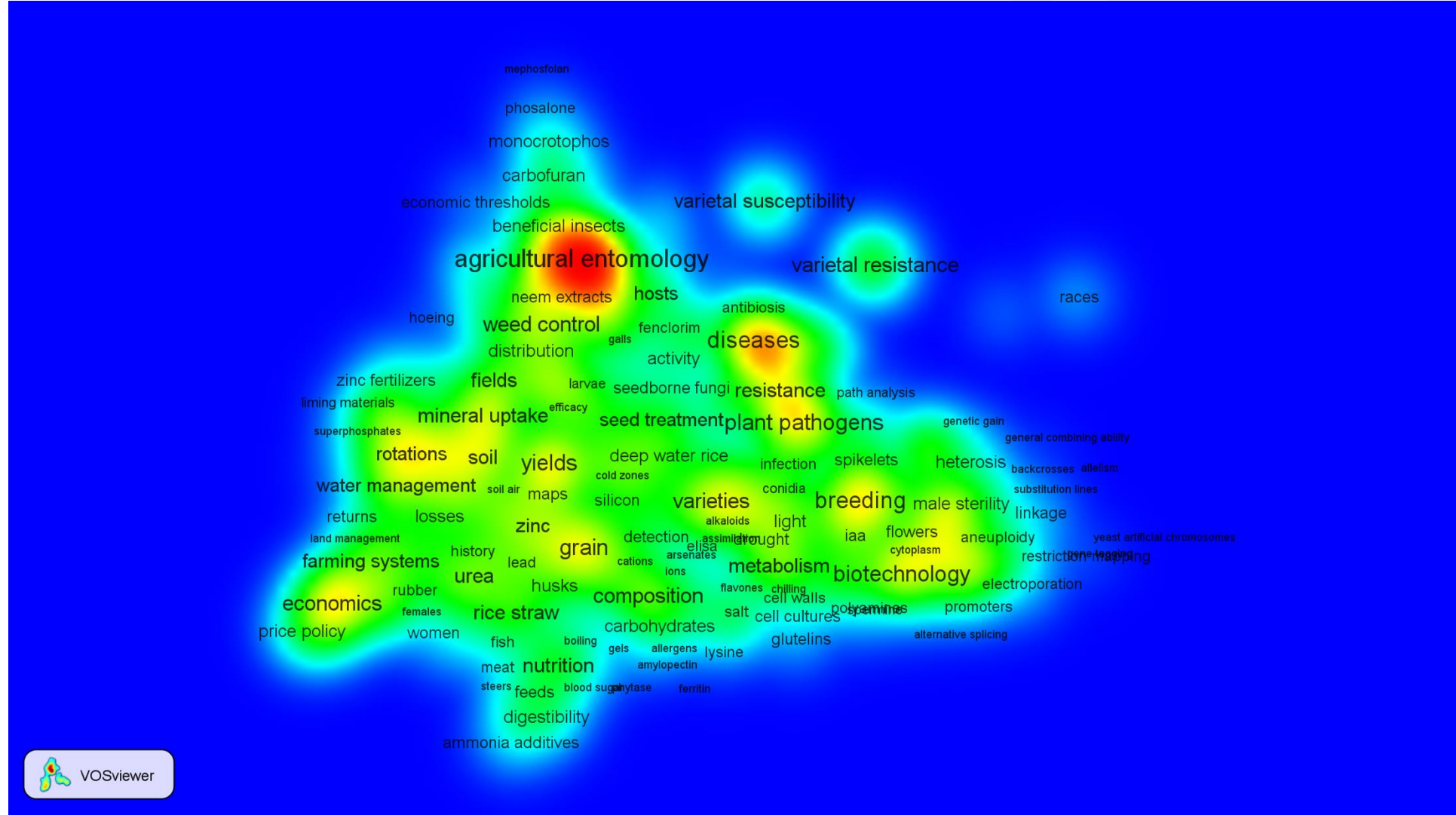


Not a fine-grained perspective

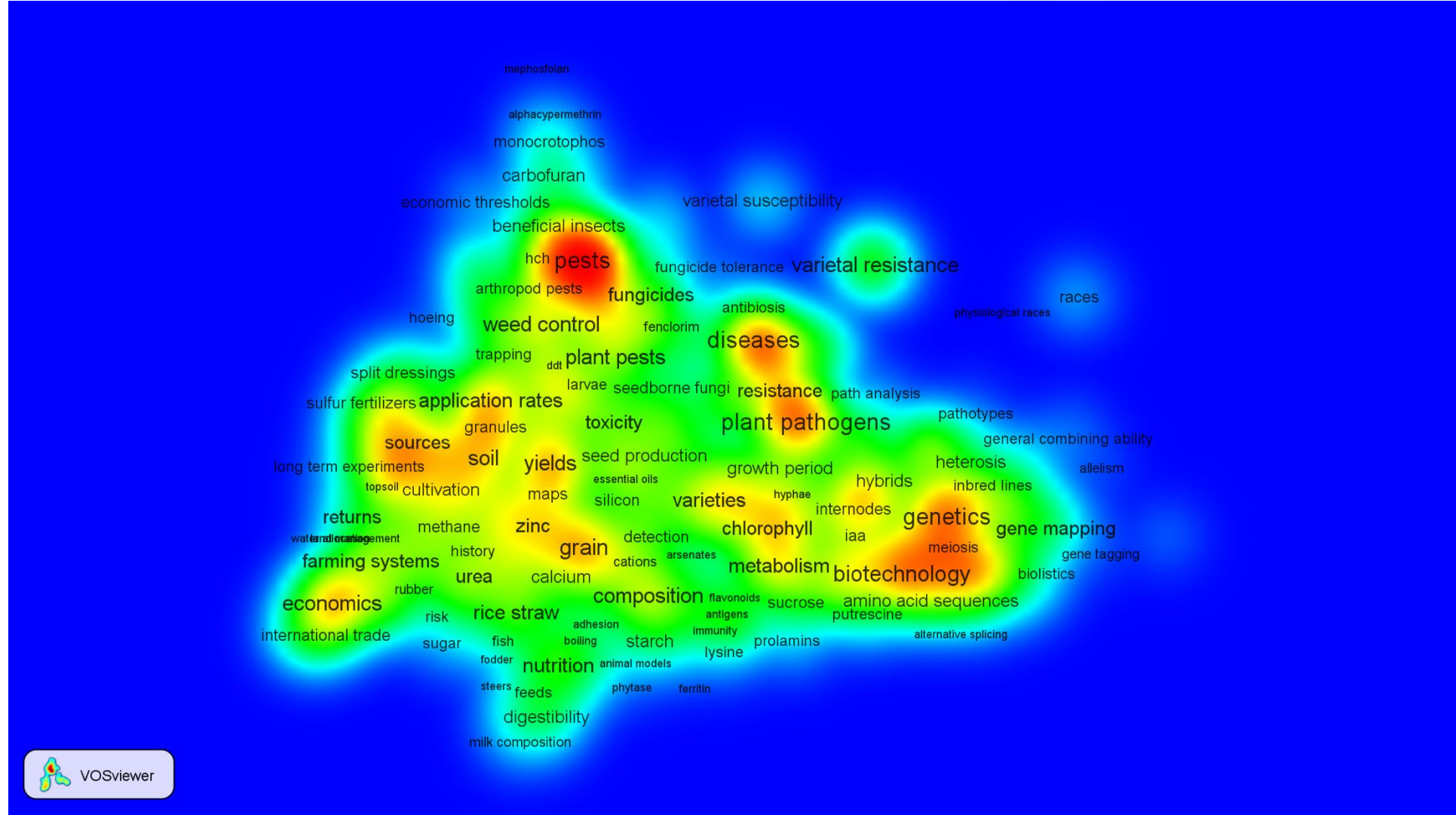
Trajectory of rice research, 1983-2012



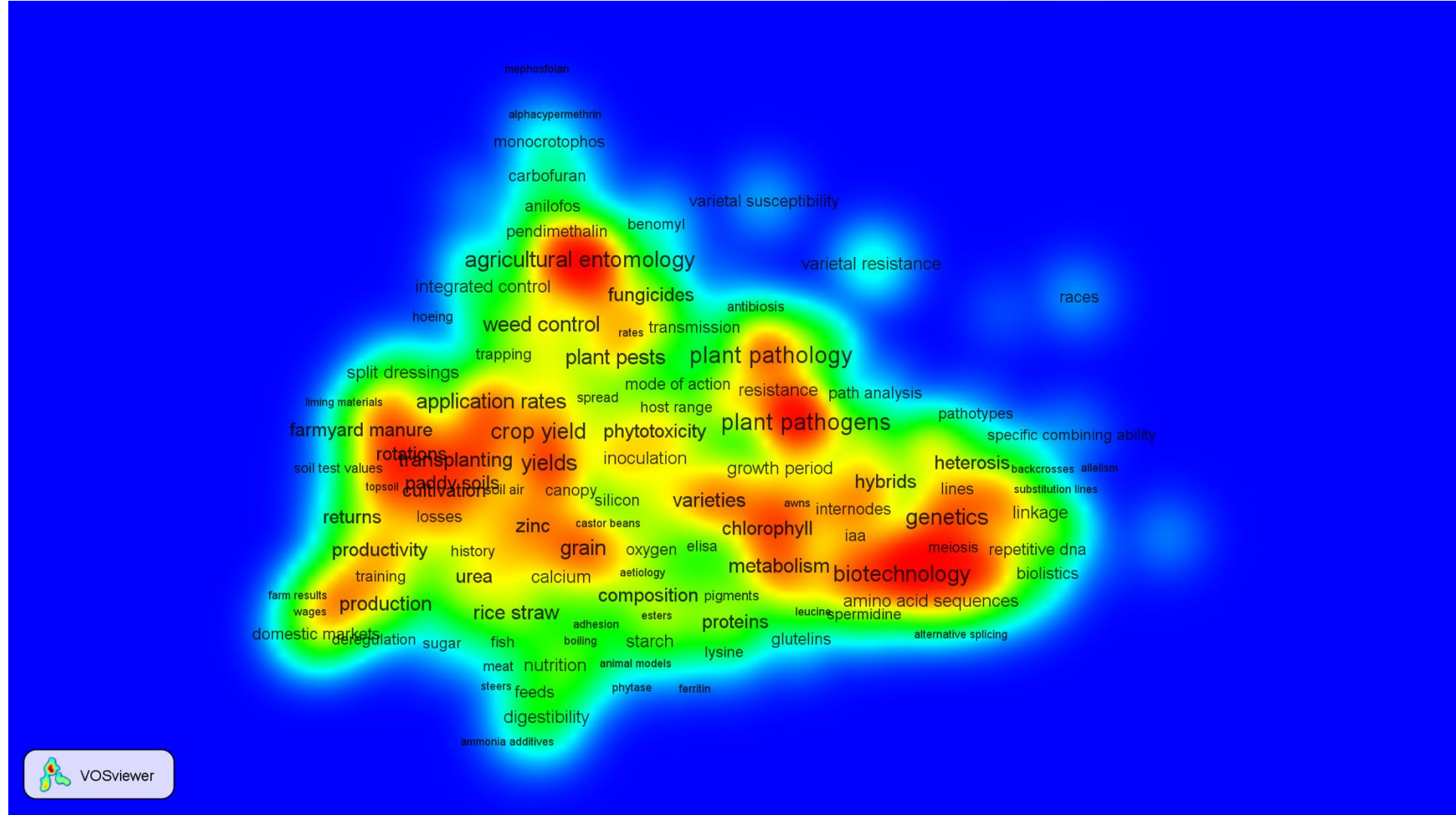
Trajectory of rice research, 1983-2012



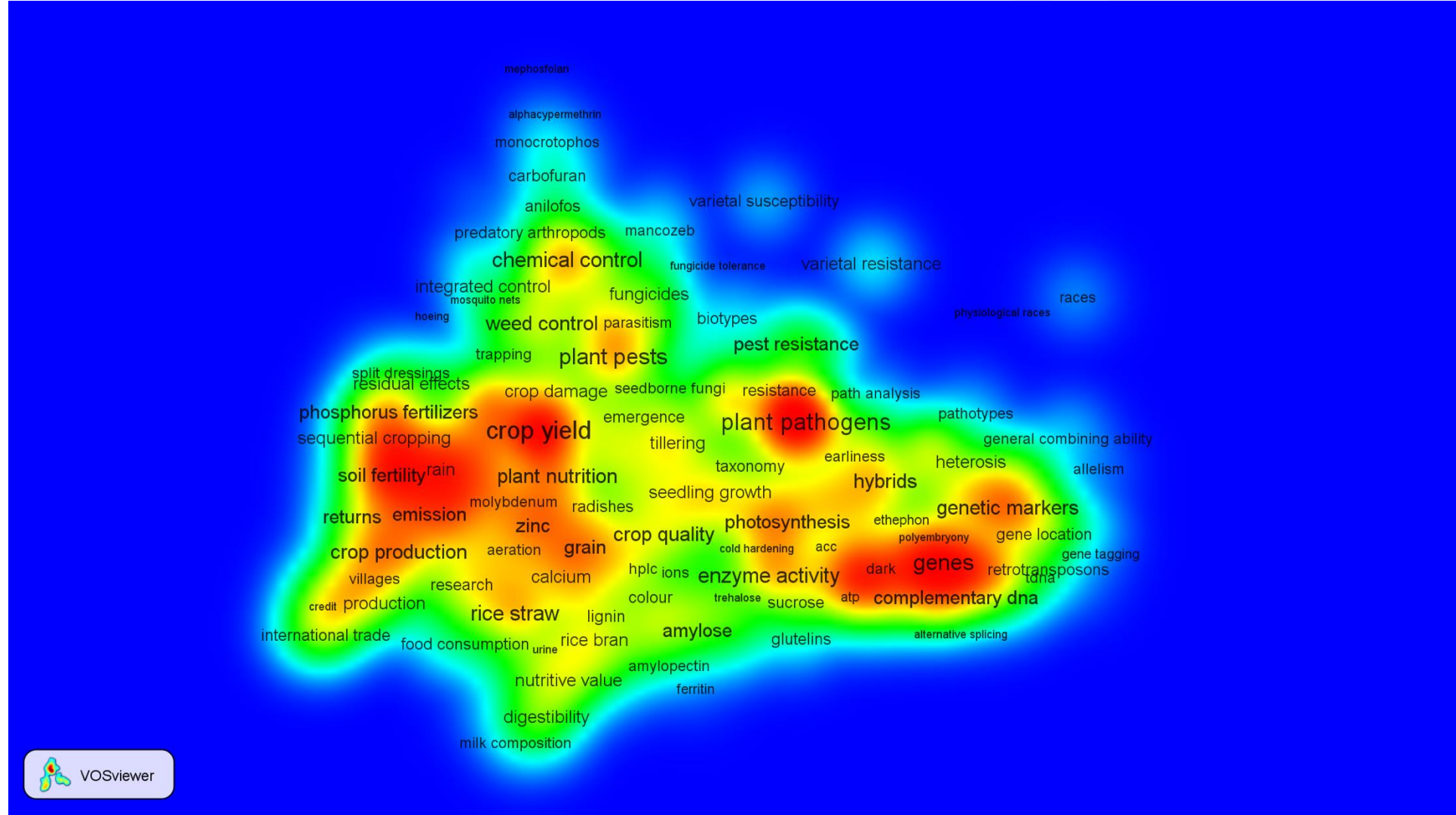
Trajectory of rice research, 1983-2012



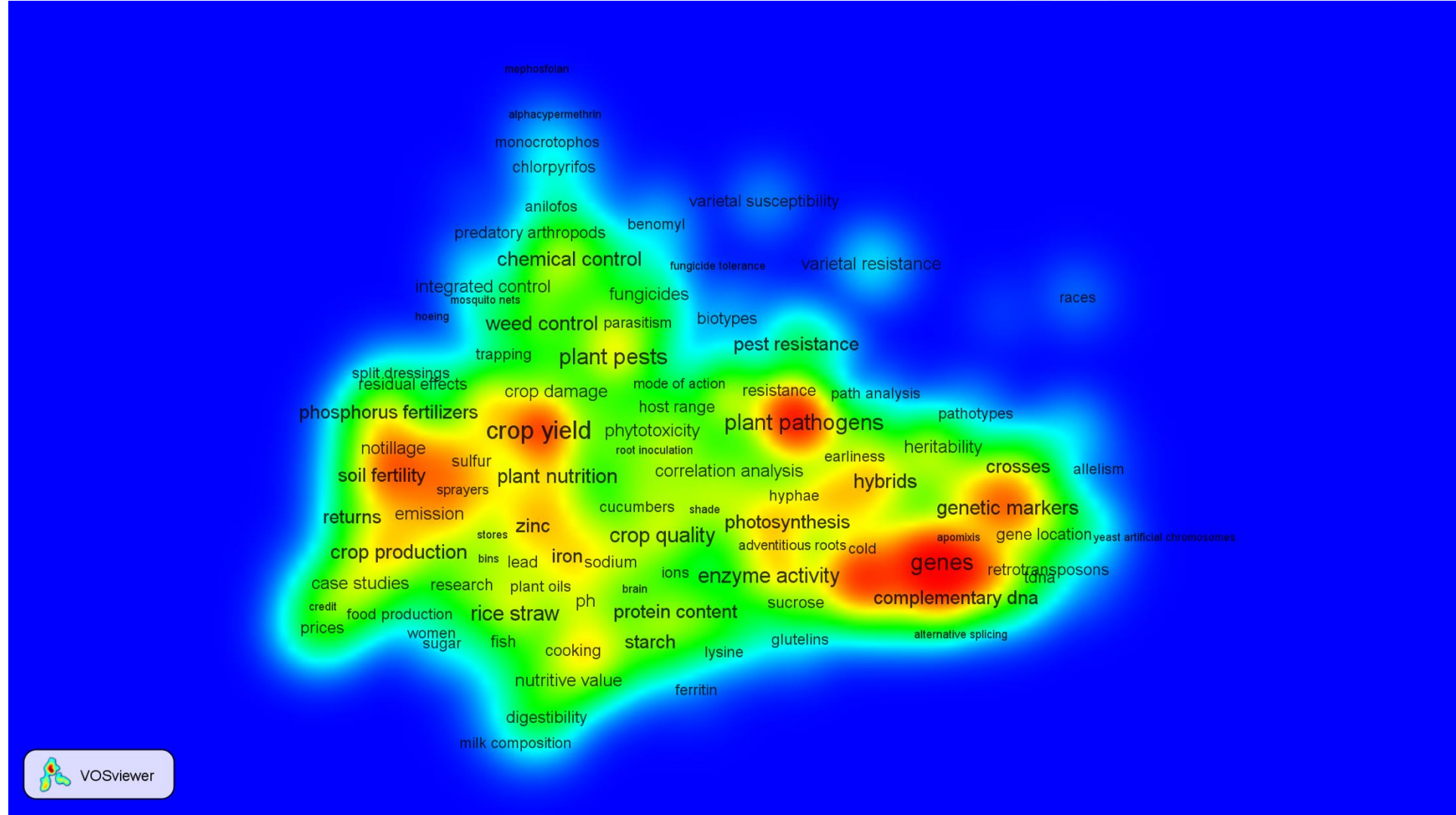
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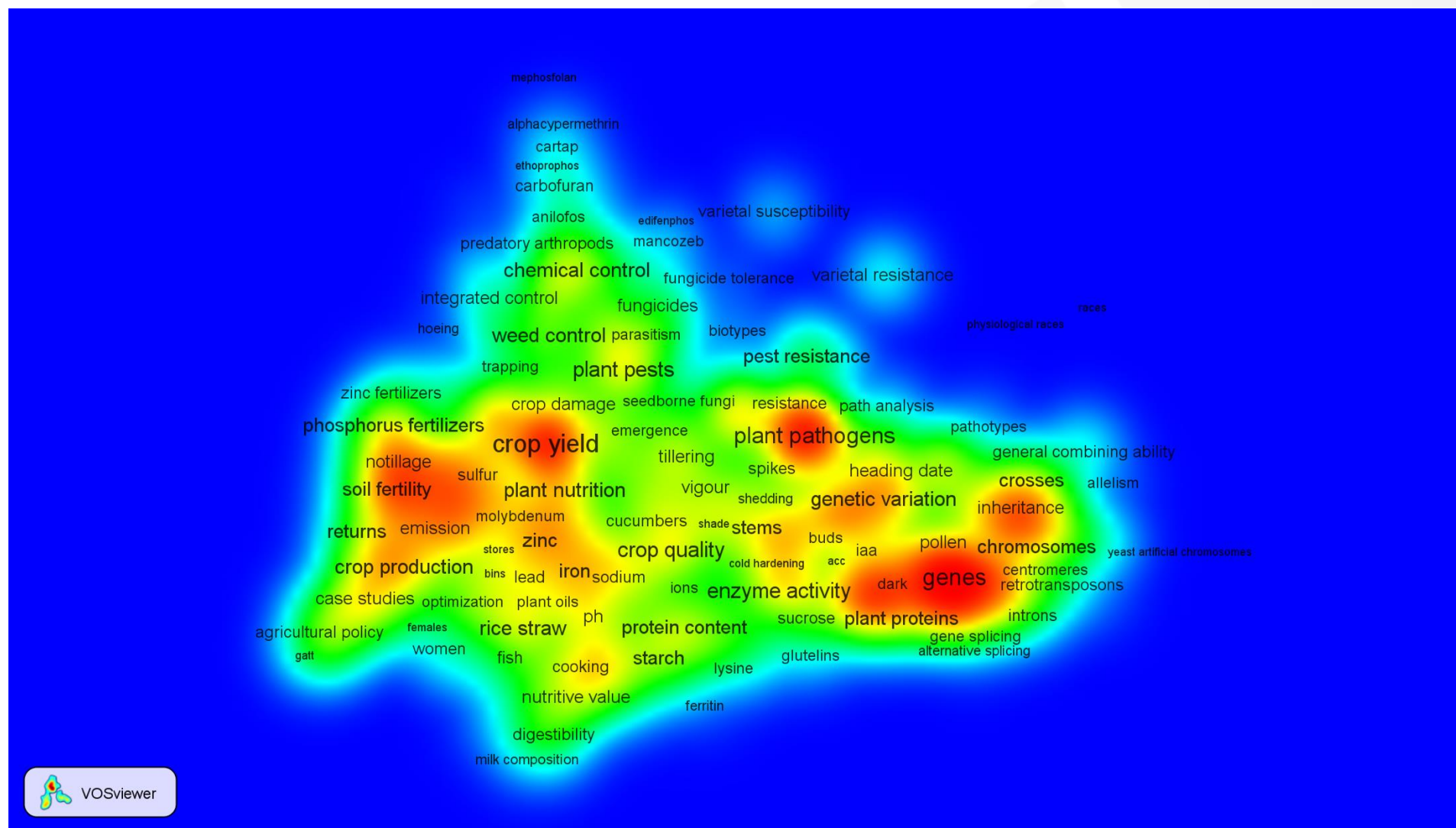
Trajectory of rice research, 1983-2012



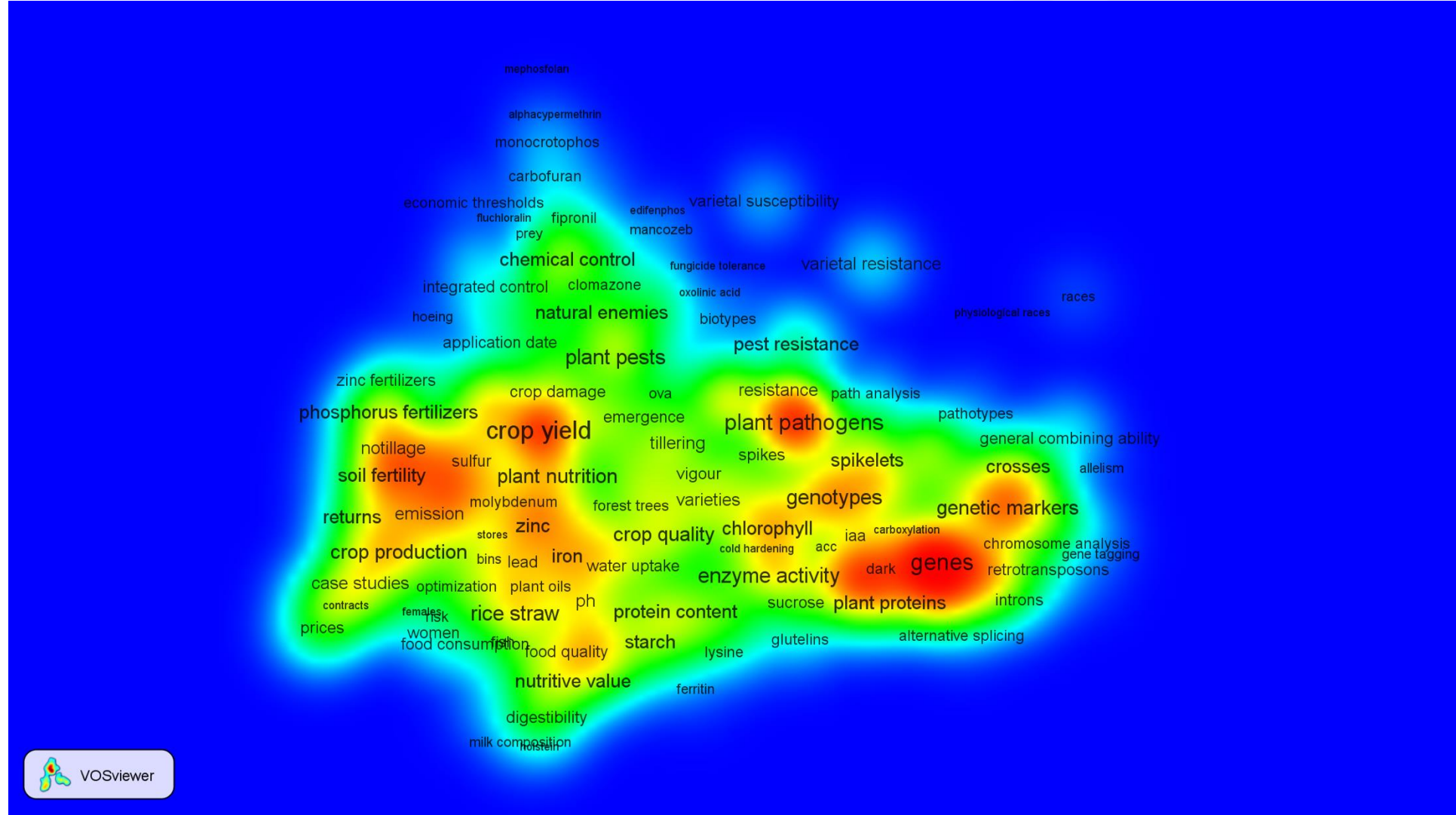
Trajectory of rice research, 1983-2012



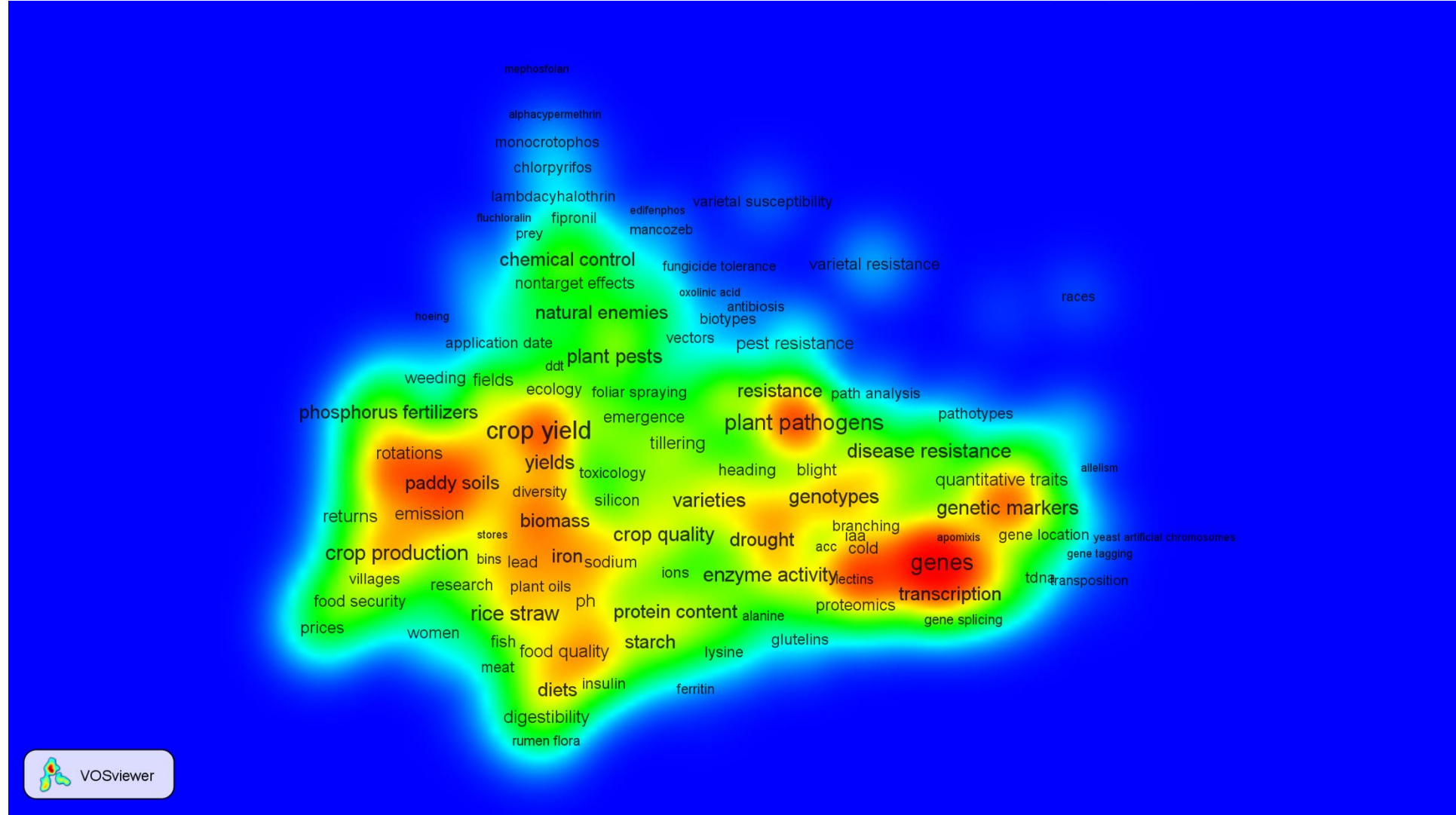
Trajectory of rice research, 1983-2012



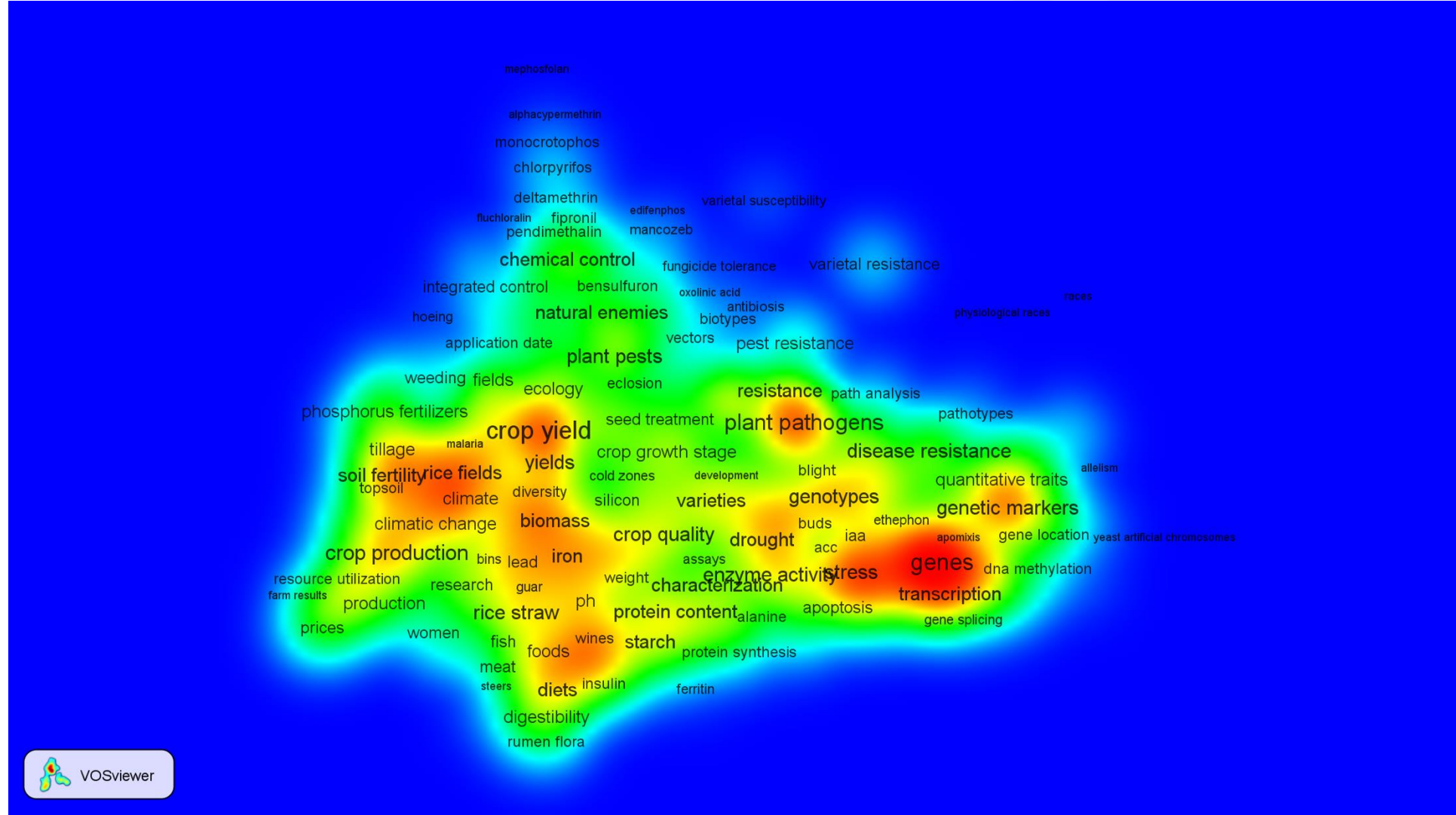
Trajectory of rice research, 1983-2012



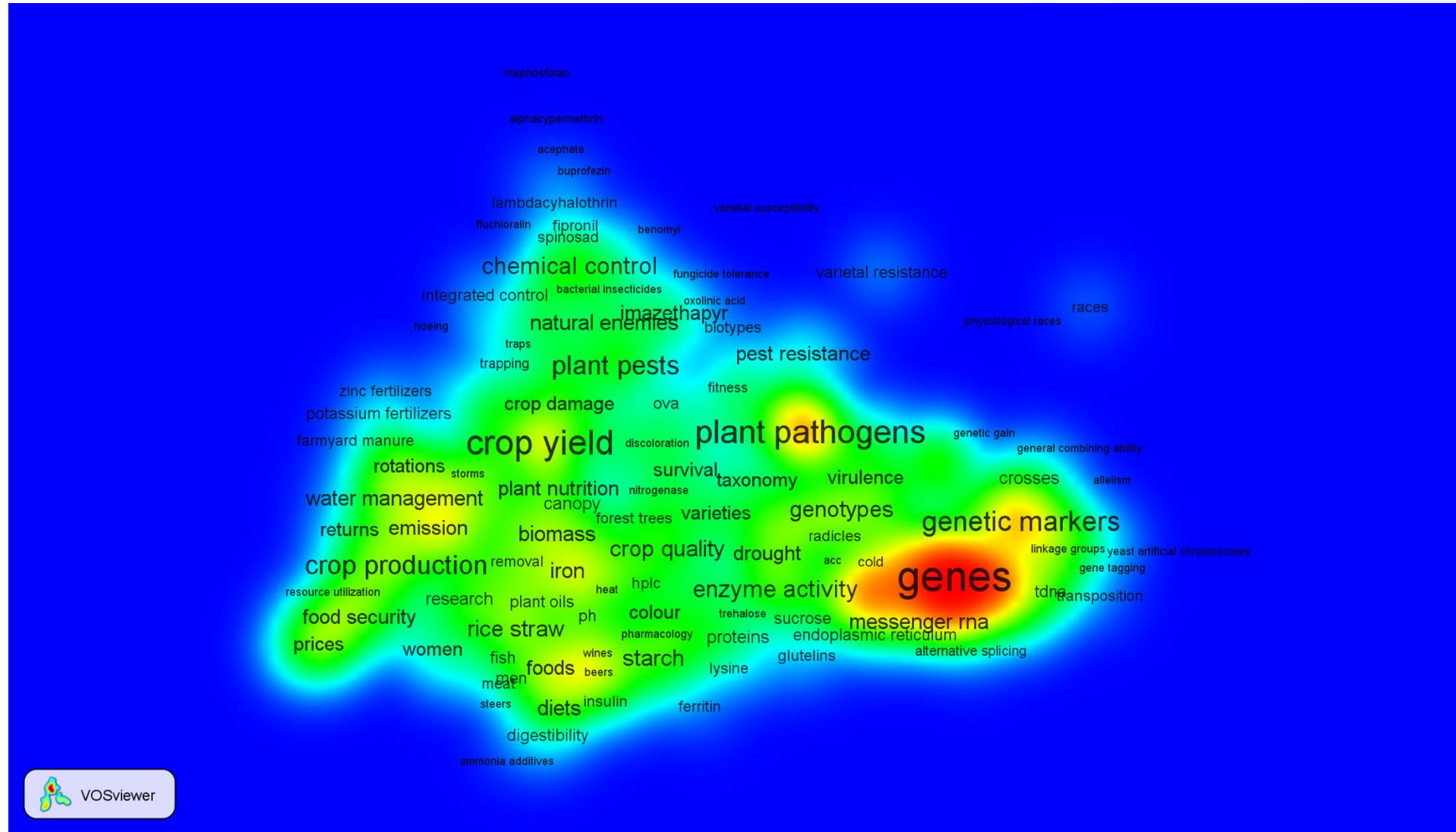
Trajectory of rice research, 1983-2012



Trajectory of rice research, 1983-2012



How research priorities differ by country







Needs and demands on rice

FAO data
on rice use
and needs

Revealed demands: measurement and relation with research topics.

(a) Variable	(b) Observed	(c) Revealed demand
<i>Export</i>	% of rice production exported	No need for consumption
<i>Food</i>	% of rice production consumed	Improved consumption
<i>Seeds</i>	% of rice production stored for future planting	Access to seeds (or seed technology)
<i>Waste</i>	% of rice production wasted	Storage (related to consumption), and distribution
<i>Imports</i>	% of rice production imported	All related to increased production
<i>Processed</i>	% of rice production used in the food industry	Yields and nutritional features
<i>Rice calories</i>	Per capita human intake of calories from rice	Nutrition
<i>Rice yields</i>	Productivity	Improved productivity
<i>Fertilisers</i>	Amount of chemical fertilisers used per crop area	Improved soil nutrition
<i>Rice area</i>	Per capita amount of area devoted to rice cultivation	Reliance on rice (farmers and consumers)
<i>Under nourished</i>	% of undernourished population	Nutrition
<i>Pesticides</i>	Amount of chemical pesticides used per crop area	Improved pest control

How is Research Specialisation related to these variables? Regression analysis based on 17 countries. Mixed results:

Positive -- more use of fertiliser is associated with more research on rice production

Negative -- more rice intake does not mean more specialisation in nutrition (as expected)

Problematic -- more informed and fine-grained analysis needed. E.g. Thailand, lack of focus on productivity

4. Learnings and next steps

Summary

It is possible to analyse research portfolios from the perspective on whether they are aligned or not with societal needs.

Oftentimes, the benefits of science are unequal

→ they tend to favour the hegemonic countries, groups, communities, gender

Research portfolio analyses allow to see inequalities

Combined more contextual information and deliberative and participatory methods, offer a way of pointing to desired agendas

→ Direct (relative) policy uptake (Vinnova-FORTE; Dept. Health Catalonia)

Humbling insights from case studies

- Difficulties with classifications (contingent on choices)
 - Lack of coverage in databases (we used WoS, OpenAlex now improvement) – bias in results.
 - Scientific topic classifications are heterogenous. Medical vs. Scientific topic vs. Determinants.
- Unclear relation between research options and demands
 - Health is the only sector with quantified ‘needs’ estimates (controversial)
 - Focus groups seem more robust approach – but matches between discussion and categories unclear
 - Experimentation in eliciting societal needs from text analysis (news, policy reports, etc...) (?????)
- We only study relative research efforts, not capacity for “translation”
 - Missing: capabilities and possibilities of social engagement and translation of research options
- Most STI policy NOT framed in terms of choices between STI trajectories
 - More attention to ‘discovery’ and ‘excellence’ than to ‘needs’
 - Assumption in that existing arrangements support relevant priorities or that scientists know better

Next steps (to be explored in MSCA Doct Network proposal)

Opportunity: New possibilities using semantic models for classification

- Also new data sources of grants, news, policy documents

1. What are the objects of prioritization?

- Classifications with specific ontologies (topics, methods, demands) (MERIT and SIRIS Academic)
 - This may be useful for upstream / midstream classifications: research related to prevention, health system management, primary health,
- Transversal classifiers:
 - Women's health, One Health, Climate Change and Health, AI usage
 - Alignment is not about balance across categories, but about 'colouring' of categories by transversal theme

2. Standpoint mappingSSS: whose perspectives are the various mappingSSS showing?

- LLM-based ontologies-classifications that reflect the world view of a certain discourse:
 - Not only the preferences, but the categories depend on the actor.
 - Develop explicitly constructivist "mappings" that show how different perspectives differ.

Parts that are missing – more participatory and explanatory efforts

Increasing interest in mission-orientation, targeted funding, new funding instruments and Experimentation in research funding

Missing: stronger participatory focus plust...

1. Studies of prioritization practices (by David Barberá at INGENIO)

- How are research policy priorities defined?
- How do scientists interpret and respond to policy-driven priorities?

2. Studies of different funding instruments (e.g. Aarhus team – Carter Bloch)

- How and which (if at all) do targeted funding instruments succeed in orienting research?
- How can research portfolios be managed towards more balance?

3. How the broader political economy shapes research agendas (...)

- Professional standards and regulations
- The influence of private support / funding

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