COVINFORM

CORONAVIRUS VULNERABILITIES AND INFORMATION DYNAMICS RESEARCH AND MODELLING

D3.1 Case study selection

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 101016247.

Project

Acronym	**COVINFORM**
Title	COronavirus Vulnerabilities and INFOrmation dynamics Research and Modelling
Coordinator	SYNYO GmbH
Reference	101016247
Type	Research and Innovation Action (RIA)
Programme	HORIZON 2020
Topic	SC1-PHE-CORONAVIRUS-2020-2C Behavioural, social and economic impacts of the outbreak response
Start	01 November 2020
Duration	36 months
Website	https://covinform.eu

Consortium

SYNYO GmbH (SYNYO), Austria
Magen David Adom in Israel (MDA), Israel
Samur Proteccion Civil (SAMUR), Spain
Università Cattolica del Sacro Cuore (UCSC), Italy
SINUS Markt- und Sozialforschung GmbH (SINUS), Germany
Trilateral Research LTD (TRI UK), UK
Trilateral Research LTD (TRI IE), Ireland
Kentro Meleton Asfaleias – Center for Security Studies (KEMEA), Greece
Factor Social Consultoria em Psicossociologia e Ambiente LDA (FS), Portugal
Austrian Red Cross (AUTRC), Austria
Media Diversity Institute (MDI), UK
Societatea Națională de Cruce Rosie Din România – Romanian Red Cross (SNCRR), Romania
University of Antwerp (UANTWERPEN), Belgium
Sapienza University of Rome (SAPIENZA), Italy
University Rey Juan Carlos (URJC), Spain
Swansea University (SU), UK
Gotenborg University (UGOT), Sweden

Acknowledgement: This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 101016247.

Deliverable

Number	**D3.1**
Title	**Case study selection**
Lead beneficiary	FS
Work package	WP3
Dissemination level	Public (PU)
Nature	Report (RE)
Due date	30.04.2021
Submission date	30.04.2021
Authors	**Dalila Antunes**, FS **José Palma-Oliveira**, FS **Igor Linkov**, FS **Benjamin Trump**, FS
Contributors	**Diotima Bertel**, SYNYO **Jil Molenaar**, UANTWERPEN
Reviewers	**Jil Molenaar**, UNANTWERPEN **Lore van Praag,** UNANTWERPEN **Diotima Bertel,** SYNYO

Document history

Version	Date	Comments
0.1	25.04.2021	First version of the Deliverable
0.2	29.04.2021	Version to be submitted after quality check review
1.0	30.04.2021	Final version

Executive Summary

COVINFORM is implementing the use of a socio-ecological systems resilience approach for developing case-studies aiming to identify promising practices in vulnerable communities.

The implementation of such perspective is not easy, particularly when aiming for establishing a common research methodology for case-studies spanning diverse disciplines (social epidemiology, the economics of unpaid labour, the sociology of migration, etc.) and vulnerable populations (COVID-19 patients, precarious families, migrating health care workers, etc.). Moreover, COVINFORM envisages the development of a methodology in a way to allow replication of research in a way that can be comparable and/or complimentary by defining a set a categories and variables for system analysis.

Even though this report presents the main ideas developed during a short first period of COVINFORM lifecycle and only establishes the initial steps for the development and implementation of the research methodology, partners strongly believe this perspective will allow to set a new milestone on the application of a more comprehensive perspective of communities' resilience that can be applied on future crisis situations.

Contents

Figures

1 Introduction

The main goals of COVINFORM case-study methodology are:

- Confirm the relevance and feasibility of the proposed case studies focusing different vulnerable groups and identify additional and/or alternative relevant case study sites based on data analysed in WP2
- Design a multi-site research plan, including project-level research questions and a multidisciplinary methodological framework
- Plan and coordinate research activities per case study, cross-cutting the domains of governance, public health, community, and (mis-)information
- Evaluate overall findings per case study site, synthesising the domains of governance, public health, community, and information.

The case study design and methodological framework, which is still running, is critical for developing case studies that provide information which can be comparable through a consistent theoretical framework and a consistent set of variables within the general inspiration of intersectionality theory and complex system perspectives.

Based on this methodological framework, partners will define 15 target communities for in-depth desk research. Target communities will be determined on the basis of scientific interest and partner access. From these 15 communities, 10 case studies will then be selected for empirical research.

As defined on the proposal, case studies will address vulnerabilities on site by focusing on a certain location (municipality, region, etc.), a certain target population (at-risk persons, migrants, etc.), or a certain research and innovation approach (transferable toolkit or good practice development, etc.).

The task confirms the relevance and feasibility of these case studies and solicits nominations for additional case studies from consortium partners and stakeholders within partner networks. A total of 10 case studies will be confirmed on the basis of scientific relevance, representativity of conditions and concerns in target countries, as well as consortium partner access and interest. Partners responsible for coordination will be confirmed, as well as partners responsible for support on the levels of government, public health, community, and information policy.

The main goal of this report in is to provide the roadmap, and a first idea on the framework and methodology for intersectional case-study identification and selection. This work package closely relates with remaining work being performed on COVINFORM project. Future reports will demonstrate in more detail how the different case studies operationalize the relation with each work package and contribute to them.

2 Case-study Methodological Framework

COVID-19 aims to evaluate promising practices in target communities through case studies spanning diverse disciplines (social epidemiology, the economics of unpaid labour, the sociology of migration, etc.) and vulnerable populations (COVID-19 patients, precarious families, migrating health care workers, etc.).

The introduction of case studies serves two apparently contradictory aims a) to describe the diversity of COVID19 impact in a huge array of contexts and b) to be able to compare the dynamic of the different systems response to the pandemics, and protection of vulnerable groups, across different geographical and functional defined systems. Thus, in order to accomplish those goals, one has to use a consistent theoretical framework that could be heuristic in classifying the different variables (namely vulnerability ones) as precisely as possible, determining the diversity of system components under a common theoretical framework.

COVINFORM recognizes that interactions of systems at different levels are often non-linear, and the system produces self-organization without intent. The main objective of the case studies is to analyse how the pandemic variables interact with the "normal" systems dynamic and comprehend how it contributes to amplify or minimize inequalities. It is important to underline that the definition of a system's boundary and function depends clearly on the objective of the scholar or practitioner. When an external stress is introduced, like a pandemic, existent vulnerabilities can be strengthened and often generate exponential effects. The comprehension of these phenomena can contribute to the construction of holistic models of socio-ecological resilience. Given the inherent complexity of these dynamics across systems this document aims to define a set of theoretical concepts that can be used in all the case studies in a pragmatic way.

It is important to underline that the pandemic is a specific kind of disaster / disruptive event that consists of a set of impact points that differ in space and time that all contribute to the joint and felt effect on the population. This characteristic became clear in these last months, during which the successive strategies to curtail the virus and the significant variation of its prevalence across geographies, overwhelmed any kind of simpler prediction. Thus, all different systems (either geographically defined as countries, counties, or communities, or functionally defined ones as hospitals, nursing homes, groups of minority immigrant workers) have had to differentially adapt to different point loads. One of the objectives of the COVINFORM case study procedure is to define comparable systems across European space, understanding the specific interaction between equivalent system variables that can acquire different values and determining different response patterns and effects.

2.1 Methodological Framework for defining case studies

Figure 1 below illustrates the framing of COVINFORM case studies. Empirical research for each case study will explore the cross-cutting issues which are studied across work packages: governance, public health responses, community responses and communication). The communities of practice[1] that will be under analysis during the case studies will be analysed across domains or cross-cutting issues

[1] community of practice is used in the context of Brint (2001), as a community that is an activity-based or belief-based community of choice.

(governance, health, information…) and on their relationship with other systems: upper-level systems (e.g. national/regional/municipal context), systems at the same level, and systems at lower level (e.g. family, people…).

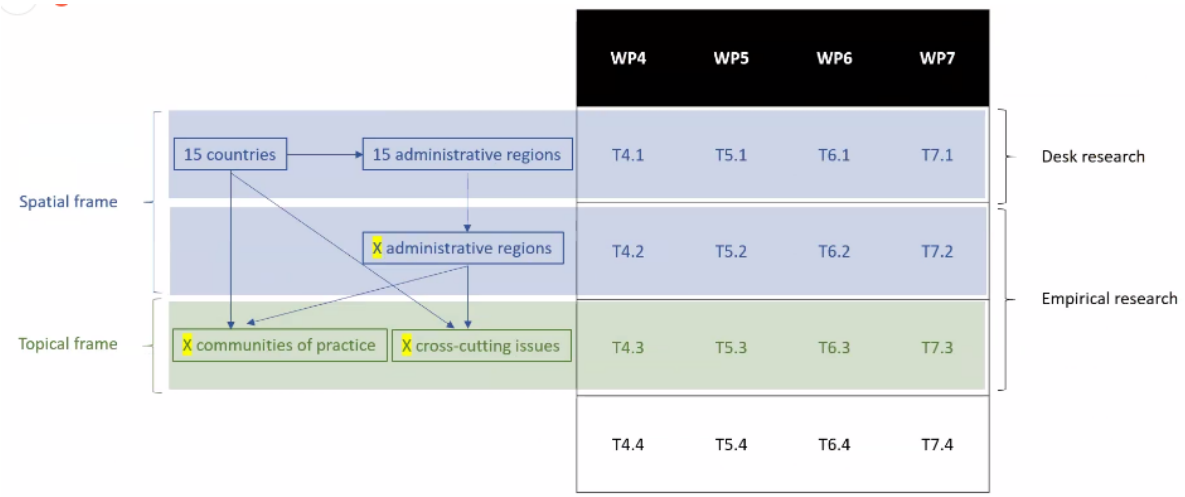

Figure 1. COVINFORM rationale for granting cross-cutting analysis during case studies definition

In order to be consistent across cases, and according to the accepted proposal, the nature of system framing and analysis should be secured. In the definition of COVID-19 pandemics and vulnerability, partners should try to frame case-studies in terms of complex system framework. This perspective implies the identification of a) categories to be used for the basic definition of the systems and b) the classes of variables that allow a common ground despite a myriad of different case studies.

2.1.1 Definition of a socio-ecological system

System behaviour results from an interactive self-organized set of processes and structures that vary across scales and that have a set of emergent properties, resilience being one of them. A definition of a complex problem immediately puts into the forefront the critical functions of that system that can naturally be at peril in the normal development of that system or be at high risk as a result of the pandemic.

This document briefly outlines a possible case study to illustrate the proposed methodology. The case will be nursing homes across Europe and how they were called to answer to the pandemic and the diversity of consequences across the countries and inside the same national spaces.

As stressed across this document, the existence of a multitude of frameworks for the understanding and description of complex systems is a recognized feature of modern-day science. However, there are few perspectives that are able to furnish a dynamic understanding of the systems cycle across time while are able to incorporate both qualitative and quantitative information.

In a nutshell it will be proposed a integrated methodology that:

a) always define a *case study* as *a complex adaptive system* with a series of *critical functions* that help to define the *systems boundaries* (Linkov et al. 2014; Palma-Oliveira & Trump, 2016).
b) A *system* tends to follow an *adaptive cycle* where certain internal or external factors can *change the phase* (Walker et al., 2004). The *pandemic is seen as a factor that could non-linearly contribute to that change in phase and produce adaptive problems.*

c) The *non-linear nature of the systems cycle is connected with tipping points* that frequently are determined by the *influence of the functioning of smaller or larger systems (panarchy)* (Allen et al., 2014). The pandemic context is of particular relevance since *the top down and bottom-up ripple effects* are recognized across different levels systems.
d) They are a set *of limited and basic factors that can be used for the systems description* (Ostrom, 2007). All systems can be described using the same variables that are: resource units and a resource system, the users, the governance, the interaction between the resource systems, the users and the governance system and, obviously, the outcomes. Depending on the particular system, we can be more or less precise answering to a higher or lower level of variables and using different theoretical frameworks and levels of explanation (see Palma-Oliveira & Trump, 2018). The dynamic of these factors and the influence of larger and smaller systems actually can inform us about the evolution of the system.

2.1.2 Adaptive cycle and a Multitier framework for analysing an SES

As mentioned above, one of the basic tenets of this perspective is to identify a certain number of variables that are assumed to be able to describe any type of Socio Ecological System (SES). Using the Ostrom (2007) basic proposal of decomposable systems as allowing a) conceptual partitioning of classes and subclasses, b) distinguish classes and subclasses of variables and c) systems are always greater than the sum of their parts.

Using the model depicted in the figure, one is basically able to describe a system and to understand the dynamic of each of the sub-systems. These 8 basic variables will be developed at will according to the need of the precise SES chosen (case studies) and the connection with the larger or smaller systems where they are integrated. More importantly the use of a specific theory to clarify should be driven by the precise case study. Some of the interactions can be better understood by sociological, economic or socio-psychology frameworks that can be used as better suited to explain the SES dynamic (as proposed by Palma-Oliveira & Trump, 2018). This articulation between the systems theory and specific theories should be addressed. System vision is a framework where we can identify a set of rules of functioning (existence tipping points, adaptation, negative and positive feedbacks, etc) that can be apply to a system defined by a leaf of a tree, by a tree, by the forest, by the social and economic space where the forest is integrated, etc. Although one can describe all the different “systems” through the same global variables in order to fully understand the leaf one has the use of cytology, the incidence of the light, etc. In order to understand a socio-ecological system (a community with the forest) one has, besides the global rules with general system variables also introduce the economic rules, the social psychology phenomena of perception, the sociology of groups, etc.

It is actually possible to see Figure 2 as a very simple identification of the basic variables of a SES and the indication of their basic properties. However, the identification of those basic variables and functions for the different systems cannot replace the precise use of precise theories to understand the interactions of variables and the dynamic of the system.

It is impossible to understand the resources of a certain community without, for instance and using the forest example, to use general ecology theory to describe what type of resources are present and the interaction with the clima, for instance. Also, it is impossible to describe the way people interact with those resources without describing the proprietary regime, the social norms, and the way people value and perceive the environment.

Actually, this is interdisciplinary endeavour with a common global framework.

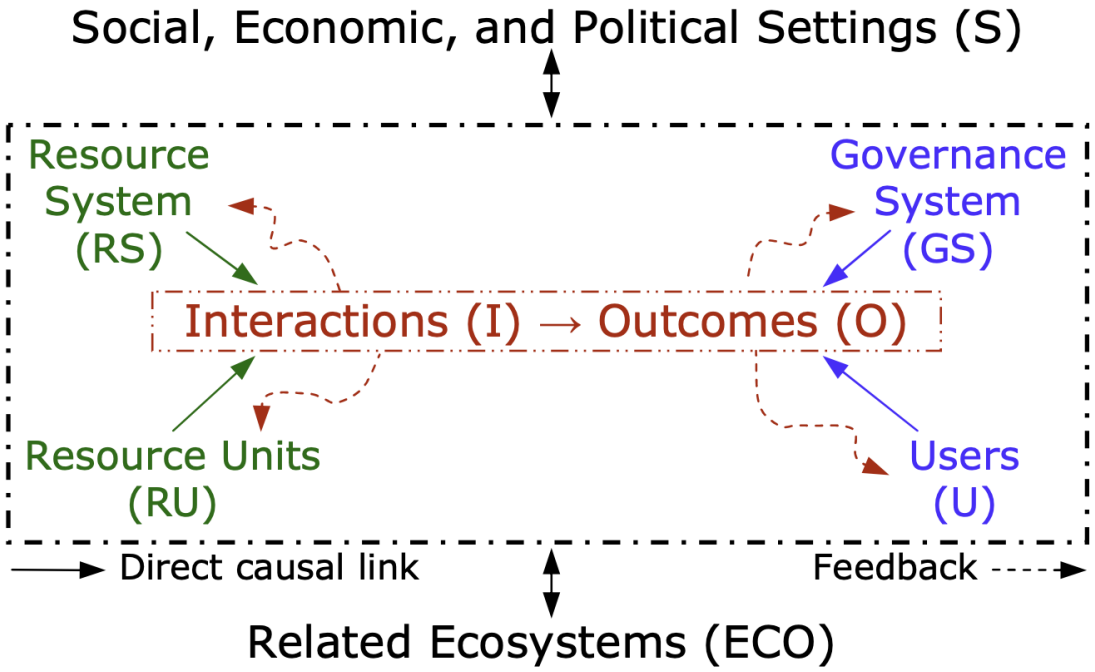

Figure 2. Ostrom (2007) Multi Tier framework for analysing Socio Ecological Systems

Every system can be described using these eight types of variables despite the fact that it is not necessary to use all of those with the same kind of precision. Using Ostrom's own words: "one can begin to organize an analysis of how attributes of (i) a resource system, (ii) the resource units generated by that resource system, (iii) the users of that system, and (iv) the governance system jointly affect and are indirectly affected by interaction and resulting outcomes achieved at a particular time and place. Using such a framework also enables one to organize how these attributes may affect and be affected by the largar socioeconomic, political and ecological in which they are embedded as well as smaller ones" (Ostrom, 2007, p. 15182).

With these basic variables one can make a more precise identification of variables and of level of analysis that will, at the same furnish a more detailed level of description providing the fulfilling of what one can describe as the second-tier variables.

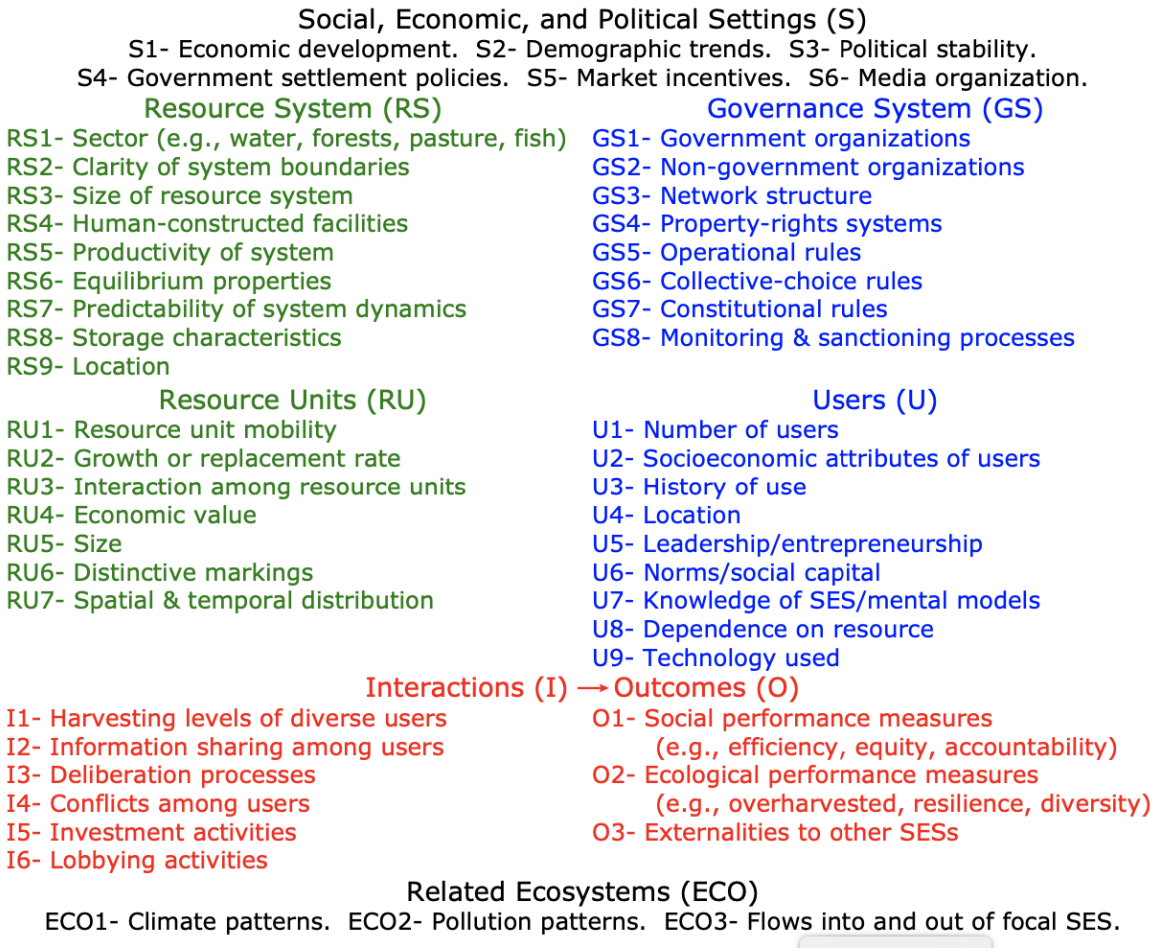

Figure 3. Ostrom (2007) second tier variables for analysing SES

All the case studies will provide a minimal description and identification of variables according to these basic frameworks and the detail will follow the main objectives of each case study.

Using the example of the nursing homes that were hit by the pandemic it is possible to describe and identify some of the relevant variables. If one analyses the nursing homes systems across Europe the conclusion is, that besides the diversity, there are a set of common variables that structurally equivalent can induce a high diversity. In this case, one has to identify the resource system, particularly RS4, RS5 and RS6 and the Resource Units particularly RU3, and RU7 (spatial and temporal distribution). According to the type of nursing home, the governance system has to be described and has relations with the resource system. It is important to describe the governance system GS2 (n - RS6 Equilibrium: governmental, private, governmental) that would make a big difference in the way GS5 (operational rules) will be adapted throughout the pandemic. Also, the conflict amongst users (I4) lobbying activities (I6) should be described speedily. And for users one should identify the providers (technical staff undermanned or not), the old people and the community and the direct family ones. Particularly important is how these variables interact and how they interact with the governance rules imposed during the different phases of the pandemic.

Using these variables, one could easily discriminate the different subsystems. For example, the different governance systems will be interacting with the rules coming from higher governance systems in the Covid-19 waves. According to the resources and the nature of the nursing homes the access to the reinforcing of technical staff will be completely diverse. Some come from the outside

(larger security system), others can't find the resources and others can have the possibility to hire in house.

An important point of any SES description and comprehension is the time dimension. The time, as stressed above, is not a linear progression and the existence of phases is fundamental. Particularly when the literature stresses that a certain system follows certain phases that are normally recurrent. If a system sometimes does not follow all the phases, if it is a particularly resilient one and it is sustained by other systems above and below. For instance, the nursing homes sub-system can have different levels of structure fixity and stay mainly in the same two phases. The pandemic has been, in the last year and a half a good example of a disturbing event that which non-linearly drives some phase changes that were determined by both the dynamic of the system (for instance a spread of the virus in-house) or by the new governance rules derived directly by the health authorities or by municipality and community's intervention.

In order to understand this dynamic, the best proposal is to use as a working metaphor the notion of the Adaptive Cycle (Allen et al, 2004). In a nutshell this means that a system normally, not always, proceeds through phases of growth (*r*), conservation (*k*), release (*Ω*), and reorganization (*α*) (Holling, 1986). The cycle is depicted in the next figure where clearly one can distinguish between the two brisk phases, usually faster of collapse and reorganization, followed by also fast phase of accumulation of capital that eventually leads to a phase of conservation and rigidity.

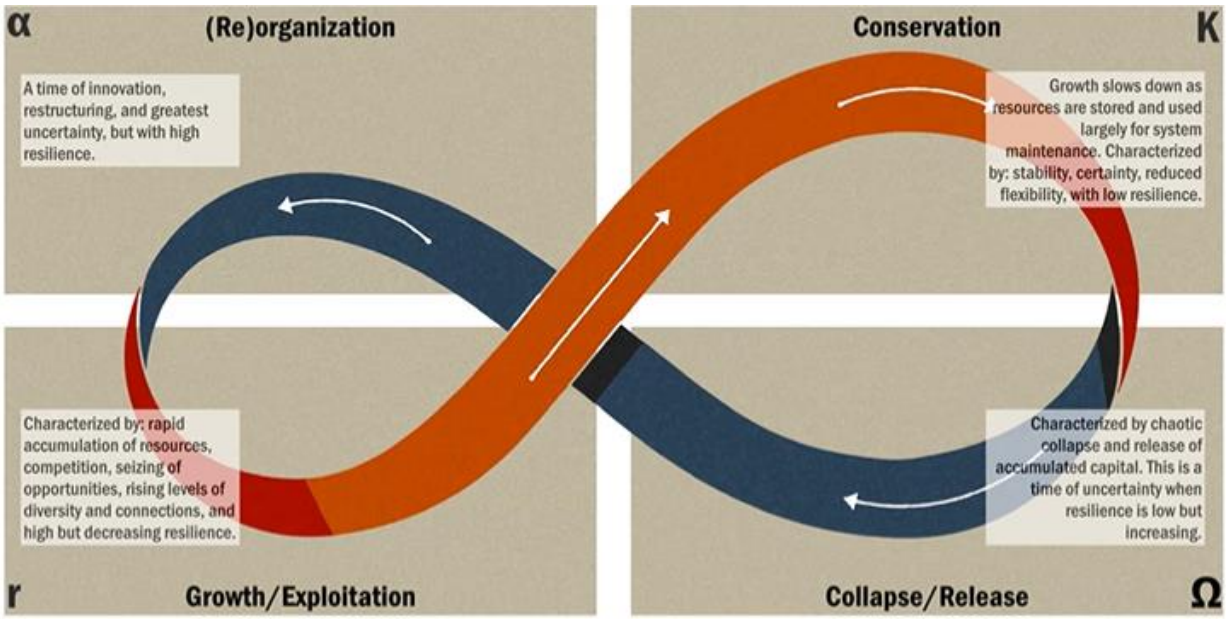

Figure 4. Adaptative cycle (Allen et al, 2014)

One of most theoretically remarkable and heuristic features in this formulation, is the fact that after and during the reorganization phase the particular system can recreate a systems structure and dynamic mainly like the before the collapse /release with more or less smaller differences, or, on the contrary, change into a different system with a less predictable trajectory. That is why resilience can be seen as a property of the system, and can be described as how well systems can resist collapse and recover to a system that can be described with the same system properties as before. Besides, the analysis with the framework above described, should be extended to the adaptive analysis metaphor, where not only the phases of the system should be described and identified but essentially the interaction with the systems *above* (the rules from the government that change the functioning of

nursing homes for instance) and *below* (lack of capacity of hiring in the community) describe not only the system but also the panarchy interaction between systems at different scales. Again we should stress that the evolution of the system and, thus, the identification of the different phases of the system as time unfolds, is one of the central objectives of the case studies.

This implies that, although all systems naturally follow adaptive cycles in their development, the pandemic could be, directly or indirectly, a trigger for phase change or accelerate ongoing changes. The system can be sufficiently resilient to maintain itself as such (the same with adjustments) or lack resilience and change qualitatively into a new one.

Besides this important time aspect of the analysis integrated in an adaptive cycle, it is important to have a basic definition of system variables and rules that are defined in the next sections but that can be summarized as:

a) case studies aim to study socio-ecological systems (broadly defined) either in a geographic or a thematic context
b) systems need to be defined by their *critical functions*
c) the time and the adaptive cycle analysis assume nonlinear phenomena and the data should be particularly attentive to the occurrence of tipping points and changes in state in direct, indirect or delayed relation with the pandemics.

A system can follow a diverse array of reorganizations during its evolution, and or stay for a long time in the same phase. The figure 5 tries to graphically describe a particular evolution of a SES (Seixas & Berkes, 2003).

What should be stressed in this example is the fact that, after the basic system is described and explained, it is straightforward to identify the modification of the phases during a cycle and the difference between cycles. We can identify the basic reason for the collapse (a new road, a changing of governance rules and enforcement, etc.) and integrate it into the description of the cycle. Also, it is possible that the system will change the resilience threshold and become a different one (in this case the lack of enforcement, the break of the regular liaison to the sea and the overfishing can actually change the system).

Using the nursing homes example during the pandemic one has to describe, as referred above, the different configurations of nursing homes systems connecting the rules of the authorities in the pandemic and how they were accepted. Also, it should be analysed the different moments in time where we can identify a phase or a change in phase. Also, there are examples of illegal nursing homes (i.e. nursing homes running without being formally registered, e.g. in Portugal) where they were obliged to close doors because of the pandemic and the change in governance. Those systems actually cease to exist and change into different ones.

Along the pandemic, and always using as example the nursing homes, either the appearance of an outbreak inside a home or changing the rules of governance, etc. were able to change the phase and implying always a certain level of renewal and reorganization. Some nursing homes had a set of governance rules that implied, for instance the access to a poll of workers that would replace the infected ones and were subject to specific rules of replacement. In other other homes the staff were kept isolated for an extended period (some time more than several weeks). These governances are related with the resources and the propriety type and community characteristics.

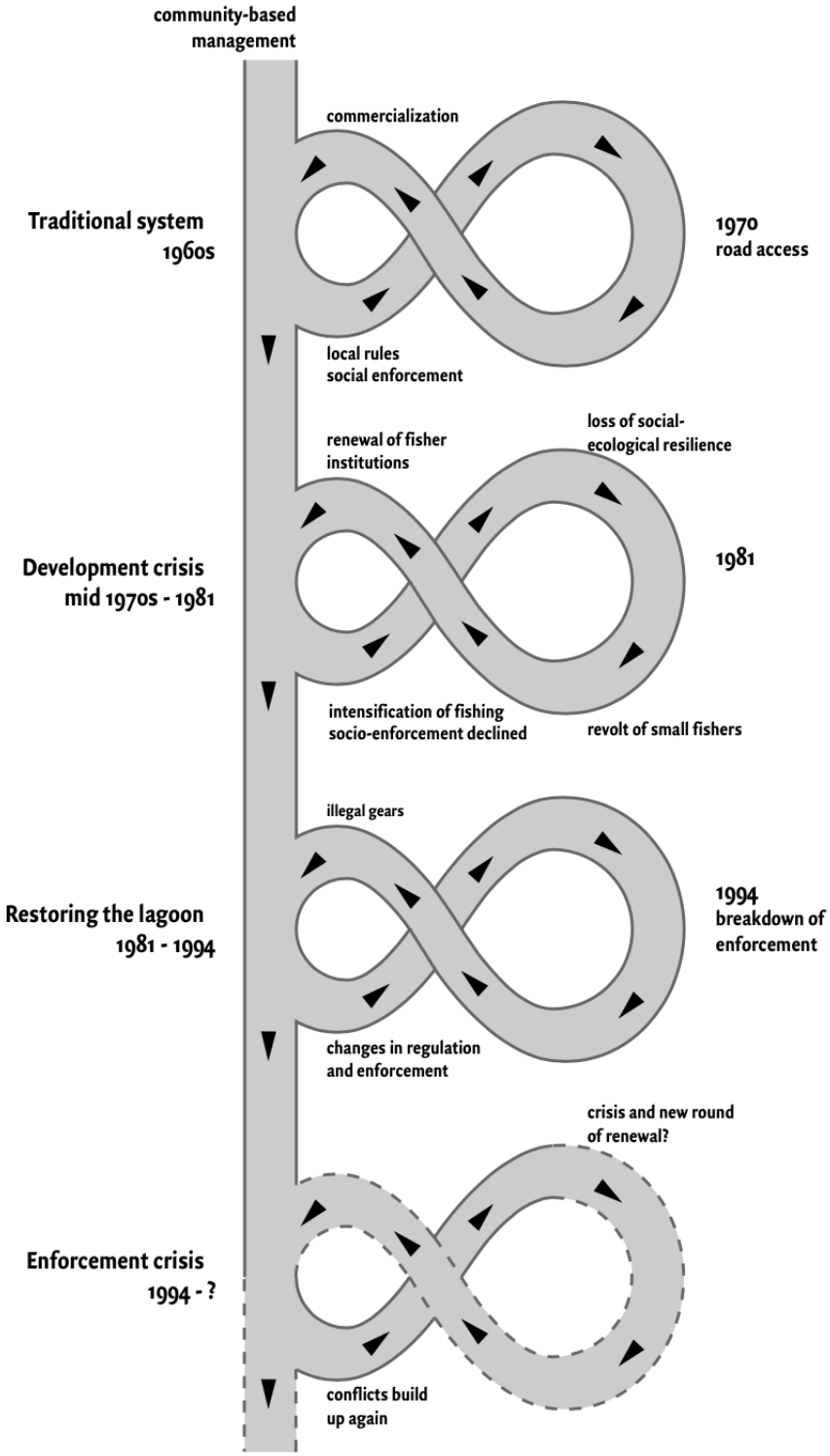

Figure 5. An example of a succession of adaptive cycles of a SES in Brazil (Seixas & Berkes, 2003)

The interaction between these different system configurations and the pandemic waves should be the object of study to understand what were the factors that were correlated with a collapse / release phase and what kind of reorganization they undertake.

2.1.3 Complex Interactive Processes

When one refers to the analysis of complex interactive processes across the case studies that implies recognizing the use of an organismic or systemic perspective. Those systems are defined by their

critical functions. This definition is able to set the analysis free in relation to the boundaries of the system. These boundaries are introduced by the critical functions and they can be defined geographically or more functionally (e.g., a community, a community of users, a social identity group, or a functional system like nursing homes, organizations etc.).

Afterwards, the case studies will be jointly defined by several levels, each of them, articulated with the others:

a) Definition of systems by their critical functions (critical operations performed by the system to ensure maintenance of its mission, i.e. the provision of its main product or service)
b) Description of the systems within the list of main and second level variables. An effort should be made to use only those variables despite the different levels of explanation might be used (economy, sociology, social-psychology)
c) The time dimension and the resilience dynamic will be described using the adaptive cycle during the different phases of the pandemic.
d) The system will be described within larger systems and how it is embedded within these systems.

The transactional perspective also includes the dimension of behaviour setting[2] stating that can only be studied within a specific context, considering the roles and interconnectedness between units, within a specific time frame (Stokols & Altman, 1991). Moreover, it is known that socio-ecological systems behaviour is not only ruled by formal norms, such as government regulations, but also self-organising in some extent (i.e., community led process based on communities' priorities, needs, knowledge capacities and resources) (Reid, 2016).

In this way, resilience processes cannot be understood looking at a system alone but requires a better understanding of the network of systems, interacting during a specific stressful period of time in ways that optimize functioning that benefit one or more systems with as few con-sequences (trade-offs) as possible (Ungar, 2019). A definition that emphasizes resilience as a set of complex interactive processes which unfold in contexts of atypical stress as the one presented by COVID-19 pandemics.

COVINFORM research aims to grasp a better understanding of the complex interactive processes that are set up within systems so they can adapt to COVID-19 changes. This implies moving beyond knowledge of the formal norms and numbers set by governments (studied under T4.1, T5.1 and T7.1 and represented on D4.1, D5.1 and D7.1) and exploring perceptions, behaviours and informal norms and processes implemented by different communities and/or systems.

2.2 Identifying, Selecting and Refining case studies

The development of the methodological framework for case studies aimed to facilitate comparability across research countries and settings and to understand more in-depth how this impacts vulnerable groups within these systems. The main objective is in the end to build further on the results to increase knowledge on COVID-19 responses to develop guidelines that can be applied across countries and systems (complementarity) to reduce vulnerability. This work is represented in section 2.1 of this document. The procedures to develop these procedures is listed in the following steps.

[2] The concept of behaviour setting is similar to the concept of ecological unit, as it brings together the physical and social dimensions to better understand behaviour, as in Roger Barker socio-ecological theory. They are self-generated and occur in a specific time-space. (Bonnes & Bonaiuto, 2002).

2.2.1 Step 1 - List case studies possibilities (April 2021)

Case selection involves identifying comparable and/or complimentary units of analysis and variables of analysis. Comparatively, this may include evaluating the performance of different countries and cultures, sub-regions and municipalities, systems and subsystems, within the same country, and other levels of abstraction. Proper case selection requires the analyst to ensure that each instance (country, region, city, system, etc) is appropriate both to analyse vulnerability and for comparative evaluation.

Hence, case studies may focus on a certain location (municipality, region, etc.), a certain vulnerable target group (at-risk persons, migrants, etc.), or a certain system (Health care system, Nursing homes, Transport System…).

The following list of possible case-studies arise from a workshop performed on 7 April, and further ideas developed by individual partners until 14 April. This list includes some possibilities of case-studies that are being discussed and that will be further developed:

- Access to healthcare in times of COVID-19: migrant communities in Borgerhout
- Panel survey on the impact of the pandemic on Italian Health Care Workers and their families.
- Intersectional analysis of health care workers and vaccination hesitancy in Vienna, Austria
- Information seeking among ethnic minorities in Sweden related to the implementation of protective measures and vaccination willingness
- Migrant health workers, Gypsy Travelers and people with learning disabilities in times of COVID19
- COVID-19 pandemics impact on senior care home centres and best practices on adaptation: a Portuguese case-study
- Self-organising communities - the community-driven emergence of neighbourhood tools during adaptation to COVID-19 pandemics
- First line responders' preparedness to pandemic situations: learnings from COVID-19 pandemics
- COVID-19 related to citizens' fear for being victims of crime (especially online) and trust to LEAs to tackle such behaviours
- Trust issues from vulnerable populations towards government and policy decisions across countries during COVID-19 pandemic

2.2.2 Step 2 - Detail case studies possibilities (May 2021)

Considering the goal of performing a cross cutting analysis within case-studies, it is required that for each case study selected there is the chance to gather data on the domains of governance (WP4), public health (WP5), community (WP6) and information (WP7), either through desktop research or empirical research. This means that listing of case studies possibilities shall strongly consider the first screen on data availability performed on COVINFORM Tasks 4.1, 5.1, 6.1 and 7.1, and further tasks predicted under each of these work packages.

Moreover, in order to grant alignment and comparability or complementarity between case studies, and also with WP2, there will be the need to further detail and explore variables to be studied within each case study. For this purpose, second tier variables of the Ostrom model will be considered.

The case studies to be presented on this stage are detailed into a template that provides the following information:

- case study name

- scale
- systems to be considered
- main research questions
- main domains to be considered on case studies - this section explores the relationship with other WPs will be explored including governance (WP4), public health (WP5), community (WP6) and information (WP7), and beyond)
- main groups of variables to be collected under each domain - under this section the second-tier variables of Ostrom model will be considered (figure 3 presented before)

For this purpose, a draft template was developed, which is presented on Appendix II. The final template will include the revision of questions for governance, health, community and information domains by the leaders of work packages 4, 5, 6 and 7; as well as a review and adaptation of the second tyer variables presented on Ostrom model (figure 3 displayed on section 2.1.1)

2.2.3 Step 3 - Selecting case-studies (June 2021)

For COVID-19 comparative analysis, case selection includes the evaluation of multiple objective and subjective variables: social, economic, governmental, etc. These include top-down and bottom-up variables to get an assessment of how various **actors and/or systems** perform within a given case (families, companies, governments, etc.).

Additionally, considerations of **time** are critical – the conditions of a case may change over time. For example, for COVID-19, some countries performed well in the first wave, but were hit hard during the second. Tracking how our units of analysis or ecological settings change (or do not change) over time provides a far richer and more complete narrative to understand different behaviours and operations during and after the pandemic.

Requirements to Assign Cases:

To adequately develop narratives to understand the impacts of the pandemic, multiple case permutations are required. The following conditions/criteria will be considered when selecting case-studies:

(1) A clear rationale for comparative analysis
    a. Definition of the critical functions of the systems that are the focus of the study
    b. The selection of units of analysis that are comparable, but with unique conditions
    c. Selection of countries, regions, cities with differing cultural/governmental practices with clear identification of the levels at which the systems at which information will be collected
    d. Inclusion of timing and magnitude of COVID outbreaks, as well as areas of similar and contrasting governmental response.
(2) Multiple data sources
    a. Economic disruption, changes to family/household dynamics, etc.
(3) Change over time

2.2.4 Step 4 - Revisit and refine case-studies variables across domains (July 2021 - October 2022)

For ensuring that case studies are comparable and complimentary COVINFORM will develop a common data collection framework to be used across case-studies. Variables will be selected in a way that fit case-studies diversity.

In reviewing each case, it is essential to gain a complete understanding of each system. What was the epidemiological experience? How do the systems operate, and deal with stress? What about its infrastructure, and how systems responded to restrictions and changes to lifestyle?

All variables must be grounded in sound scientific theory that provides narrative structure regarding *how* and *why* key variables matter for our units of analysis. That means that, besides the list of variables described, the *Interaction and Outcomes ones should be described with the theories more appropriate for each system explanation* (economics, sociology, social psychological, etc.)

The approach of each case study to the set of variables covering at least the domains of governance, public health, community and communication will be thoroughly considered. Leaders of each of these work packages will analyse in detail the opportunities offered by each case study to explore their domains and how case studies can offer complementarity to potentiate knowledge development.

2.2.5 Step 5 - Revisit and refine case studies methods (July 2021 - December 2021)

The main goal of this stage is to make sure comparability of case studies is achieved in practice, meaning information gathered and results can be combined and contrasted. This implies making common arrangements on the way information is gathered and variables are measured.

In order to promote comparability, not only variables will be addressed but common methods, tools and procedures for gathering and measuring variables will be defined. This task will be developed in strong interconnection with COVINFORM Work Package 2.

2.2.6 Step 6 - Implementation and monitoring (November 2021 - April 2023)

During implementation, monitoring meetings with different case-studies will be set to support case studies leaders on overcoming any difficulties that may arise on implementing common procedures for measuring variables and for granting common databases are used for recording and processing information. These meetings will be performed with the participation of leaders of work packages 2, 4, 5, 6, 7, so decisions can be made in strict articulation with the work performed across the project.

The image on the following page synthesis the road map for the case-studies development and implementation.

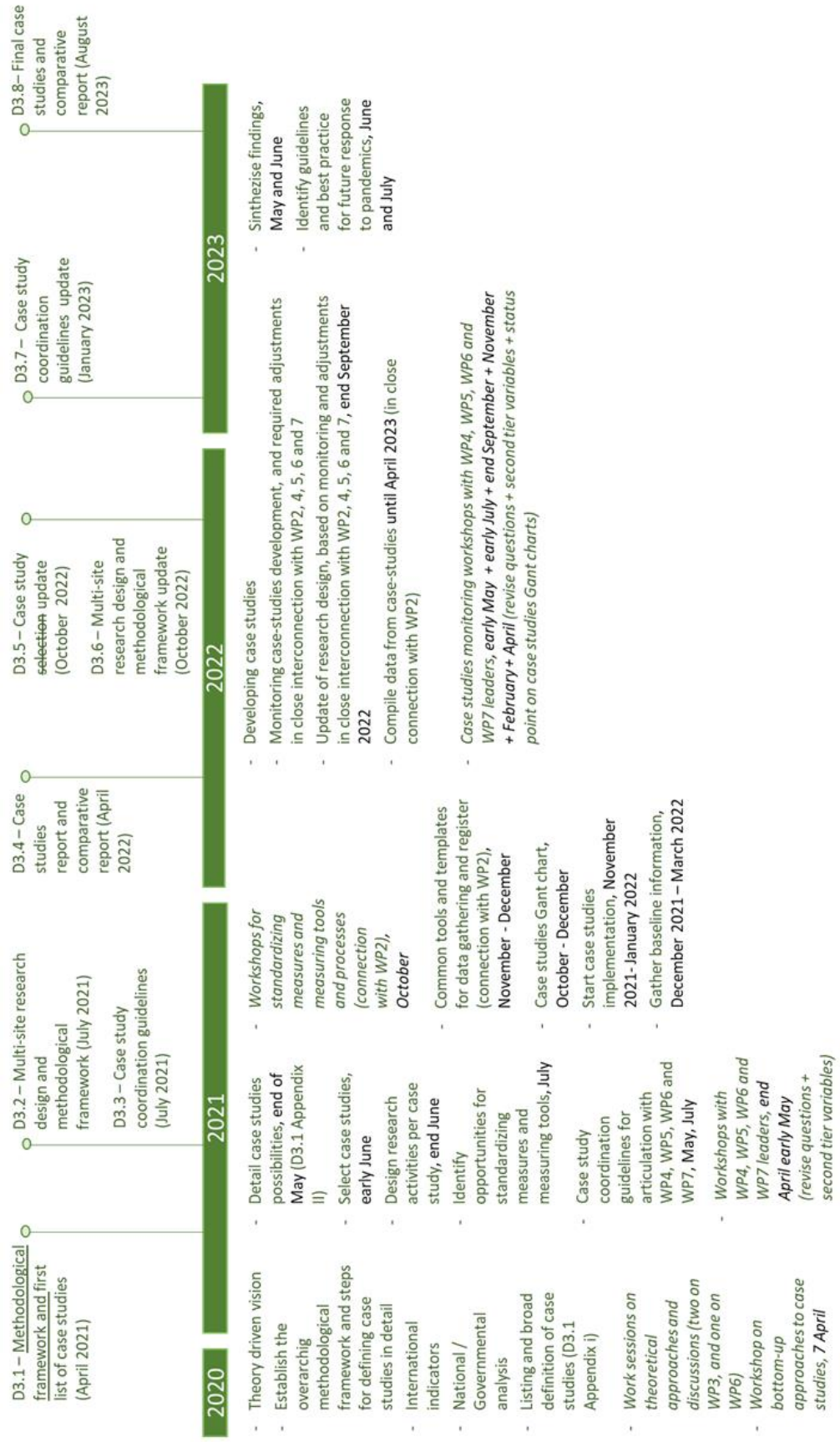

Figure 6. Roadmap for the development and implementation of case-studies

3 Conclusions

This report presents a first glance at COVINFORM's perspective on case studies and the overarching methodology that will be used for designing and developing them. The COVINFORM perspective is strongly anchored in the concept of resilience of socio-ecological systems.

A set of steps for case studies design, development and implementation has been developed, which together provide a roadmap that will guide the implementation of the case studies.

References

Literature

Day, R. & Gastel, B. (2012). *How to write and publish a scientific paper*. Cambridge.

Allen, C., Angeler, D., Garmestani, A., Gunderson, L. & Holling, C. (2014) Panarchy: Theory and Application. *Ecosystems 17*: 578-589

Bonnes M. and Bonaiuto M. (2002). Environmental psychology: from spatial-physical environment to sustainable development. *The Handbook of Environmental Psychology* (ed. R.B. Bechtel and A. Churchman), pp. 28–54. New York: Wiley.

Brint, S. (2001). Gemeinschaft revisited: A critique and reconstruction of the community concept. *Sociological theory*, 19(1), 1-23.

Palma-Oliveira, J. & Trump, B. (2018) resilience: moving forward from a metaphor. In Trump, B., Florin, M. & Linkov, I. (Eds) *IRCG resource guide on resilience (vol.2) Domains of resilience for complex interconnected systems.* Lausanne, CH: RPFL International Risk Governance Center: available in irgc.org

Linkov, I., et al.(2014) Changing the Resilience paradigm. *Nature Climate Change, 4*, 407-410.

Ostrom, E. (2007) A diagnostic approach for going beyond panaceas. *NAS, 104 (39)* 15181-15187.

Seixas, C. & Berkes, F. (2003) Dynamics of social-ecological changes in a lagoon fishery in southern Brazi. In Berkes, F., Colding, J. & Folke, C. (eds) Navigating Social Ecological Systems. Cambridge: Cambridge University Press.

Stokols, Altman, I. (1991). *Handbook of Environmental Psychology.* Krieger Pub Co; Reprint edition.

Walker, B., Holling, C. Carpenter, S., & Kinzig, A. (2004) Resilience, adaptability and transformability in social ecological systems. *Ecology and Society* 9 (2) www.ecologyandsociety.org/vol19/iss2/art5

Ungar, M. (2012) The social ecology of resilience. Springer.

ANNEX I. Case Study Template to be developed on step 1, and case-studies first presentation

Case study name	
Scale	
Time frame	
Systems to be considered	
Main research questions	
RQ1	
RQ2	
RQ3	
RQ4	
RQ5	
What are the main disciplines required for the work that will be developed?	

ANNEX II. Case Study Template to be developed on step 2

Case study name	
Scale	
Time frame	
Systems to be considered	
Main research questions	
RQ1	
RQ2	
RQ3	
RQ4	
RQ5	
What are the main disciplines required for the work that will be developed?	

How does this case study contributes to COVINFORM objectives?
O1 - Analyse preparedness, initial responses, and subsequent responses to COVID-19 across the EU27 countries and the UK and selected third countries?
O2 - Index and model relevant dimensions of health, socioeconomic, political, and community vulnerability and resilience within a multidisciplinary and intersectional theoretical framework.
O3 - Compare selected regional/local responses within 15 EU countries, with a focus on local social structures (including inequalities) and multi-level governance processes.
O4 - Assess the impacts of national and regional/local COVID-19 responses on human behaviour, social dynamics, and physical and mental health outcomes.
O5 - Implement intervention or pilot case studies in selected EU and non-EU countries, with a focus on transferring promising practices for boosting well-being within specific vulnerable groups.
O6 - Develop policy guidelines and promising practices to influence behavioural change across different groups in society and improve the resilience, wellbeing and mental health of the population.

O7 - Integrate the project parameters, data flows, research findings, case study assessments, and response guidance into the COVINFORM COVID-19 Knowledge Repository	
Main domains to be considered on case studies (including governance (WP4), public health (WP5), community (WP6) and information (WP7), and beyond)	
WP4 a) identify governmental responses relevant for case studies – empirical research on; b) how the case study tackles governmental response and impacts	
WP5 a) dimensions of public health responses which are relevant to study for the case study b) how the case study contributes to analyse public health response and impacts	
WP6 a) describe the relevant target community to be studied b) what kind of community responses are analysed by the case study c) how the case study contributes to analyse community and citizens response and impacts	
WP7 a) how will the case study analyse vulnerable groups from the perspective of communication /information b) how the case study contributes to communication / information response and impacts	

Main groups of variables, and indicators, to be collected under each domain	
Social, Economic and Political Setting	
Resource System	
Resource Units	
Governance System	
Users	
Interactions	
Outcomes	
Related Ecosystem	

ANNEX III. Case study suggestions

The following table provides an overview of the first discussed case studies.

Topic & target groups	Partner
Mobilities: Migrant health workers, Gypsy Travelers and people with learning disabilities in times of COVID19	SU
Panel survey on the impact of the pandemic on Italian Health Care Workers and their families	SAPIENZA
Information seeking among ethnic minorities in Sweden related to the implementation of protective measures and vaccination willingness	UGOT
Intersectional analysis of health care workers and vaccination hesitance in Vienna, Austria	SYNYO
Access to healthcare in times of COVID-19: migrant communities in Borgerhout	UANTWERPEN
Emergency Medical Service staff and volunteers in the frontline during the COVID-19 pandemic OR COVID-19 in the refugee and integration context - social implications of the pandemic for the Syrian and Afghan communities as well as NGOs in the care of refugees in Vienna	AUTRC
COVID-19 and precarity in Germany: synergising theoretical frameworks to better understand the social determinants of health	SINUS