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Overview

This is the first in a policy brief series that will examine societal problems from a solution design perspective. It presents the frameworks that will be applied to examine consequential challenges with deep shades of wickedness such as COVID-19, open defecation, climate change and violence against girls and women etc. in future briefs.

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How should policymakers tackle 'wicked' problems? From designing solutions to building legitimacy

Diverse disciplines, including economics and mathematics, have explored complex problems which are not well defined, or whose solutions are not evident or which have multiple solutions that need to be bargained over[1]. But, the quandary that policymakers are often caught in seems best captured by design theorists, Rittel and Webber[2] who coined the term 'wicked problems'— for societal challenges whose simple resolution would be impossible for any optimal planner. They explain that, "a great many barriers keep us from perfecting [an idealised] planning/governing system: theory is inadequate for decent forecasting; our intelligence is insufficient to our tasks; plurality of objectives held by pluralities of politics makes it impossible to pursue unitary aims; and so on".

Many policy challenges are wicked problems not due to any malevolent content, but because the definition of the problem itself and its possible resolution pathway(s) are perceived differently by different stakeholders, such that the processes and outcomes of addressing the original problem may lead to vicious consequences for some, open up new problems both foreseen and unforeseen for others and even lock the system into sub-optimal functioning. But, for policy responses to wicked problems, like for the Apollo 13 Moon landing mission: "Failure is not an option".

The state is usually held responsible for governance, regulation, provision of public goods (e.g. national security, law and order, justice, knowledge production, infrastructure, hygiene etc.), maintenance of public agencies offering services to citizens (e.g. health, education, police, social protection, banking etc.) and other administration. Further, the state both creates and invests in public programmes to build or improve governing and citizens' capabilities and well-being. Though there are many treatises on the precise definition of public policy, generally they relate to how the government carries out the above functions. Nevertheless, while the attenuation of consequential wicked problems falls on the shoulders of the state, it is not the only governing actor, for the state governs in systems of 'interactive gover-

nance' to steer "the complex process through which a plurality of social and political actors with diverging interests interact in order to formulate, promote, and achieve common objectives by means of mobilising, exchanging, and deploying a range of ideas, rules, and resources[3]".

A layperson might think that it should be easier than ever for policymakers to solve any problem, wicked or non-wicked. We live in a world with more evidence, data and methodologies than ever before. The science of tracing trends and structural changes, identifying and distinguishing between causalities and associations, and communicating them through sophisticated data visualisation techniques is ever-growing. Hence, the baseline conditions for a challenging context can be assessed by experts, and once a programme is implemented to address the challenge, its impact can be assessed in a myriad of ways. But experts often disagree on normative issues, and fail to predict the effects of policy interactions in new contexts. In reality, the design of the solution itself is often left to policymaker teams, and the consultants they hire for the purposes of designing the solution. Amidst a growing variety of baseline and impact assessment techniques, this makes the work of non-expert policymakers even more challenging and probably more confusing – especially when it comes to designing solutions to address wicked problems which by definition are beyond resolution. The trial for policymakers is then to arrive at a second-best attenuation without creating new problems or aggravating existing ones.

In this vein, the present policy brief seeks to offer guidance to non-expert policymakers (and other interested non-experts) to distil the advice of experts when addressing wicked problems. In other words, it does not purport to offer a theory to predict causality, determine investment plans etc. being more set in line with managerial frameworks like the Porter's 5 forces[4], SWOT[5], the business model canvas[6] etc. albeit to address wicked problems. Two simple frameworks termed 'SPITE' and 'SISTER' are proposed to guide conversations with experts. Their rationale is founded on selected representations of the world by innumerable scholars from evolutionary economics, innovation systems, game theory and design theory, who in turn have been influenced by developments in other disciplines like biology, management science, psychology, sociology etc.

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Settings of wicked problems within constantly evolving systems i.e. our world

Across the social sciences, the 'Systems Approach', i.e. consideration of the field of enquiry as a set of interconnected components, has been found to be useful to organise evidence on variables, structures,

actor interactions, outcomes etc. By definition it is open to many forms of interpretation and investigation. In the present brief, we adopt the game theoretic representation of our world as being shaped by the strategies of its players and the system characteristics, which is in sync with systems thinking for social change[7].

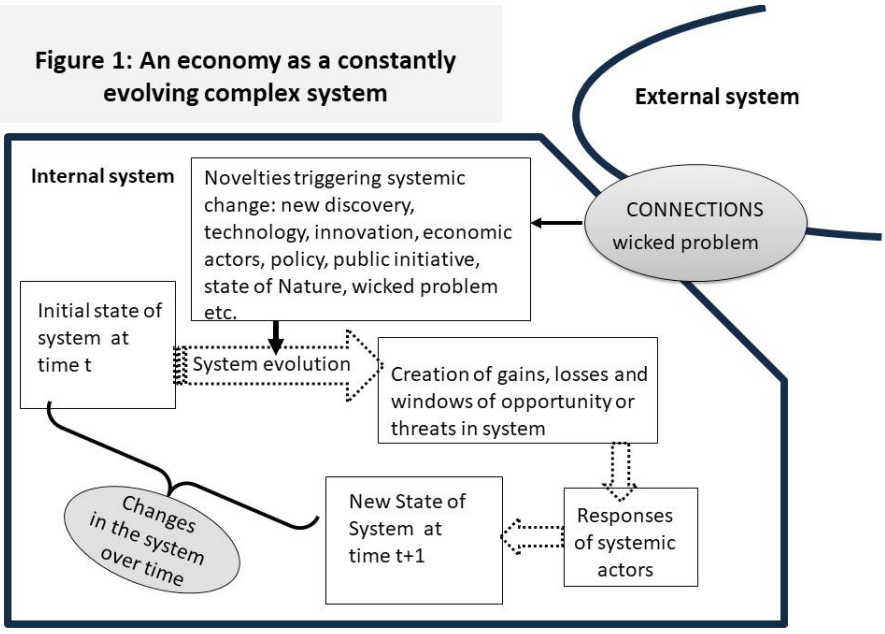
Let us take the point of departure as the wicked problem and consider its corresponding system as being given by a space containing economic actors (e.g. citizens, firms, public agencies, social sector actors, universities and public laboratories and government etc. that engage in monetary transactions) which impact or are impacted by the wicked problem. Nature or the associated ecological system[8] could also be included. The system is characterised by the quantity and quality of its natural resources, artefacts, infrastructures (physical, institutional, financial, digital etc.), access to the different economic actors and its (i.e. system's) governance. It is also marked by its history, social norms, actor-coalitions, actor-capabilities and the performance of its artefacts and infrastructures. Systemic actors interact with one another through markets, hierarchies and/or networks. Systemic outcomes depend on the nature of interdependencies between the actions of the different actors and actor-groups, possible spillovers and externalities and other system characteristics[9].

Mutation and novelty-introduction (e.g. new knowledge, new firms, new products, new pathogens) are constantly occurring processes in the system[10]. Every type of systemic actor ranging from nature, citizens, firms, public agencies, universities, the state and coalitions of economic actors can launch novelties into the system. Some mutations are rejected and some are accepted. Some of these mutations may be benign, some may generate positive value for all and some may also be wicked problems (Figure 1). Wicked problems can therefore hit a system either as an exogenous shock or an endogenous one imploding from an accumulated past.

Heterogeneity and complexity mark our world

A fundamental assumption that distinguishes evolutionary economics from its mainstream neoclassical brethren is its acceptance of actor-heterogeneity as a given in the system. Economic actors can differ from one another in terms of resources, capabilities, preferences and objectives. They can also wield different bargaining powers in the system. For instance, we can distinguish between players, stakeholders and non-player-stakeholders. Economic players are the influencers, who can shape the impact and/or spread of wicked problems partially or totally. On the other hand, stakeholders are entities which are impacted by the wicked problem. Of course, an economic actor can be both a player and a stakeholder, but not all stakeholders need be players. A non-player stakeholder is one

Figure 1: An economy as a constantly evolving complex system



who does not have a 'voice' in changing the parameters of the system or problem. In this manner, while evolutionary economics conforms more to reality, it is messier to model real contexts using this approach because of actor-heterogeneity, mutations and constant evolution.

There is no universally accepted definition of complexity, but a general notion can be easily rationalised[11]. Firstly, 'to recognise' complexity is a capability in itself and hence agent specific. In this vein, an economic actor can consider a system to be complex if: (i) The actor does not have complete and/or perfect information on all the other systemic actors or other system parameters; and/or (ii) The actor cannot control the choices of one or more of the systemic actors in all systemic processes. Secondly, a system can be termed complex if it is complex for all actors in the system (e.g. even the regulator or the state does not know the hidden agenda of all economic actors or is able to control all their actions).

Complexity arises from heterogeneity and bounded rationality[12] (i.e. limited memory and/or ability to make calculations). Shared objectives or prospects of individual gains from coordinated actions can give rise to coalitions[13], which can also change over time, given how its members fare and how the system evolves. Often, lack of complete and perfect information on other economic actors (their resources, capabilities, preferences and objectives) makes it impossible to design contracts or incentives that are complete, self-enforcing and effective. Then only trust and gut instincts must guide actions – which is far from optimal[14].

This brings us to the role of communication in resolving strategic logjams. Game theory demonstrates that ensuring respect of contracts, cooperation or coordination can be daunting, because there is often an inbuilt incentive for players to deviate from their engagements, and to free-ride on the good will of others, assuming that the latter will respect their commitments. This is self-evident at every level of group interaction. Even in couples, one partner may cheat on commitments assuming that the continued good nature of the other will keep the relationship intact. Unfortunately as opportunism is a common player trait, we frequently end up in social dilemmas, wherein the selfish action of self-promoting players puts everyone in the worst position – while a better outcome could have been obtained for all, if only the players had respected their commitments. However, scholars have demonstrated that social dilemmas can be resolved or attenuated in many instances through communication[15].

The world as a three-layered deck for a policymaker[16]

The multilevel perspective or MLP framework is a useful tool to illustrate how governments (or other economic actors) can address wicked problems in a complex world. The MLP represents a system as a vertical three-layered deck (Figure 2). Public policy can intervene at one of the two levels, either at the top 'landscape pressure' or at the bottom 'niche innovation' level to tackle a wicked problem.

The topmost landscape layer refers to top-down pressures that shape the possible actions of the majority of economic actors. These pressures include larger societal problems that emanate from socio-economic activities (housed in the middle layer) as well as national, regional and international policies to address them. A curative state action from the landscape to address a wicked problem can take the form of a new regulation, public investments, directives etc.

About the Author

Shyama Ramani is a Professorial Fellow at UNU-MERIT. Her research focuses on the relationships between technology, innovation and their governance for inclusive development. Her work examines the role of technology and innovation in conjunction with actor (government, firms, citizens, public laboratories, NGOs etc.) engagements to attain the Sustainable Development Goals (SDGs) related to gender equality, sanitation, sustainable cities and communities, education and climate change. Her methodology is varied, ranging from contextual analysis and case studies to the use of game theory for studying strategic problems related to innovation creation and diffusion. Prof. Ramani holds a PhD in economics from Cornell University, USA.

The middle layer is the space of systemic socio-economic activities where industries thrive and economic actors compete and cooperate with each other to create value, both positive and negative. Systemic outcomes are determined by sets of self-reinforcing forces wielded by actor-coalitions that are collectively referred to as the dominant regimes. The actions of dominant regimes are assumed to support the status quo, given landscape pressures from above and novelties from below. At the same time, it is the functioning of the system as it does – that also contributes to the build-up of negative landscape pressures and the wicked problem within the system. Thus, to weaken a wicked problem, the status quo of dominant regimes has to be broken partially or totally.

The lowest layer is the source of constant novelties or niche innovations that are introduced into a system by economic actors, including the state. Such novelties carry the greatest potential for system transformation while bearing the heaviest weight of uncertainty, as their integration in the system may result in 'creative destruction' of some aspects of the dominant regimes governing 'the way things are done normally'. Therefore, niche innovations could also be contested and rejected; or integrated, and repurposed etc. by the dominant regimes without any change in the status quo.

The SPITE solution design

To address any societal problem we propose a combination of five 'SPITE' elements, as shown in Figure 4. Here, S stands for science or knowledge creation investments, which may be necessary to understand the wicked problem and find ways to tackle it. P is for any new policy initiative. I is for any innovation, be it technological/social/business, to be introduced into the system. T refers to existing technology, in terms of mobilisation / repurposing / redesign / management. E stands for every type of engagement (i.e. communication and dialogue) necessary with systemic players for adoption and diffusion of the above solution design. The nature of this final aspect, the engagement investments, will depend on the other elements, the wicked problem and the systemic context[17].

This design theory inspired approach emphasises that a combination of elements is needed in a solution technology, rather than any single one component. The combination itself may take different forms at the landscape and niche levels. Engagements are key, for the mere introduction of a solution may not be sufficient for its successful adoption and diffusion[18]. SPITE has to be coherent in terms of its own elements and with respect to the system and the problem – to elicit the

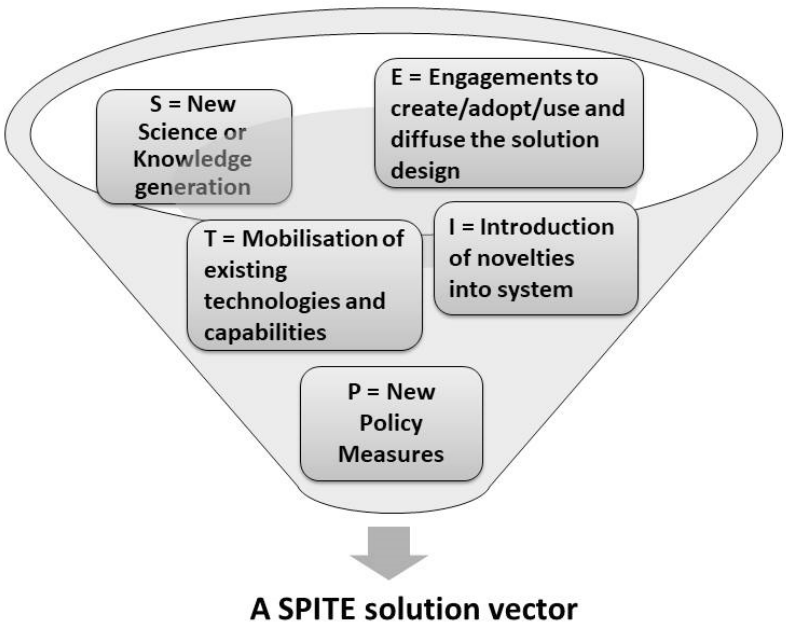
Figure 2: The Multilevel Perspective of an economy as a constantly evolving complex system

required cooperation and coordination between diverse players to break down resistance to the proposed solution.

The SISTER framework for legitimacy construction[19]

Whatever the entry pathway of a curative or preventive SPITE solution, policy resistance is likely, because it will have to challenge the dominant regimes or parts of dominant regimes that support the wicked problem and strengthen those that are against it. Therefore, there will be a need for legitimacy construction. Often there is an implicit assumption that any state-supported initiative has already earned legitimacy because of its presumed selfless intention to address a societal problem. But this is not always the case. Legitimacy may be threatened whenever there is disagreement over the value of state intervention between policymakers and key systemic players. Then there is policy resistance.

Figure 3: The SPITE framework to address wicked problems



Combining this with the multi-level perspective, a natural presumption is that legitimacy requirements for state action emanate least from the landscape level and most from the niche-innovation level. This is because the adoption and diffusion of innovative solution designs are not certain. The triumph of an innovation-based solution design will depend on how successfully it is adopted and diffused within the system. It might need to be adopted only by some 'actor-islands' to eliminate a wicked problem or it may require a comprehensive adoption by a majority of the systemic actors[20]. Without adequate legitimacy, the dominant regime may reject the solution.

How then is legitimacy to be constructed? Here, we turn to design theory, which advocates a participatory, human-centric approach to solve problems[21]. Design thinking means finding a satisfactory solution fairly quickly, without necessarily undertaking a prolonged analysis as the purpose is not to identify the best solution but a satisfactory solution[22]. Design often reflects in action, without complete and/or perfect reflections or calculations about the action. It calls for creativity, it can lead to mistakes and it relies also on intuition and artistry. The widely used 3Is' approach of the world-renowned design firm IDEO[23] involves[24]: (i) drawing Inspiration from learning about the context and the problem from the stakeholders' perspective and co-defining the problem; (ii) Ideating the solution in a participatory manner; and (iii) Implementing the solution with constant forward and backward testing, with feedback going into the other steps.

Weaving the design perspective into the earlier points gives us the SISTER framework representing a consultative planning process to maximise returns to investments while minimising systemic friction

through legitimacy construction. As shown in Figure 3, the SISTER framework involves a multi-phased non-linear process, consisting of the following elements: (i) S: System, stakeholder, problem, regimes characterisations; (ii) I: participatory Investigation of possible solution designs; (iii) S: building a Shared a vision to address the problem; (iv) TE: fine-tuning the pathway i.e. designing the solution TEchnology or deciding on the form of the SPITE solution vector; and (v) R: undertaking evaluation of impact to again redesign the solution or scale it up for Replication.

Within SISTER, actions on the different phases may be initiated simultaneously as well as sequentially with iterative loops. It is built on recognition: (i) of the systematic, complex and evolutionary nature of our world; and (ii) that this complex system is constantly evolving at multiple levels linked to shocks, mutations and games being played by economic actors across actor-communities, actor-power-groups, geographical spaces, sectors and communities; and (iii) that cooperation and coordination from diverse actors are required for systemic transformation. Thus, any government confronting a wicked problem has to build a shared vision of the problem and its solution design through a stakeholder process such as SISTER to *gain legitimacy and minimise policy resistance*[25].

To conclude, given a wicked problem, SISTER offers an overall 'management' framework to embed a context-specific SPITE solution design. Both are essentially non-linear processes that co-evolve over iterations of implementation, systemic impact (both expected and unexpected) and learning. As the system constantly evolves and the wicked regimes change, both the SISTER and SPITE elements will likewise co-evolve. Application of the SISTER and SPITE frameworks to address a wicked problem will thus involve actions, sometimes sequentially, sometimes simultaneously, in non-linear iterative cycles, with feedback, learning and legitimacy construction – within a constantly evolving complex system.

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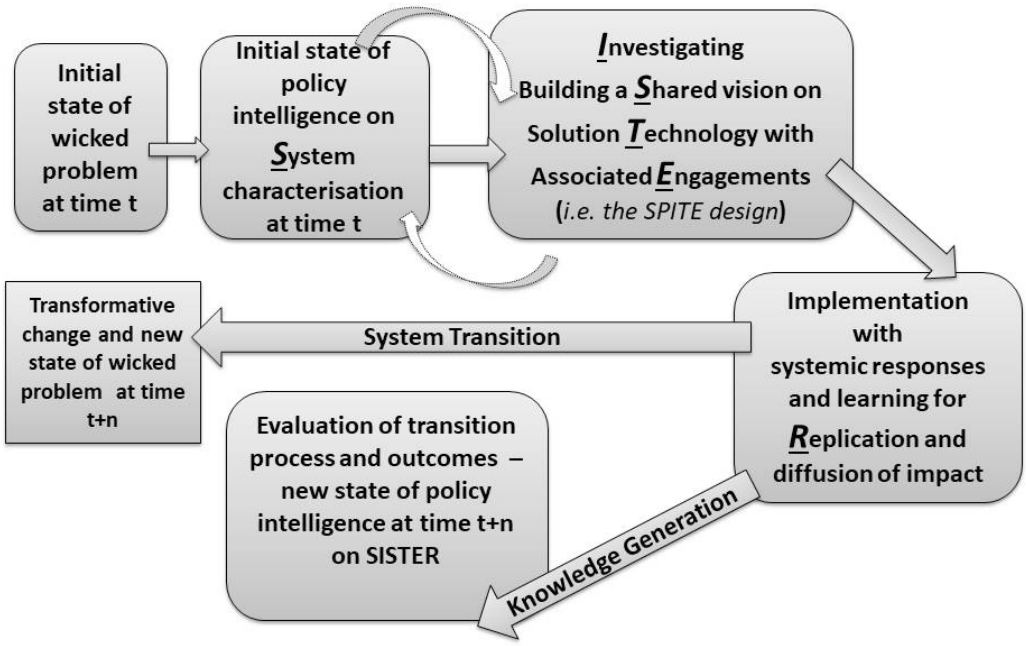
*** Please click here for references and endnotes ***

Also given at the end of the brief.

Figure 4: The SISTER process framework to address wicked problems



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The United Nations University – Maastricht Economic and Social Research Institute on Innovation and Technology (UNU-MERIT) is a research and training institute of United Nations University based in Maastricht in the south of the Netherlands. The institute, which collaborates closely with Maastricht University, carries out research and training on a range of social, political and economic factors that drive economic development in a global perspective. Overall the institute functions as a unique research centre and graduate school for around 100 PhD fellows and 140 Master's students. It is also a UN think tank addressing a broad range of policy questions on science, innovation and democratic governance.

INSIDE:

Policy Brief

How should policymakers tackle 'wicked' problems?

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NOTES AND REFERENCES

[1] Game theorist, John Nash proved that in any strategic play between a set of economic actors, equilibrium in terms of concrete actions that no one would regret and deviate from may not exist, and sometimes on the other hand, there could be multiple equilibria points. This has also been conjectured in mathematics. For instance, consider a system of equations made up of interconnected entities that for simplicity we can allude to as variables. The equations can be considered as challenges to solve and the variables as instruments with which to solve them. Mathematicians in the 17th century proved that if in a system of (linear) equations, the number of equations (i.e. challenges) is greater than the number of variables (i.e. instruments), then there can be no solution, i.e. no value of the variables can make the system truthful. Furthermore, if the number of instruments or variables is greater than the number of challenges or equations – then there could be multiple solutions. Nash, John. "Non-cooperative games." *Annals of mathematics* (1951): 286-295.

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