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Building a Scientific Narrative Towards a More Resilient EU Society

Part 1: a Conceptual Framework

Manca, Anna Rita
Benczur, Peter
Giovannini, Enrico

Joint Research Centre

EUR 28548 EN

Contact information
Name: Anna Rita Manca
Email: anna.manca@ec.europa.eu

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Title: Building a Scientific Narrative towards a more resilient EU society. Part 1: a conceptual framework

Abstract
This report explains the main elements of a conceptual framework for resilience. The framework was developed in consultation with several Directorate Generals of the European Commission, participating in the Research Network on the Measurement of Resilience, which was jointly established by JRC and EPSC in 2016. The conceptual framework was designed to serve the policy DGs in their policy-making activities by creating a common understanding of the concept and paving the way towards a measurement and monitoring facility.

Contents

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1 Motivation

Interest in resilience has been rising rapidly during the last twenty years, as a response to increasing uneasiness about actual and potential shocks that would test the limits of the coping capacities of individuals, regions, countries and institutions. Though resilience is often discussed in an engineering, environmental, development and social protection context, the resilience of European citizens and the EU as a whole has been recently tested by economic shocks, political changes, migration and security threats that no one had foreseen before (Joint Research Centre (2015)).

Thinking about changes brought about by the digital innovation, demographic change, climate change, globalization or migration, it would be illusionary to believe that we can eliminate crises, shocks or persistent structural changes (*slow burn processes*) in the future. On the contrary, the number of potential shocks could even increase. Since we will not be able to avoid them, we have to learn from distressful experiences and set up policies that prepare citizens, companies, societies and institutions to overcome them with the minimum damage possible.

In particular, public institutions, such as the European Union, need to adapt to these new circumstances and assume their role to engineer system-wide transformations to mitigate damages, and not only to protect but especially to prepare its citizens to face future adversities. In other words, to foster resilience.[1] Being resilient depends mostly on individuals and their various levels of aggregations (entities such as communities, cities, regions or even countries), but it also involves institutions such as governments, markets, businesses, legal and physical infrastructures and policies. At the same time, resilience can be enhanced by various interventions: by preparation, prevention, protection, promotion and transformation policies.

Therefore, the role of policy institutions, such as governments or supranational institutions, is crucial in fostering policies towards a positive socio-economic-environmental outcome of sustainability, cohesion and prosperity of the society. In the context of a stormy future becoming the "new normal", enhancing resilience might become one of the most important tasks of policy institutions.

This paper provides an overview of a conceptual framework for resilience to facilitate a common understanding and the incorporation of resilience into policy thinking.[2] It was developed in consultation with several Directorate Generals of the European Commission, participating in the Research Network on the Measurement of Resilience, which was jointly established by JRC and EPSC in 2016. The framework also guides JRC work plans in 2017-18, aiming at establishing a measurement and monitoring system for resilience.

[1] Though resilience has not been recognized as a common organizing principle for policy thinking, it has already entered into many specific EU policies and actions. Examples include the Resilience Action Plan for Crisis Prone Countries, the EU Strategy on Adaptation to Climate Change, the Roadmap to a Resource Efficient Europe, the EPSON program supporting the effectiveness of EU cohesion and structural policies, A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, the Communication on Effective, Accessible and Resilient Health Systems. Resilience is also an important element of the external policies of the EU. The EU Global Strategy (Shared Vision, Common Action: a Stronger Europe, presented in June 2016) enlists state and societal resilience as one of its five priorities. The Joint EU-Africa Strategy also foresees resilience (of food security and health in particular) as one of the key societal challenges and issues for its 2018-20 priorities.

[2] For a more detailed and involved version, see Manca et al. (2017).

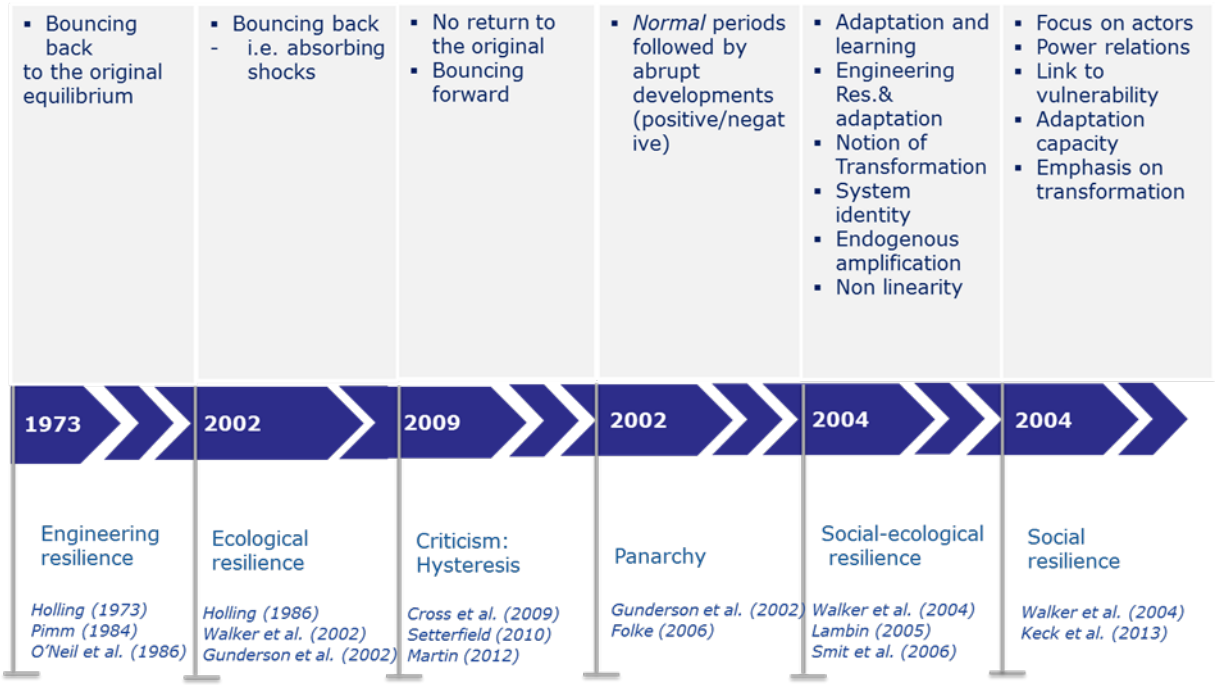
2 Building on aspects of existing approaches to resilience

The concept of resilience has evolved from various disciplines like psychology and psychiatry in the 40s (Johnson and Wiechelt (2004)), ecological science (Batabyal (1998)), physics and engineering. Over the last fifteen years, resilience has found applications in many other different areas. In environmental management and disaster risk reduction, the concept is used for understanding and assessing how far communities can cope with extreme natural events such as earthquakes, tornados, floods or droughts (Bruneau and Reinhorn (2006)). The point of view of engineers, transport specialists or architects focuses on adaptability, robustness, and rapidity of recovery of structures and infrastructures (Cimellaro et al. (2006), Cox et al. (2011), Caverzan and Solomos (2014)) when hit by both natural and human-made disasters.

Figure 1 summarizes the evolution of thinking on resilience over the last fifty years.[3] The sequence is not necessarily the chronological one: instead, it reflects the main steps of development and criticism of the concept of resilience as it has evolved in different disciplines. It emerges that the concept of resilience has been collecting more elements and adding more complexity as it expanded into many disciplines.

As resilience is a multidimensional phenomenon with important cross cutting aspects, this paper aims at facilitating a common understanding across fields and the incorporation of resilience into policy thinking. The framework is designed to take into account all key elements from this long evolution and reflects the contribution of each actor to the system in its full complexity.

Figure 1: Evolution of thinking on resilience



[3] Manca et al. (2017) offers a more detailed review.

3 The proposed policy framework for societal resilience

A *resilient society* is able to cope with and react to shocks or persistent structural changes by either resisting to it (absorptive capacity) or by adopting a degree of flexibility and making small changes to the system (adaptive capacity). At the limit, when disturbances are not manageable anymore, the system needs to engineer bigger changes, which in extreme cases will lead to a transformation (transformative capacity).

An illustration of the distinction between absorptive, adaptive and transformative resilience can be the case of the ongoing policy response of the EU to the 2008 financial crisis. The short-run response to the threat of bank failures and the emergence of a systemic crisis was to provide financial support to banks (absorption). The next step was the gradual creation of the financial safety net of the Banking Union, which already makes some important changes in the operation of the banking system (adaptation). Finally, the push towards a deeper capital market union can be viewed as a transformation, introducing a major shift away from bank-based financing, yet maintaining the core function of the financial intermediation system.

The framework for resilience has five main ingredients, which are elaborated in more detail in the coming sections.

First, it is individual centric and takes the societal perspective. In particular, the final goal of resilience is functional to societal and individual wellbeing, and the main contributors to resilience are individuals, with all of their interactions, social ties and power structures.

Second, it takes a dynamic perspective. Shocks can differ in their chronicity and intensity, which influences the relative importance of stability versus flexibility (the absorptive, adaptive and transformative capacities). Moreover, during the dynamic response to shocks, it might happen that there is a change in the most relevant capacity, in the most affected entities, or both at the same time.

Third, it emphasizes interactions, feedbacks and possible nonlinearities among various entities and layers of the system. This "system view" helps understanding how shocks spread among the different segments of the system, how they interact with each other and with the actors, and based on all these, where to intervene. This also serves as a call to break the silos in policy making.

Fourth, interventions may contribute actively to the resilience of the overall system, by enhancing the entities' own abilities to cope with disturbances. This could mean helping entities to invoke the necessary capacities (e.g. incentivizing people to accumulate savings to cope with a potential job loss), or support these capacities directly (e.g. unemployment benefits). Interventions may need to vary with individuals and change in time.

Fifth, a crucial aspect is to be able to "bounce forward" (instead of "bouncing back"), to learn from past difficulties, and come out stronger from a witnessed storm. This means being able to use shocks as windows of opportunities, and thus translate the negative narrative of a "stormy future" into a positive one.

4 Societal wellbeing, resilience and sustainability

Societal wellbeing (*social welfare*), broadly speaking, depends on the *individual wellbeing* (*utility*) of all society members (*the individualistic part*), and on *society's structure* (the links among individuals, i.e. the social connections). Utility in general depends on physical and abstract objects ("goods") the individual gets or is exposed to. Within economics, the interpretation of goods is typically restricted to traditional products, services and leisure time, but it can be interpreted more broadly. This aggregation from individual wellbeing to social welfare can be done by social welfare functions, or by using less structural approaches (like social multi-criteria evaluation, see Munda (2008)). Yet, individual wellbeing also has a subjective component. Many of these ingredients (like social engagement, sense of belonging to a community, and social trust) go beyond individual wellbeing, and have a strong link with the structure of the society. This is what we will label as *socio-system services* later.

A resilient society aims to sustain its level of individual and societal wellbeing in an inter-generationally fair distribution, i.e. ensuring current wellbeing without seriously compromising that of future generations. Societies that are more resilient to disturbances will also be able to ensure a higher level of wellbeing as the shock will impact in a less severe way on them. The absorptive and adaptive capacity of resilience means that despite some initial inevitable losses after a shock, a resilient society tends to restore its original wellbeing and ensure the usual functionality. When the situation becomes unbearable and a transformation is necessary, the original wellbeing and usual functionality cannot be sustained any longer. Continuing along the previous development path would thus lead to a collapse in the future, implying a drop in societal wellbeing at that point. This means a marked difference between the wellbeing of generations living before and after the collapse. The objective of resilience is to ensure the system's ability to avoid such situations, which would imply an inter-generationally unfair distribution of wellbeing.

This ability matches a very general notion of sustainability, as put forward for example by the 2011 Human Development Report of the United Nations Development Program: "Sustainable human development is the expansion of the substantive freedoms of people today while making reasonable efforts to avoid seriously compromising those of future generations".[4]

[4] UNDP (2011), page 2. The concept of sustainability dates back at least to 1987 (United Nations (1987)): "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

5 The dynamics of distress and the corresponding capacities for resilience

The concept of resilience goes hand in hand with the notion of a system being hit by shocks or being subject to disturbances. If disturbances did not exist (a "certain world"), the concept of resilience would be meaningless, while if the system was able to eliminate disturbances or at least completely insulate itself from them, resilience would be infinite.

Conceptually it is possible to distinguish among three layers of exposure to shocks. In front of a potential shock, *riskiness* refers to the probability of being hit. Once the risk materializes, a system can be *vulnerable* or not, in the meaning that its response to the shock, in terms of its intensity, might be small or large. A vulnerable system then can *recover with contained social welfare losses* or not. In our framework, a system is *resilient* if the combination of riskiness and vulnerability (expected loss) is low, or when the expected loss is high, but the system can recover with limited losses.

Few examples can be made to illustrate these different layers of resilience. First, it is easier for a system to be resilient if it has a low probability to be at risk. This can come from a low underlying probability of the risk, or from an active societal intervention, like the prevention of diseases.

Second, some individuals might be at the risk of losing their job, but once unemployed, they have a buffer of resources to sustain themselves with a relatively little loss in their consumption (or other elements of wellbeing). This means that they are at risk but not immediately vulnerable. Similarly, it might happen that the system is able to absorb the shock because of a certain level of flexibility in the labour market, or due to a well performing social insurance system.

Third, in case of a sizeable shock which is not absorbed by the system (which is thus vulnerable), resilience would call for the system to adopt or even to transform. For example, Hopkins (2008) argues that society should respond to "peak oil" and climate change not by simply reducing emissions, but by transforming its communities to positively accept energy descent as a desirable reality, building ways of living that are more connected and enriching. In this case, the system will be able to maintain its future welfare generating function even in response to a big shock, thus proving to be resilient.

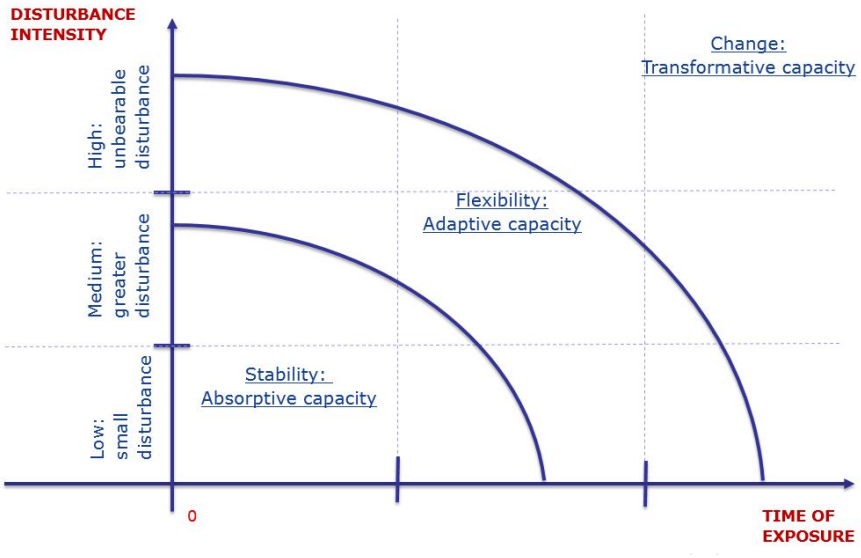
Finally, there is also the unwelcome possibility in which the system collapses, causing a massive social disorder, no longer being able to deliver wellbeing in the future, thus not being resilient.

The two main dimensions of disturbances (both shocks and slow burn processes) that determine the response to them (and hence the resilience to them) are their *intensity* and *persistence*. An intensive shock can cause an acute "discomfort" in its target (be it an individual, community, region or country), regardless of its duration, while even a mild effect can distort the target if it is very persistent (cumulative, chronic discomfort).

Figure 2 shows the joint role of the two dimensions in identifying the capacity required to sustain a resilient behaviour. When the time of exposure is not too long and the intensity is not too large, the main ingredient is the *absorptive capacity.* This ability relates to *stability* and resistance, when agents absorb the impact of shocks without changing their behaviour. The mechanism of resistance is very similar to the behaviour of the human

immune system, which constitutes one of the most effective resistance strategies known to exist (Norris et al., 2008).

Figure 2: Shocks and capacities



As the time of exposure and its intensity increases and the absorptive capacity is exceeded, the *adaptive capacity* will start playing a role (Cutter et al. (2008)). This is the ability which deals with the deliberate process by which agents adjust their expectations and aspirations when trying to cope with deteriorating changes in their living conditions (Sen (1999))**.** It requires *flexibility* and involves incremental changes that are necessary to allow agents to continue functioning without major qualitative distress in response to disturbances. This is a continuous process which is difficult to track and to measure (Béné et al. (2012)). Agents try to mitigate potential damages and at the best to turn the adverse situation into an opportunity.

Ultimately, as the disturbance becomes unbearable (both in terms of its intensity and persistence) and the adaptation would lead to a too large change, a *transformation* happens. This transformation can be both a deliberate decision and action of agents, like a regime change through a democratic election process, or a forced change by, for instance, environmental or socio-economic conditions (Béné et al. (2012)). The transformative resilience is the means of learning from past events and engineering changes ideally to a better condition given the current constraints. Such a shift of the *status quo* is nevertheless difficult. Moreover, learning from past or current disturbances is the opportunity to handle better future crisis (the steeling effect put forward by Rutter (2012)). Since the ultimate goal is to maximize societal wellbeing, any distress, no matter how painful, is also the mean for improvement in managing future disturbances. This is a continuous process, where ex-post and ex ante evaluations follow each other in a circular fashion.

6 The system view: who are the actors and how do they interact?

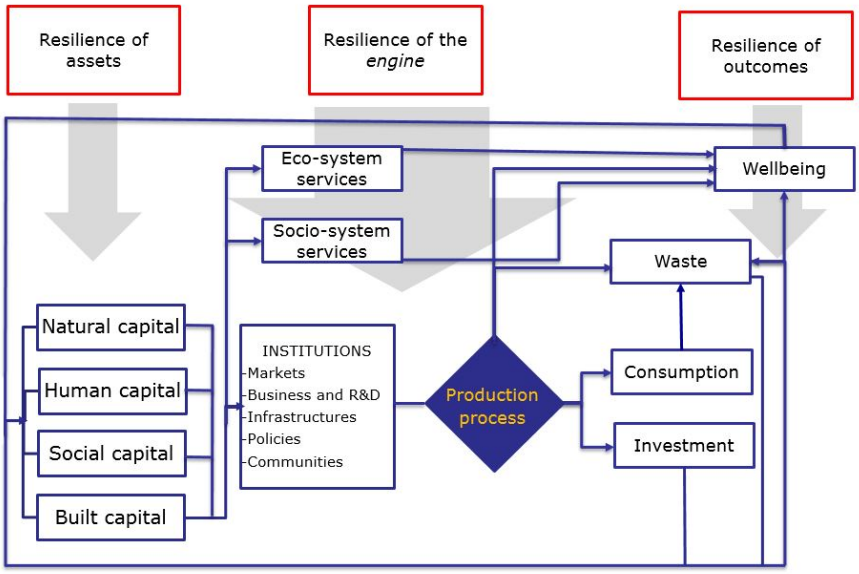
Resilience requires a variety of capacities and, as it is highly dependent on the context where the disturbance occurs, it needs to be analysed within the entire ecological-social-economic-political system. To understand how to support a resilient behaviour, it is paramount to identify (i) those actors (entities) who play a role in the system, such as individuals, communities, institutions, regions or owners of capital, (ii) their role in the system and (iii) the interactions among them.

Figure 3 shows a schematic visualization of the system view. Starting from the original "materially closed Earth system" model of Costanza (1997), we augmented it in two aspects. First, we introduced the concept of "socio-system services", which refer to a direct influence on wellbeing by the social system.[5] Second, we divided the overall system into three main blocks to analyse the different aspects of resilience related to these "ingredients".

The first block/ingredient is concerning assets (the four capitals), the second deals with outputs/outcomes (the target variables such as societal wellbeing, investment, consumption and waste), while the third is the "engine" of our entire socio-economic, political and environmental system, connecting assets with outcomes. This engine includes eco-system services, socio-system services and institutions in a very general sense (markets, infrastructures, businesses and research, policies and communities), shaping the production process and utilizing the available capitals to produce outputs/outcomes. Shocks typically affect the inputs (capital stocks), and then the effects interact inside the engine. Finally, most of the policy interventions enter at various parts of the engine.

[5] It typically comes from social capital. Examples include shared values, identities, bonding and bridging, or criminality, fear and hate.

Figure 3: Ingredients of resilience in the materially closed Earth system



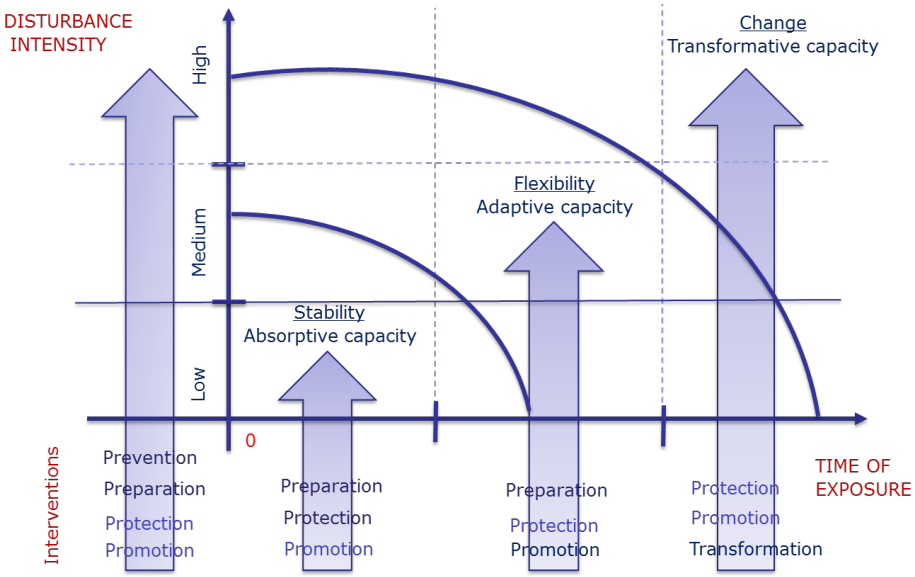
Using this structure, one can look at the resilience at the level of inputs (capitals), outputs/outcomes (in particular wellbeing), and various ingredients of the engine (captured by intermediate outcome variables, like productivity, the status of institutions or market functioning). A crucial aspect of this "system view" is that one cannot have the resilience of outputs/outcomes without that of assets and of the engine.

7 Interventions supporting a resilient behaviour

Being resilient depends mostly on individuals and their various levels of aggregations (entities such as communities, cities, regions or even countries), but it also involves institutions in a broad sense. At the same time, resilience can be enhanced by various interventions, starting possibly even before the disturbance is anticipated or has materialized. In our context, they can be classified into five categories: prevention, preparation, protection, promotion and transformation. To identify the most appropriate interventions to enhance resilience, we adjust the "3P+T framework" of social protection[6] to our broader resilience framework (Figure 4).

Prevention measures aim at reducing the incidence and size of shocks and, in the best case, to avert them. As an example, the 2016 EU regulation concerning measures to safeguard the security of gas supply[7] puts in place various preventive measures to reduce the likelihood of a gas shortage due to a disruption in supply or exceptionally high demand.

Figure 4: Link between capacities and interventions



Since prevention measures might not completely avert a disturbance, it is important to couple them with *preparation measures*. They aim at putting in place arrangements (contingent plans, mutual assistance agreements, or financial buffers) that would reinforce the necessary resilience capacities in case a disturbance materializes.

[6] The 3P+T refers to a framework for social protection. It includes *protective* measures, which have the objective to guarantee relief from deprivation, *preventive* measures, which seek to avert deprivation, *promotional* measures, to enhance real incomes and capabilities, and finally, *transformative* measures, to address concerns of social equity and exclusion. (Guhan (1994), extended to include transformation by Devereux and Sabates-Wheeler (2004)). Manca et al. (2017) discusses the main differences between our framework and the original 3P+T.

[7] European Commission (2016) 52 final REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010.

The boundary between prevention and preparation is not strict. For example, the European Systemic Risk Board (ESRB) was created to monitor and assess systemic risks and, where appropriate, issue warnings and recommendations. It thus serves both to prevent systemic crises (by detecting the build-up of risks and enable early action) and to prepare for handling them (by creating various capital buffers).

Disturbances can still happen and *protection measures* are required to mitigate their impact, and to provide relief from potential deprivation or a loss of the standard of living. For example, unemployment benefits act as an (income) buffer, supporting the standard of living for a time period sufficient to find a new job and to recover a suitable income.

While protection aims at supporting absorptive capacities (stability), *promotion measures* serve to invoke the adaptive capacity (flexibility) necessary to cope with longer and/or more severe disturbances. Examples can be increasing flexibility in the labour market by structural reforms, investing in innovation (which is shown to help regions recover much faster, see EPSON (2014)), or providing training to unemployed people for an easier reallocation among sectors.

Finally, large and persistent distress can lead to a situation where the current system can no longer be maintained and a profound, often painful change is necessary. The role of *transformation measures* is to facilitate this process, to avoid unnecessarily abrupt changes. As an example of such a voluntary and gradual transformation, the EU action plan on the circular economy sets up targets for recycling to be reached by 2030.[8]

[8] European Commission (2015) 614 final COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Closing the loop - An EU action plan for the Circular Economy Decision 1313/2013/EU Union Civil Protection Mechanism.

8 Using the framework to rephrase policy debates in a positive narrative: an example

We believe that this framework can serve as a powerful positive narrative for a multitude of pressing societal and political issues in the EU, such as the ones enlisted in the White Paper on the Future of Europe:[9] climate change, globalization, population ageing, migration, and the ongoing changes in the nature of work and technologies ("*digitization*"). For example, there is a strong consensus that digitization leads to higher overall productivity, but also to large reallocations between industries, with jobs being lost in some sectors while other, though different ones being created elsewhere. This means that we are clearly in a "bouncing forward" type situation, particularly for future generations.

The transition however tests the coping abilities of all workers of the current generation. Those who work in the declining industries need support for their potential retraining (flexibility, supported by promotion), but they also need to be able to manage this transition without a major loss in wellbeing and may need public support (stability, protection). Some of them might not be able to be retrained, hence needing medium-term support (protection). In general, since these reallocations would remain with us for long, we need to facilitate the general adaptive capacity of everyone currently in the labour market, regardless of their industry and profession. And finally, we need new, more flexible types of education (formal – curricular schooling, non-formal – non-curricular schooling, and informal – non-school-like experience) for those who would be entering the labour force only in the future (adaptation or even transformation).

It is also important to recognize that resilience during this reallocation process might have bottlenecks in various places: labour market regulations, gender and age discrimination, access to finances by households, psychological difficulties of managing career changes, fragmented international capital markets, insufficient geographical mobility of labour, partly driven by illiquid real estate markets. This makes the case for applying the systems view.

[9] http://eur-lex.europa.eu/content/news/white_paper.html

9 Way forward

The next step is to make this conceptual framework operational for the policy programming done by all DGs. The final aim is to:

- First, collect indicators and develop analytical tools which look into the system at multiple points and are able to detect relevant changes;
- Second, monitor resilience and identify the most relevant points of intervention;
- Third, develop analytical tools able to capture the "system view" and support the design of more effective policies to support the resilience of societies.

Due to the complex and multidimensional nature of the concept, the intention is to place "resilience sensors" on observable outcome variables corresponding to assets, to the functionalities of the engine related to institutions (markets, infrastructures, businesses, research, policies and communities), to the eco- and socio service systems, and finally to final outcomes. In all cases, the sensors would correspond to various *entities*, like individuals, communities, cities, regions or countries.

Such a dashboard would allow (1) a continuous monitoring of the resilience of the society of the EU and its Member States, (2) an assessment of the intended or unintended impacts of policies on resilience, and (3) based on such information, the forming of guidance for new policies improving resilience directly or indirectly.

Given that resilience is related to the dynamic response of a system to disturbances, its direct monitoring would require a continuous re-assessment of such conditional responses. In the absence of new shocks every year, this continuous assessment would not be possible. The proposed alternative is to follow a two-step approach. We conclude by sketching out its main ingredients.

The first step is to obtain *resilience indicators*. For this, one would estimate the dynamic response of *outcome variables* of various *entities* to disturbances. Examples of outcome variables of interest include inputs like the status of a capital stock, intermediate outcomes like productivity, institutions, market functioning, infrastructure, and most importantly, final outcomes, i.e., determinants of individual and societal wellbeing, like employment, income, health status, trust and the quality of life. Using shocks (like the recent episode of the Great Recession), we would determine the degree of resilience of the entities.

In the second step, one would look for features of these entities that prove to be influential and robust determinants of their resilience. For example, the educational level (or human capital in more general terms), social connectivity (or social capital in general), health status, or various psychological factors might contribute positively to individual resilience. Such *resilience characteristics* could and would then be monitored continuously, typically on an annual frequency.

The dashboard would consist of such characteristics. The validity of their impact on resilience should be regularly reassessed (particularly after observing large disturbances), incorporating the lessons drawn from the accumulated experience.

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