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WORKSHOP INTERDISCIPLINARITY / TRANSDISCIPLINARITY IN DISASTER RISK ASSESSMENT¹

REMAKE Research Program – Nice-Antibes
September 29th, 2017

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On September 29th, REMAKE Research Program (or REMAKE – Website: <http://remake.osug.fr/>) held an international workshop called *Interdisciplinarity / Transdisciplinarity: from announcement to implementation, the example of the geo-hazards in the Andes*. REMAKE's WP6 aims at improving Disaster Risk Reduction (DRR) and Disaster Prevention Policies (DPP) through both **knowledge** and **action**. WP6 was in charge of the organization of the workshop. Workshop's insights relate with one of the 2 objectives of REMAKE's WP6 ("cognitive objective" – see website), which is "how to turn ID & TD into actual research practices in REMAKE research program?"

According to international assessments (like GAR, 2015), **fragmentation of knowledge, risk governance**, or **low integration of different kinds of actors** involved in DRR initiatives are among the main shortcomings for achieving better and more efficient DPP policies on the ground.

To solve part of these problems, interdisciplinarity and transdisciplinarity (**ID & TD**) are **acknowledged as appropriate approaches** for assessing risks and how it is managed. We can find many definitions of what ID and TD are. In our case, and in line with a clear distinction coming from various international institutions as with the Swiss EAWAG²:

- ID corresponds to the articulation of different disciplines (concepts, methodologies, viewpoints, or data) in risk assessment
- TD refers to the integration of different kinds of actors (scientists, policy-makers, inhabitants, political representatives, or leaders from the private sectors) in the ways problems and assessments are framed, as well as in the manners options are chosen, or initiatives are implemented on the ground.

Yet, **limits and obstacles** for achieving both ID & TD are also well acknowledged in the literature. This is the issue at the heart of this REMAKE Workshop.

First, we introduce a **synthesis of the main elements** of the discussion regarding ID & TD in risk assessments. We present definitions elements, the reason why ID & TD approaches are critical in risk studies, and some of the key obstacles put forward during the workshop. Then,

¹ Cette réunion a bénéficié d'une aide au titre du projet Investissements d'Avenir UCAJEDI portant la référence n° ANR-15-IDEX-01 dans le cadre de l'Académie d'Excellence « Espace, Environnement, Risques et Résilience » et du soutien du projet n° ANR-15-CE04-004 REMAKE.

² <http://www.eawag.ch/fr/>

we briefly mention **research & action experiences** (in Colombia, Peru, France, UK, Turkey, or even Congo) that have been exposed (see authors for details or ppt presentations). Finally, we identify **coming challenges and potential activities** of REMAKE program regarding ID & TD, particularly in WP6.

1. Synthesis of the main elements

1.1. Definition issues of ID & TD

Even if there is low consensus on what ID & TD refer to, some key elements are enforced by international institutions. Differences between **multidisciplinarity** and **pluridisciplinarity** may exist regarding the quality of integration of disciplines in risk assessment. But some institutions act as authority in risk (or environment) research assessment, like Belmont Forum, and introduce rather clear elements to define **ID & TD**. This way, ID corresponds to the integration of inputs coming from different disciplines, viewpoints, background or methodology. One of the recent Belmont call for research (Belmont Forum, 2017) places TD at the forefront of the goals to achieve:

“To build capacity, overcome fragmentation and have a lasting impact on both society and the research landscape by cultivating durable research collaborations across multiple borders, disciplinary boundaries, and with practitioners and societal partners”.

TD refers to the integration of different kinds of actors, from the framing of the research project to the implementation of envisioned initiatives.

In the Transformations to Sustainability (T2S) call for research of the Belmont forum (2017), evaluation criteria appear to be very clear respect to ID & TD dimension of research proposals:

*“T2S seeks to contribute to a re-structuring of the broad field of sustainability research by placing social science and humanities at the heart of **interdisciplinary research** in a step change in scale and scope for **research programming** on this topic. Within the call, **co-production** of knowledge and research problem formulation is considered to be critical to the process of societal transformation. The objective is to move beyond description to an understanding of the complex processes of societal transformation **to identify opportunities for intervention** and to secure effective, equitable and durable solutions targeted to real problems in specific contexts and in line with the Sustainable Development Goals (SDGs)”*

Many contributions in scientific literature add grist to the mill of ID & TD, in different ways. We can mention the assessment of the place of integration of knowledge and disciplines in a scope of Swiss research programs related with water issues (Hoffmann, 2017), giving methodological insights to achieve ID & TD at different degrees. We can also mention the efforts of *Natures Sciences Sociétés* journal, in the French literature, to strengthen ID & TD efforts in environmental research (see Jollivet and Legay, 2005, or Borderon *et al.*, 2015). A last example of classification and experience of ID & TD (among many others) appear in the typology Thompson Klein offers (2017):

Table 1: Typologies of Interdisciplinarity

Multidisciplinarity	Interdisciplinarity	Transdisciplinarity
<ul style="list-style-type: none"> • juxtaposing • sequencing • coordinating 	<ul style="list-style-type: none"> • integrating • interacting • linking • focusing • blending 	<ul style="list-style-type: none"> • transcending • transgressing • transforming
<ul style="list-style-type: none"> • complementing 		<ul style="list-style-type: none"> • hybridizing
<ul style="list-style-type: none"> • Encyclopedic ID • Indiscriminate ID • Pseudo ID 		<ul style="list-style-type: none"> Systematic Integration Transsector Interaction
Partial Integration ←-----→ Full Integration Contextualizing ID Auxiliary ID Composite ID	Supplementary ID Generalizing ID	Conceptual ID Structural ID/Unifying ID Integrative ID
<u>Degrees of Collaboration</u> Shared ID ←-----→ Cooperative ID		
<ul style="list-style-type: none"> • Narrow versus Broad or Wide ID • Methodological versus Theoretical ID • Bridge building versus Restructuring • Instrumental versus Critical ID • Endogenous versus Exogenous ID 		

Despite the diversity of definitions, key elements appear to be widely shared with respect to ID & TD practices and challenges. In the words of T2S call of the Belmont Forum (2017), ID & TD are stated

*“To build capacity, overcome fragmentation and **have a lasting impact on both society and the research landscape** by cultivating durable research collaborations across multiple borders, disciplinary boundaries, and with practitioners and societal partners”.*

Here we find both the cognitive and applied objectives of REMAKE’s WP6.

1.2. Why are ID & TD important in risk assessment?

It is still a topic to **highlight the segmentation of research approaches** in risk assessment and risk management. There is no doubt that such fragmentation (thus, specialization) brings to light critical knowledge in risk studies. It allows offering Disaster Prevention Policies (DPP), which are limited, though definitely necessary. What would be the balance of damage and deaths with no DPP at all, as limited as they may be (Pigeon & Rebotier, 2017)?

Yet, fragmented and specialized knowledge is far from being enough to understand the whole risk situation, let alone improving DPP and actually reducing vulnerability conditions. Indeed risk is the product of a triangle of **exposed assets** (and lives!), **hazards** and **policies** (to address exposed assets and/or deal with hazards). The relations of the above-mentioned triangle define risk situations. The relations of such triangle are more likely to be accounted for through ID approaches, as each of the 3 summits of the triangle influences each other, to a certain point. Scientific knowledge either on hazards only, or on the social world only are necessary, though definitely not sufficient, especially if considered separately. ID approaches are required to assess complex and far-reaching risk situations (some would talk about holistic approaches and systemic understandings of risk issues).

There is a shared consensus on the mismatch between classical structures of research programs on risk, and what is required to stimulate more integrated and less fragmented scientific knowledge. Indeed, in most cases, geoscience and hazard assessment come first, while social sciences are required to translate knowledge on hazards to the social world. In some cases, social sciences might produce autonomous knowledge on risk, from a social science viewpoint... without tackling a classical and fragmented structure of knowledge production, which is, thus, another form of fragmented knowledge. Integration of scientific knowledge through ID practices mostly remains to be done!

Beyond ID issues, **TD aspects are also considered as key elements** regarding DPP. Through TD approaches, DPP are expected to fit better contexts, local challenges or actors' interests. TD research practices also affect research processes and the production of knowledge.

Both ID & TD practices correspond to a rather original way of producing knowledge on risk today. But in spite of being widely encouraged, such practices still meet many obstacles, of different kinds. We tried to identify and address such obstacles during the workshop.

1.3. What are the main obstacles for achieving ID & TD in risk assessment?

Plenty of obstacles appear at the moment of making ID & TD approaches real. At the end of the workshop, some of them have been identified, and discussed (order is not hierarchical):

** Issues of graphic representation of ID research*

How to graphically represent together insights from different disciplines? How to bring together different scientific practices, viewpoints, methods, etc.? We sometimes put on the **same map or diagram scientific information coming from different approaches**, not always compatible.

** Epistemological issues*

Epistemological issues regarding ID & TD research on risks can be divided in different points:

1. "**Different definitions** of the same words exist in different disciplines". This is an issue numerous researchers have already stressed on as with critical works on resilience (Reghezza-Zitt & Rufat, 2015: 33). Consequently, we find the second main epistemological issue.

2. "There is **no shared conceptual models of risk**". And a common graphical representation of risk situations cannot be considered as a shared model³. As there is no correspondence between different definitions of the same words, a shared conceptual model of risk (much beyond hazards, or prevention policies alone) remains to be built, according to the needs of research & action about risks. A model displaying feedback loops (a means to display experience returns and DRR policies limitations) has still to be framed. A **theory of disaster risk prevention that would be widely agreed on is still lacking**.

Therefore, existing conceptual models we can deal with are selective, and reductionist. They mostly show linear relations: few interactions, experience returns or feedback loops mostly deficient, with the exceptions of models in line with socio-ecological system thinking. But the latter can hardly be used for disaster risk prevention itself, and remains academic, in spite of the efforts coming from resilience thinking (see Walker & Salt, 2006, f.e.). A tension exists between operational but simplistic models Vs more refined and complex (potentially more integrated) but more abstruse models. Is there no other option?

In line with the previous point, we also find the next issue:

³ A conceptual model refers to a consistent articulation of basic components of risk definitions, such as exposed elements, vulnerability, hazard, capacity, and their dynamic relations.

3. How to integrate contributions coming from earth sciences and social sciences into a common and consistent understanding of disaster risk prevention? “Role and **status of scientific demonstration**”

Different scientific regimes exist (for instance, and basically: evidence-based, as with earth sciences, and interpretative research, as with social sciences). How to associate such different scientific regimes in the same reflexion? How to articulate their respective arguments when answering the research question (the need to understand and to prevent disaster risk)? Both arguments are necessary to understand and manage risk. Yet they are not sufficient when taken alone, and there shouldn't be any precedence given to contributions coming from SS⁴ or ES⁵.

Issues 1, 2 and 3 concern ID, yet we find similar issues related with TD: they also arise with the need to gain more integration between social actors implied in DRR, which of course are not only coming from the academic field.

** Political issues (multi-risk, multi-actors)*

DRR policies experience returns display **numerous discrepancies between what is being expected from a policy and how it is implemented**. Gaps between policies and implementation reveal that academic knowledge (be it from SS or from ES) is necessary for prevention, but is not sufficient. Such gaps are mostly explained by policy decision-making process, which is still mostly top-down (i.e.: decisions made by national stakeholders without taking enough into consideration local stakeholder's knowledge or positions). Gaps draw attention on the need to discuss results coming from sciences with grassroots stakeholders, directly concerned by DRR policies. In other words, DRR policies cannot be only a transfer of academic knowledge towards stakeholders.

This type of limitations reveals the need to **address multi-risks** and consider its management, as they imply trade-offs between involved actors. Trying to improve disaster prevention related with earthquakes (as in our case) means to address also a wide array of risks stakeholders (institutional ones and not institutional ones) have to deal with, some of them on a day-to-day basis (especially for the poorest).

Stemming from political issues and concern:

** TD challenges: inter-institutional governance of risks*

DRR prevention needs to **integrate more academic knowledge** (ES and SS), as well as **other types of knowledge** and **political positions** coming from a wide range of stakeholders. Solutions do already exist as with knowledge management systems or multi-stakeholders platforms. Literature gives examples of such solutions (f.e. with Renaud *et alii*, 2013). French ONRN also illustrates the wish to reach inter-institutional governance of risk: see <http://www.onrn.fr/>

Yet a still pending question is how to effectively integrate more local stakeholders, and especially the poorest, into decision-making process. Indeed, KMS are basically tools helping decision-making process, and nothing more than tools. Inter-institutional governance of risks may challenge existing power relationship, which still takes the form of top-down policies.

** Final considerations*

There are many reasons⁶ to hamper ID & TD research practices in risk assessment and management. Many others than the ones that have been listed above have been alluded to during the workshop. Among them, we can mention:

⁴ Social sciences

⁵ Earth sciences

⁶ Stemming from our research experiences as well as from literature or previous international programs on knowledge management

- The **diversity of scientific cultures** (notions, methods, viewpoints, ways of producing different kinds of knowledge) that needs to be acknowledged.
- The **importance of space & time scales** when it's time to integrate research questions, specific issues and fieldwork (very specialized viewpoints Vs. more integrated or cross-cutting positions).
- The role **aggregation** of past researches and knowledge play in ID & mostly TD practices. Is there a common ground from which it is possible to built a shared position towards future initiatives? **Memory** is seen as a potential for integrated starting point.
- In ID & TD research practices, scientists must be able to **shift** from scientifically mastering processes & objects to assessing risk in a more released and open-minded manner. Has scientific assessment any room for serendipity⁷ in the making of DPP? Is that even possible (allowed)?

** Encompassing views on ID & TD obstacles...*

It is out of the scope of this workshop to hope to be as exhaustive as possible. Just by identifying regular obstacles to ID & TD practices we highlight potential frontlines and coming efforts towards ID & TD in our own research on risk and DPP. Two of our colleagues have accepted to attend the workshop and share with us general comments on what they heard at the end of the morning:

- Christine VOIRON (UNICE, UMR 7300, ESPACE, Nice) makes three main comments:
 - As we all stayed... we are all convinced of the opportunity of ID & TD research practices to improve risk assessment and DPP.
 - Yet, fragmented approaches remain widely topical. Even among convinced people, are we really, truly working together? In which ways? Sharing which words, concepts, and viewpoints? There is a need to make things clear.
 - In the case there is not a community of convinced people, it is compulsory to convince (not to force people to adopt ID & TD practices). ID & TD risk knowledge deserves to be explicitly advocated for (among scientists, policy and decision makers, inhabitants, managers, etc.).
 - People need to be involved in our understanding of risks. Not only as part of the research object, but as part of the process of producing knowledge on risk. Here is a condition to opportunely co-produce knowledge on risk.
 - Spatial and temporal dimensions of risk are to be accounted for. Risk assessment has to be connected to past and future dynamics. Scientific insights on risk cannot be absolute or universal insights, without any spatial, social or historical dimensions. Context is definitely required.
 - What does “accepting risk” mean? For whom? Up to which point? For how long? What does “reduced functionality mode” mean? How can we accept, and thus acknowledge risk implications on shared bases, and make decisions from this point? On which criteria can a cost-benefits calculation be achieved?
- Damienne PROVITOLLO (CNRS – UMR 7329, GEOAZUR, Nice) stands that TD research practices is a final objective for many of us, as a general background. Different research approaches (not only ID or TD ones) can be complementary. There is no necessity to find competition between these views and approaches. A huge challenge remains in the integration of different scientific contributions, in so far as there are possibilities to make links.

⁷ Discovery by accident

Much beyond interpretations and publications, there are hard work sessions on framing the research questions, making clear our vocabulary and concepts, defining our models of understanding, etc. Research objects, hypothesis, methods... can look like “encounter points” that require a long-standing commitment between different actors (decision makers, scientists, state-representatives at different scales, etc.). Such dialogue is far from easy in French context. It implies to domesticate everyone’s approaches, to accept being called into question, and to have time ahead.

2. Sharing research and action experiences

Patrick PIGEON (Université Savoie Mont Blanc – Chambéry) – for more information, contact patrick.pigeon@univ-smb.fr: *What is the relevance of ID and TD in disaster risk prevention... in spite of acknowledged limitations?*

Juanita LOPEZ (KPMG – Colombie) – for more information, contact juanalp@gmail.com: *Flood risk assessment and adaptation to climate change in La Mojana region (Colombia)*.

Sandra SANTA CRUZ (Université Catholique – Pérou) – for more information, contact ssantacruz@puccp.edu.pe: *A Transdisciplinary And Participatory Approach To Local Disaster Risk Reduction: Experiences and Challenges In Two Cities In Peru*.

Funda ATUN (Polytechnique de Milan – Italie) – for more information, contact funda.atun@polimi.it: *Exploring horizontal and vertical relations between different layers during disaster preventions and response phases*.

Caroline MICHELLIER (Africa Museum – Belgique) – for more information, contact caroline.michellier@africamuseum.be: *The assessment of risks related to major geological hazards. The cases of Goma and Bukavu (Congo) – AVCOR research program*.

3. Coming challenges and potential activities

3.1. An outlook for integrating research & action in REMAKE research process

Epistemological and political issues mostly explain the difficulties met while trying to improve existing DRR policies. However, it does not mean nothing could be done to reduce those difficulties, and this is what we propose to explore in REMAKE.

** Concerning ID*

A first step would be to define a potential common object, which would be key for DRR understanding and prevention, seen from the viewpoints of SS & ES. It would also be key to check how this shared object seen from academy could be also considered as such by stakeholders, be they institutional or not.

We propose to focus on **buildings seen as components of urban systems**. This because:

- Earthquake related disasters concern buildings firsthand. People don’t die because of the earthquake as such, but because buildings collapse (or not...), take fire, contribute to propagate fire (or not...), or reduce accessibility to the areas damaged (or not...).
- Buildings and their surroundings are linked not only to economy but also to cultural values, as those related with households (*hogares*).
- Buildings accommodate urban functions, and stakes related. And stakes may differ depending on the period considered (normal/crisis).
- They are related with network nodes as with power or water provision, as it has been studied in depth with Pascale Metzger’s work in Quito (D’Ercole and Metzger, 2004).
- They are potentially concerned by structural measures, such as parasismic ones.

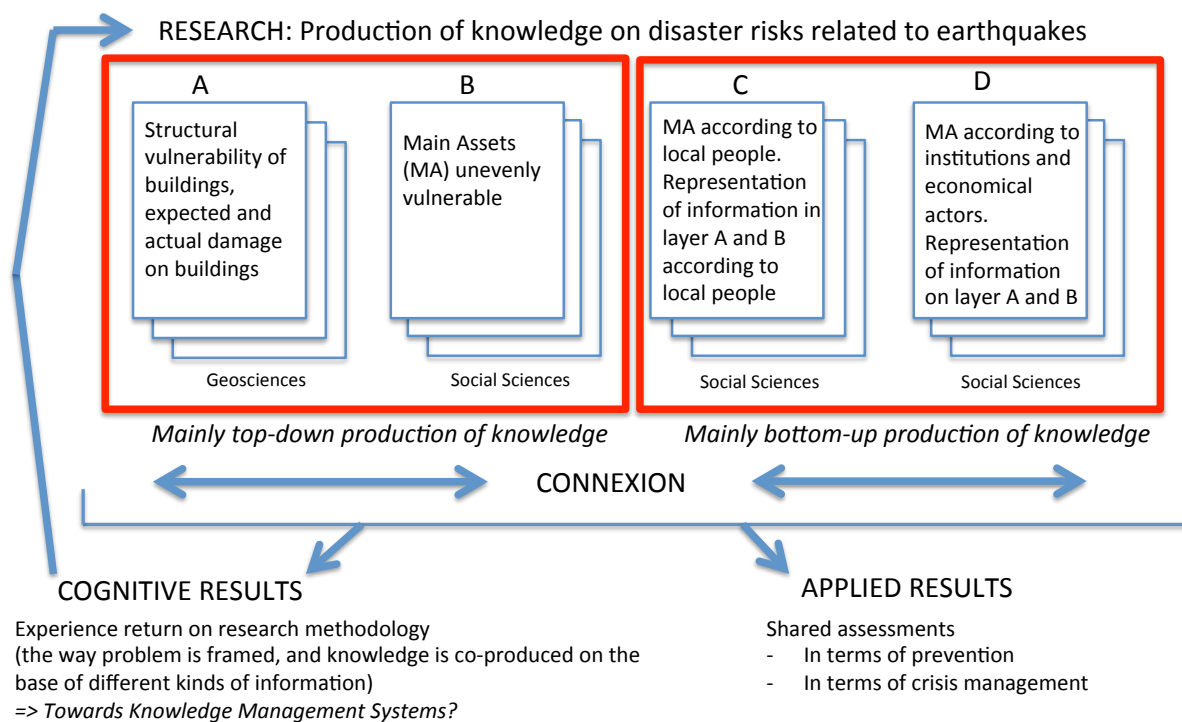
- In this program, some colleagues already work on buildings' physical characteristics before and after an earthquake. This gives an opportunity for linking more SS & ES knowledge, without eluding already mentioned difficulties.
- Buildings and how they are used, maintained, is also a key aspect of DRR policies seen from various stakeholders.

** Concerning TD*

As buildings and their surroundings have economic, cultural and various functional values, of course, **they are unevenly key for local populations as well as for a wide range of institutions.**

This is also why wide discrepancies between DRR policies and implementation are found. Considering a single viewpoint only (f.e. disaster risks related with earthquakes) in making recommendations is nothing but bound to fail. By definition, buildings and their surroundings must incorporate decisions taken in regard with a complex, multi-actors and multi-risk approach.

This is why we suggest changing the common point of view: ending with the transfer of academic knowledge to stakeholders, and improving the integration of grassroots stakeholders' views into risk assessment and future DPP (see the chart below concerning the WP contribution – or REMAKE website).



WARNING

Regarding shared assessments, letters A to D do not correspond to any hierarchy or order between layers of information

We will benefit from Mrs Cindy Ortega PhD. Cindy Ortega is architect and urbanist. She will work in close collaboration with the WP6 team. But she will also collaborate with geophysicists already working on how buildings behave during and after an earthquake (i.e.: research on structural vulnerability of buildings). She will also work with local institutions based in Esmeraldas. Those collaborations will help identifying where are the key buildings and functions for prevention, according to the researchers AND the stakeholders. We posit that embedding various stakeholders in the definition and identification of the most critical and

vulnerable buildings also leads to consider other types of risk they have to manage. Earthquake related risks couldn't be managed as if they were the sole relevant ones.

The identification of Esmeraldas as a relevant field for such a study on ID & TD related with seismic risk management is already supported by SGR's and IG's colleagues, but also by other risks managers in Quito (as with Nury Bermudez). Contributions coming from ES also justify this choice: the statistical analysis of the relationship frequencies/magnitudes concerning previous earthquakes supports the hypothesis of a future high magnitude earthquake occurring in the area of Esmeraldas⁸. Here could also be another contribution coming from the work ES perform.

3.2. How to go further in REMAKE Program

Coming ID & TD activities in REMAKE research program (cognitive objective of WP6) will be more directly connected to the scientific objectives of the program. We plan to boost interactions between REMAKE scientists, by discussing in depth, for instance, the "building" category, as an integrated object potentially able to improve ID & TD risk assessment, risk understanding and DPP.

Future activities will also take place with the help of Cindy Ortega and her PhD research. According to coming inputs from Esmeraldas fieldwork (Autumn 2017) and emerging opportunities, we'll make proposal to all REMAKE colleagues to think together, in the most integrated way possible, about specific topics (like "Build Back Better"). We'll try to build a long-standing dialogue, aiming at integrating our research practices for present purpose (REMAKE program), but also potentially to consolidate future ID & TD scientific proposals in risk area.

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⁸ For more information regarding 1958's earthquake in Esmeraldas: https://www.ngdc.noaa.gov/nmdc/struts/results?eq_0=4160&t=101650&s=13&d=22,26,13,12&nd=display