# *Uncertainty, turbulence and scenarios*

Uncertainty is a precondition for our choices to have meaning, but we like to think we have adaptive capacities to deal with the surprises and opportunities uncertainty entails. The turbulent field was defined in 1965 by Emery and Trist as the most uncertain causal texture a system could be in, though the more uncertain hyper-turbulent and vortical fields have been considered since. Peoples' experience of the uncertainty in turbulence is moderated by the adaptive capacities they perceive they can mobilize, both individually and collectively. In turbulence, pre-existing adaptation possibilities are overwhelmed for the individual system. Turbulence for a system arises because its broader contextual environment and its constituent parts become highly inter-linked and the resulting complexity and the uncertainty it produces overwhelms that system's response capability, as happened in the recent financial crises - the demise of Lehman Brothers, the Icelandic and Irish melt-downs, the even questioning the Euro's viability. In a turbulent world, scenarios are helpful navigators of the uncertainties of such futures for systems in it. The values that scenarios can surface, test, and contest contribute to create new collective certainty for those that participate in their production, pushing turbulence back and re-constructing a more stable ground for decision making and investing.

*Ziurgabetasuna aurretiko baldintza da gure hautuek zentzua izan dezaten, baina ziurgabetasunak dakartzan ustekabeko eta aukerei aurre egiteko egokitzapen-gaitasunak ditugula pentsatu nahi dugu. Testuinguru nahasi hori sistema baten bilbe kausal zalantzagarriena zela esan zuten Emery eta Trist-ek 1956. urtean, nahiz eta testuinguru hipernahasiak eta zorabiagarriak ere ikusi diren. Jendeak nahasketetan ziurgabetasunari buruz duen esperientzia moderatu egiten da banaka eta taldeka eskura ditzaketela uste duten egokitzapen-gaitasunen bitartez. Nahasketa egon bitartean, aurretiaz zeuden egokitzapen-gaitasunak ahuldu egiten dira, banakako sistemaren ondorioz. Sistema baten nahastea sortzen da bere testuinguru zabalena eta bertako osagaiak korapilatu egiten direlako, eta emaitzazko konplexutasunak eta sortzen den ziurgabetasunak ahuldu egiten dute sistemak erantzuteko duen gaitasuna. Horixe gertatu da, hain zuzen ere, gaur egungo finantza-krisian (Lehman Brothers desagertzea, Islandia eta Irlandako arazo ekonomikoak, eta euroaren bideragarritasuna zalantzan ipintzea). Mundu nahasi batean agertokiak lemazainak dira sistema horietarako etorkizuneko ziurgabetasunetan. Agertokiek sortu, probatu eta egiaztatzen dituzten balioek taldeko ziurtasuna berria sortzen laguntzen dute ekoizpenean parte hartzen dutenentzat, nahasketa urrunarazten dute eta, era berean, erabakiak hartzeko eta inbertsioak egiteko oinarri egonkorragoa berreraikitzen dute.*

**La incertidumbre es una condición previa para que nuestras elecciones tengan un sentido, pero queremos pensar que tenemos capacidades de adaptación para poder hacer frente a las sorpresas y oportunidades que la incertidumbre conlleva. Este contexto turbulento fue definido en el año 1956 por Emery y Trist como la trama causal más incierta de un sistema, aunque también se ha contemplado contextos hiperturbulentos y vertiginosos. La experiencia de la gente sobre la incertidumbre durante la turbulencia es moderada por las capacidades de adaptación a las que ellos creen que pueden recurrir, de forma individual y colectiva. Durante la turbulencia, las posibilidades de adaptación pre-existentes son debilitadas por el sistema individual. La turbulencia de un sistema se debe a que su entorno contextual más amplio y sus componentes se entrelazan y la complejidad resultante y la incertidumbre que se produce debilita la capacidad del sistema de responder, tal y como ha pasado en la actual crisis financiera- la desaparición de Lehman Brothers, los problemas económicos de Irlanda e Islandia, incluso se ha llegado a cuestionar la viabilidad del euro. En un mundo turbulento, los escenarios sirven de navegantes en las incertidumbres de tales futuros para los sistemas. Los valores que los escenarios pueden surgir, probar y ayudar a crear nueva seguridad colectiva para los que participan en su producción, haciendo retroceder a la turbulencia y a la vez reconstruyendo una base más estable para la toma de decisiones y la inversión**

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### 1.  **INTRODUCTION**

If there was no uncertainty at all, free will would be useless and choice irrelevant. Everything would have been pre-determined and all we would need to do is to become (or remain) part of the unitary unfolding fate. Yet total uncertainty would be thoroughly disconcerting. Hence, in such a context, nothing, including ourselves and those we relate to, would be guaranteed to continue existing, and we'd lose all sense-making capacity. To avoid both fatality and disconcert, we with our minds stabilise some parts of the self-context continuum, allowing us to exercise partial choice in highly uncertain conditions. We consider the self as semi-permanent, as being sufficiently stable and long-lasting so that we can consider, take, and live with the consequences of choices. As actor-network theorists such as Callon (1986) and Latour (2005) have observed, we spend a huge amount of energy and attention to keep our identity, in relation to others, sufficiently constant in light of uncertainty, whether it is uncertainty we actually experience (say, 9/11) or that we imagine though not yet perceive (say, climate change-induced ocean level rises).

Our understanding of 'turbulence' is that it becomes apparent for us when more of our immediate context's contextual environment becomes more uncertain

(Ramirez et al, 2008, 2010). More precisely, turbulence is about our realising that even the very possibility of increased uncertainty (let alone actual increased uncertainty) might overwhelm our perceived adaptive capacities in relation to our immediate transactional environment. In turbulence, our overwhelmed adaptation possibilities might in turn overpower decision-making capabilities, and even our ability to make sense of who we are and in what context.

As our world has become more turbulent, many regard these conditions to be bad, uncomfortable and/or threatening. It definitely does not feel 'right'. Turbulence has arisen to a large extent because many activities previously considered unrelated have become inter-linked. These links have created many new opportunities, including entirely new industries such as infotainment and bio-engineering. But the links have also brought about destructive unintended consequences, as experienced in the financial crisis which started in 2006-2007. That crisis, whose severity was triggered in the minds of many by the collapse of Lehman Brothers over one weekend, where the 42 billion USD in liquid assets held by the bank on the Friday did not prevent its bankruptcy on the following Monday (15/9/08), showed that failure to effectively address turbulence in our contexts is not only expensive, but can also be prohibitive.

Together with several colleagues, the first author has explored the nature of turbulence extensively (Ramirez et al, 2008, 2010) than we do here, where our intention is simply to summarise and overview the main points and implications of that research.

It now appears that more decision makers are seeing turbulence as an inherent aspect of their organisation's environmental conditions. They can no longer count on a stable foundation for their activities, or expect a return to more placid conditions soon. Even as businesses begin recovering from the crisis, people and organizations expect significant and unforeseen structural change possibilities to re-appear in the future.

While turbulent situations are often expressed as threats, each also constitutes potential opportunities for growth, improvement, and development. The research we reported in 2008, revised in 2010, suggested that scenarios help in becoming more effective navigators in a turbulent world. Supporting evidence is that scenario use and relevance increased since 9/11. It has become more legitimate for senior managers, politicians and policy-makers to express their inability to control how their contexts unfold. So it is becoming increasingly accepted that the turbulent contexts need to be addressed through methods that fully take into account and accept the realities and inevitabilities of the uncertainty that the future consists of.

The future can be considered to be the favourite home of uncertainty. We may be uncertain about who really murdered the former US president JF Kennedy or Swedish Prime Minister Olof Palme in the past, uncertain about how we feel about

someone in the present, but we are most concerned with what uncertainties the future may hold for us. We feel that the future, coming at us as a context different to the one we are in now (nicely captured by the French name 'avenir', to come), may bring with it changes that remain unknown for us in our present.

This means that to engage with high uncertainty – to engage with turbulence- is to engage mostly (but not only) with the future. Learning about uncertainty is learning with the future, not trying to predict it. Yesterday may still be uncertain, but as yesterday is gone, the only uncertainty from yesterday that matters is what aspects of yesterday's uncertainty will appear in the future. For East Germans, for example, the opening of the Stasi files after the Berlin wall came down had to do with learning (in the future, as they gained access to the files) who had betrayed their trust or love in the past. The uncertainty about who had been loyal and who had been dishonourable in the past regime would be about the past, but its becoming less uncertain was located -actually, in action- in the future. So even the uncertainty from the past can only be known in the future. Conversely but also in the same sense, Pierre Wack, credited with shaping scenario practice in Shell for decades since he started working there in the early 1970's, considered that finding out which parts of the past would remain certain within future uncertainty to be the key interest in doing scenario work (Burt 2008). And Charles Perrow's famous (1999) 'Normal Accidents' analysis showed also that the uncertainty about many possible future accidents was unwittingly built into the system in question in the past, but the systems of causality would only unfold –if they did- at some point in the future.

An attractive and successful way to deal with future uncertainty is to 'scope out' 'chunks' of uncertainty and call these scoped chunks 'risks'. The risks are scoped and defined, and probabilities are attached to them. The scope and probability define prices, and risk markets –such as insurance or derivatives' are created. Ewald (1986) traced how the risks associated with industrial accidents became the foundation of the French welfare state.

In researching how we would exit the financial crisis, a group the first author became part of which started in the 2008 Oxford Futures Forum http://www.oxfordfuturesforum.org.uk developed scenarios as to how the crisis might end and how that ending would frame the nature of the crisis – (see Wilkinson et al, 2010) In that work we learnt that a lot of what the financial markets had believed could be kept as risks remained wild uncertainties. In writing the new chapter on the financial crisis for the second edition of Business Planning in Turbulent times (van der Heijden et al, 2010) we concluded that this misconception (treating uncertainty as risk when it could not be properly scoped, where probabilities were based on a data set from the past that did not apply to how the distribution of probability would actually be when the risk unfolded in the future, and where impact s was unknown and unknowable) meant that the way money had been priced (with the

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Capital Asset Pricing Model and other financial techniques) had been erroneous, for the full price of the uncertainty had not been factored in. Thus, many investments made with that model would not have been economically feasible, which explains the trillion dollar write downs that have been undertaken since then. Wilkinson and Ramirez (2010) also unpacked the lessons of this to ascertain that a primary function of scenarios in such circumstances was that they serve as 'framing devices' (Kaplan, 2008) that direct attention of decision-makers to different formulations of what they need to address. In terms of turbulence, as Emery and Trist's (1965) influential typology of environmental causal textures suggests, the contextual complexity overwhelmed the capacity to distinguish risk from uncertainty, and made the environment of risk-making that had developed unviable. Inthier words, the whole field became unstable and uncertain.

## 2. DISTINGUSIHING THE TRANSACTIONAL ENVIRONMENT FROM THE CONTEXTUAL ENVIRONMENT

*Figure 1.* **TRANSACTIONAL AND CONTEXTUAL ENVIRONMENT**
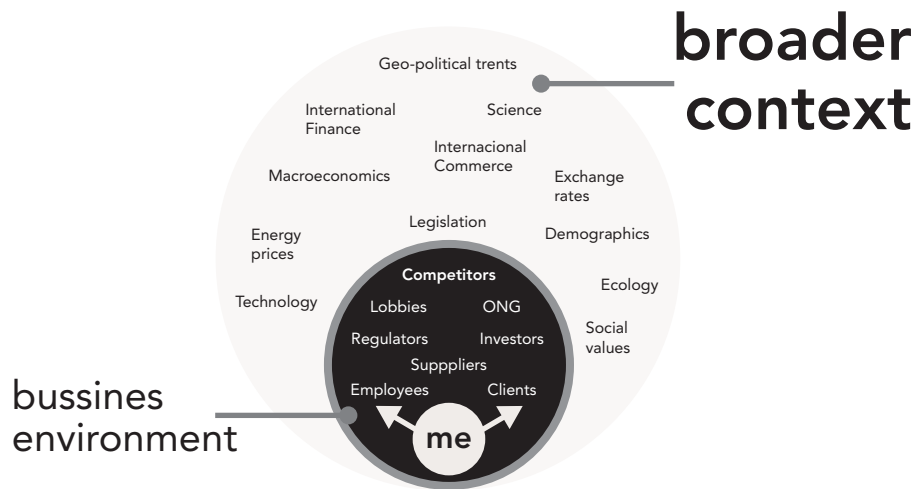


*Suerce:* Own elaboration.

In 1965 Emery and Trist developed a theory of environmental complexity and uncertainty in terms of a classification of what they called 'causal texture' that grounds the diagram above, which is key in scenario work. Causal texture theory deals with systems such as organizations (termed '1') trying to survive and thrive in their environments (termed '2') in a sustainable way. Emery and Trist suggested the following possible links between systems and environment: L11 (read 'El one one', for 'link'; not 'El eleven') links are those that remain internal within the system (i.e., intra-

organizational links, such as that between the finance department and the production units, depicted as 'me' above); L12 links are the links relating the organization to its immediate (or business) environment, - such as in the form of advertising or products, or services. or the carbon dioxide the organization emits into its environment; L21 links are those that the immediate or (business) environment feeds into the system, such as when organizations buy in elements from their environments such as supplies, and; L22 are links between elements in the broader contextual environment (the environment that is untouched by L12 and L21 links) itself - for any system/organization in this field, these links are perceived as pertaining to the broader context of the immediate or business in which the organization finds itself.

In Emery & Trist's causal textures theory, several interacting systems, their shared environments and the links that connect them together are defined as a 'field'. The causal texture is an emergent property of the whole field, concerns the behaviour of all systems within it, and sets conditions on how these systems and their shared environments transact with each other.

Causal texture theory defines the division between the transactional/business and broader/contextual environments. If an individual actor can influence her situation, then she is operating in the transactional environment; that is, in Emery and Trist terms, she is operating within the realm of L21 and L12 links. The transactional environment is where everyday business takes place. It is the playing field in which the organization is a significant actor, influencing outcomes as much as being influenced by transactors. It is the transactional environment for which the organization develops its strategy. On the other hand, if the individual actor faces what form her point of view appears to be macro-phenomena, such as demographic trends, which she cannot influence, she is dealing with factors which are in the contextual environment, defined by the relevant L22 links. There is no single actor in the L21 L12 transactional environment that is 'driving' such factors – they emerge from the broader (contextual) environment.

As causal textures theory sees it, it is the contextual environment and its L22 links that supply the boundary conditions for any one system's transactional environment. Van der Heijden (2005) explained the contextual environment as *that part of the environment which has important repercussions for the organizations but in which it has little or no influence*. The contextual environment determines how change will occur in the transactional context of an organization, and thus has a crucial bearing not only on an organization's links with its external environment but also on the survival of both the environment and the organisation.

While turbulence often feels unclear and messy; scenarios help to address it by considering the broadest possible possibilities, over a long time horizon, what the L22 context in which turbulence becomes manifest ciould have, and the way these possibilities may re-configure the L12 L21 transational environment and the assumptions about it that an actor in it holds. As opposed to forecasts, which are for

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anyone, scenarios are not only of an L22 environment but also for a given actor. Emery and Trist's causal texture theory were used Ramirez et al (2008, 2010) as a viable theory to understand how scenario work operates. The theory suggests that scenarios help to consider possible futures of the business context – which is according to that theory more technically called the 'transactional' context in turbulent conditions, when the contextual environment crashes into the transactional environment and shakes its rules, roles, behaviour, and assumptions radically and to the core. 'Transactional' is in practice a more helpful label than 'business' because it does not restrict scenarios to for-profit activities – it extends applicability to working with a church, a department of government, a city, a tennis club, or a theatre – all of whom have transactional (L12, L21) environments around them..

Scenarios as we understand them are not about the future options for an organisation, but about possible futures of the transactional environment or context of that organisation derived from plausible combinations of factors in the L22 contextual environment. And these futures of the transactional environment can best be assessed with scenarios in terms of the broader, or 'contextual' environment or context of that transactional environment, as the picture above depicts.

## 3. **WAYS OF DEALING WITH TURBULENCE**

Emery and Trist invented the term turbulence to represent what they considered to be the most uncertain environmental texture, a label that occurred to them while sitting on a very unstable airplane flight (and which has made their 1965 paper one of the most cited in management and organizational literature ever since). They developed four causal textures. I: Placid random, II: Placid clustered, III: Disturbed reactive and IV: Turbulent. As one progresses from type 1 to type IV, increasing complexity of transactions in a field leads to an aggregate behaviour of that field that becomes less and less stable.

In the first three types of causal textures, actors in aggregate maintain a decreasing degree of control over the field. But in the turbulent causal texture the institutional arrangements governing the field as a whole break down, and the field itself becomes a source of instability. The instability (which may build up gradually or become manifest suddenly and even brutally) signals to systems (organizations, actors) within the field that they can no longer rely on its ongoing stability. Turbulence makes the relevant uncertainty important because it risks exceeding the perceived or actual adaptive capacity of decision makers and their systems. Turbulence may be caused by an aggregate of actors who are unaware that they are in fact are co-producing the turbulent contextual environment, like drivers together and unwittingly creating logjam traffic conditions.

McCann & Selsky (1984) proposed an even more complex environment, called 'hyperturbulence' which Baburoglu (1988) extended to 'vortical' environments.

McCann & Selsky suggested also that people's experience of turbulence is moderated by the adaptive capacities they perceive they can mobilize, both individually and collectively. This subjective assessment of turbulence contrasts with Emery and Trist's original stance in 1965, as they then considered turbulence to be an objective condition of a field. Selsky & McCann instead think that the reason why different actors experience and perceive their environments differently is because they perceive their adaptive capacities differently, and believe they can mobilize the necessary stocks of resources to confront the challenging macro factors in uneven ways. This difference between Emery & Trist and Selsky and McCann affects scenario work, because as opposed to forecasts, scenarios are done for a subject, not only about objects.

In turbulent contexts the decision maker's attention helped by scenario work shift from understanding the (very often, competitive) games in the transactional environment to understanding how the forces from the contextual environment may shape the transactional one, not only in present but in the future.

Emery and Trist suggested that single actors (or systems) would find it almost impossible to respond alone to a turbulent environment and escape from its negative or damaging effects. Instead, they suggested that systems in a turbulent field would have to come together to jointly determine, identify, reveal or even create a shared frame of reference to address this turbulence effectively.

Emery & Trist suggested that systems would collaborate to identify a set of values they would need to institutionalize to be able to create a common ground that would counter the effects of turbulence. This required inter-organizational collaboration would produce a somewhat non-turbulent 'island' which would push back turbulence and keep it outside.

In other words, contextual environments cannot (by definition) be influenced directly by any individual system on its own. The increasing salience of the contextual environment as the context becomes turbulent therefore cannot be reduced by the actions or strategy of any individual system in that field working by itself. Given then, that collaboration is the effective response to turbulence, one thing scenario methods aim to do is to help in building common ground among disparate stakeholders of the turbulent field. These different stakeholders, with the help of scenarios, provide multiple interpretations of the situation, as e well as insights about new possible linkages and role constellations. Wit the help of scenarios, a transactor who has up to then been considered only in the role of 'client' might be seen as a future supplier, partner, or competitor. Scenarios help stakeholders to understand each other's potential under different plausible conditions to create different options for common ground -based collaborative actions to push turbulence out (Normann & Ramirez, 1993, 1994; Ramirez and van der Heijden, 2007)

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Emery and Trist considered that to stop the snowballing effects that give rise to, feed, and are fed by turbulence, the relative salience of the contextual environment over the transactional one in turbulence would best be reduced by institutionalizing new values. The idea is that newly institutionalised and shared values create an environment of lesser uncertainty than the type IV turbulent causal texture, pushing turbulence back and re-constructing a more stable ground for decision making and investing in the future.

At critical points, creative and innovative individuals such as Ghandi, Mandela or Steve Jobs, or indeed unexpected events like a scientific discovery or a coup d'etat, can play a key role in developing more stable, new common ground. They perceive the possibility of new adaptive capacity. Scenarios attempt to replicate this possibility (Ramirez & van der Heijden, 2007) assuming such individuals or events may become active in a plausible future (Bernard, 2008).

## 4. **HOW MIGHT WE DEAL WITH TURBULENCE WHEN WE CAN NO LONGER PUSH IT BACK OUT?**

The above analysis suggests that the predominant way of dealing with turbulence has been to 'push it back out' and 'away' from where 'we' (whomever 'we' is) are. To ensure it does not return, we have historically tended to then 'build a wall to separate ourselves from what we have pushed away' (wall of China, Hadrian's wall, the Berlin wall, the US-Mexico and Israel-Palestinian fences/walls, etc). As long as the world did not have too many billion people and 'nature' remained to be 'conquered and exploited' this approach was a viable way to deal with turbulence - one pushed it further away and then built a fort-like protection from it to prevent it from coming back in.

But with many more people on earth, where might we push the turbulence away to? Outer space? Maybe the Ocean: in September 2009, the Guardian newspaper reported that the Calabrian mafia, after allegedly unsuccessfully trying to bribe third world port officials all over the planet to take toxic waste shipments, was suspected of having ended up sinking the ships carrying it in the Mediterranean. Whatever the truth of that story, the fact is that 'we' are now everywhere! And that we are reaching the ecological limits to this strategy of pushing away. In his book 'Bottom Feeders' (2009) Grescoe suggests that most of the fish we have considered a staple will be unavailable on the plates of our children, as we have over-fished the seas. Ostrom, who shared the 2009 Nobel Prize, did her work on how to manage joint 'commons' (e.g., 2009) ownership such as Iceland's fisheries. We need now to collaborate more, compete sustainably within more collaborative frameworks, and depend less on and pushing back turbulence – the alternative appears to be extinction; or at the very least, unduly expensive.

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