Zadar, 13th March 2018

ROSIE - Responsible and Innovative SMEs in Central Europe

Massimo Chiocca, CISE

The evolution of concept of innovation within the complexity model

*The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. **As our case is new, so we must think anew and act anew**. We must disenthrall ourselves, and then we shall save our country.*

Abraham Lincoln

Annual message to Congress, December 1 1862

Jump shot in basket

First time attack in vol ley

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Complexity Model

The relationship betwen the parts are more important then the single part itself.

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Nobel Prize honed **P.W. Anderson**.

*"The behavior of large and complex aggregates of elemental particles is not explained in terms of a simple extrapolation of the properties of a few particles. The whole becomes **not only more** but also **different** from the sum of all its parts. We expect to find truly fundamental issues each time we make up the parts to form a more complex system and we try to understand the basically new behaviors that result"*

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We can summarize this concept with these words:

"*more is different*"

We are talking about the collective properties of natural and artificial systems (including businesses) that break the traditional boundaries of knowledge and the boundaries between the various disciplines (physics, chemistry, biology, but also economics, sociology, law etc.) by creating a new space of interdisciplinarity [or rather of transdisciplinarity] and of reciprocal connections. (De Toni 2010, Waldrop 1996, Morin 1993, Anderson 1972)

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From the economic point of view, the interesting thing is that the principles of the theory of complexity also apply to the enterprise as they are also a complex subject that develops interactions and relationships with other subjects. These relationships have a major impact on the company's performance, and if they are treated in isolation without having to consider them in their complexity, they are likely to be a serious obstacle to the company's success.

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Applying the paradigm of complexity to the areas where C.I.S.E. operates, our research lead us on the topic of responsible innovation, namely innovation aimed at quality of life.

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At Kennedy's death, Lyndon B. Johnson became President of the United State

The war on poverty

President Johnson, leading a center-left government, declared "war on poverty"

In all the main cities, help programs (home and work) for people that face economic diffculties were put in place.

The war on poverty was a disaster: at the end of the 60s in the cities there were poorer than before ... Why?

Cities are complex "open" systems.

The peasants left rural areas and moved en masse to the city to receive government aid.

But of course the aid was not enough for everyone because they were designed only taking into account the inhabitants of the city and without thinking about the possible migratory flows !!!

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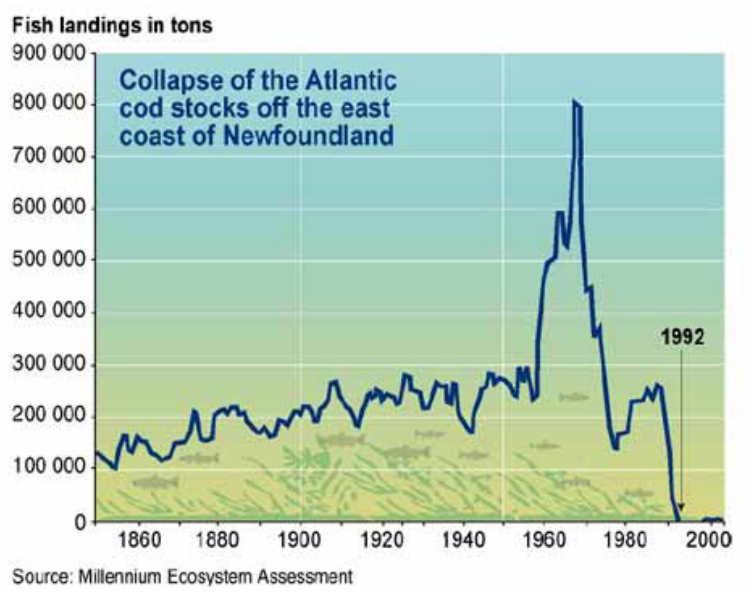
The error of Johnson's government was to undertake the war on poverty with an inadequate model of city in mind (we will say a reductionist model), in which cities were thought of as closed systems, impervious to any external influence or change.

Fishing for Cod in the North Atlantic

In the 1990s, cod fishing in the North Atlantic was practically became zero.



The Canadian government blamed the seal for the crisis, the natural predator of cod, and began exterminating **500,000 seals** every year. Exterminating the predators, it was thought, the prey (the cods) will be able to increase again and the fishing will be able to resume.

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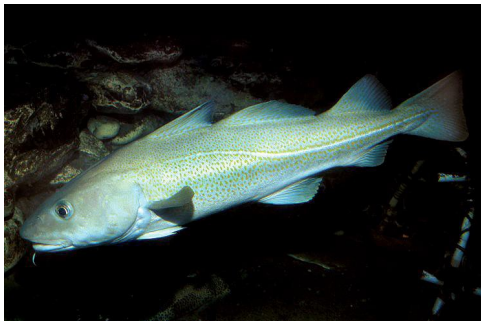
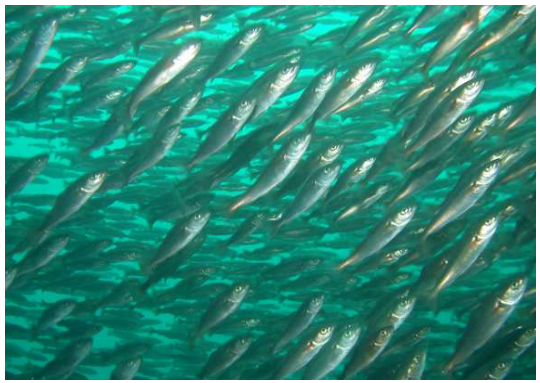
Predator A

Predator B
(Prey of A)



Predatore C
(Prey of B)



Despite the massacre of seals, the number of codfish has never increased ...

Why?

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In 1988 Peter Yodzis showed that the model of food chains is a linear banalization of the intricate food networks, in which many predators are also predators of predators.

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Seals do not eat only cod, but also many cod predators
If the seals decrease, the other cod predators increase
and the cod ... decrease!

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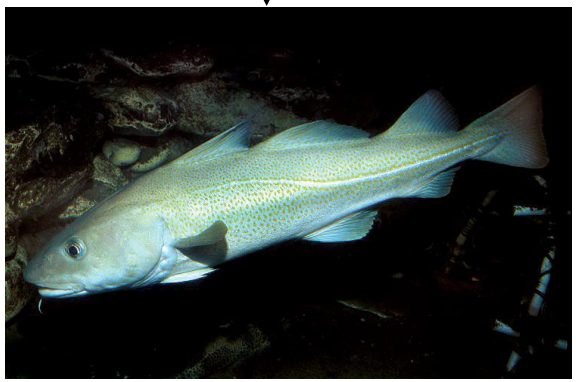

Yodzis has calculated that the food chain of seals and cod is a complex system with at least 150 species interacting. A similar food web, with only 8 species, "includes" almost 29 million food chains ... And with 150 species?

In 1984 Pepsi Cola had almost reached Coca Cola as sales revenues

In blind tasting tests, 57 people versus 43 preferred Pepsi, which was sweeter and lighter than Coca Cola. The Coca Cola Company then decided to change the formula, for the first time in 98 years, and create New Coke, sweet and light like Pepsi

It was a disaster: the company received 8 thousand protest calls a day and at the end decided to retire the New Coke

Why?

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The model that the Coca Cola Company executives had in mind was a linear hyper-simplification of the type:

In fact, the pleasantness - that is, the perception of a taste as "pleasant" is a phenomenon that is anything but trivial and non-linear, determined by numerous factors that act on the brain (which, in turn, is one of the most complex systems that known)

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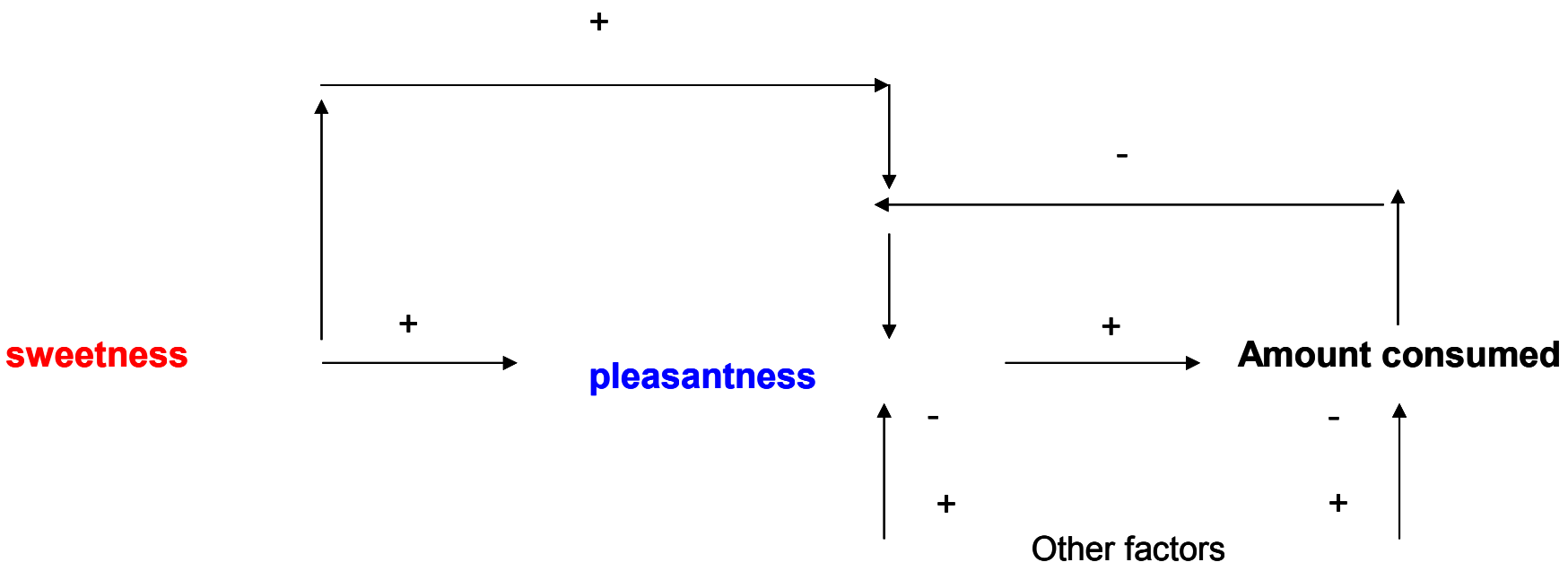

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Among the other factors:

- **Environment** (temperature, etc.)
- Food consumed together with the drink
- Physical subjective factors
- Subjective psychological factors
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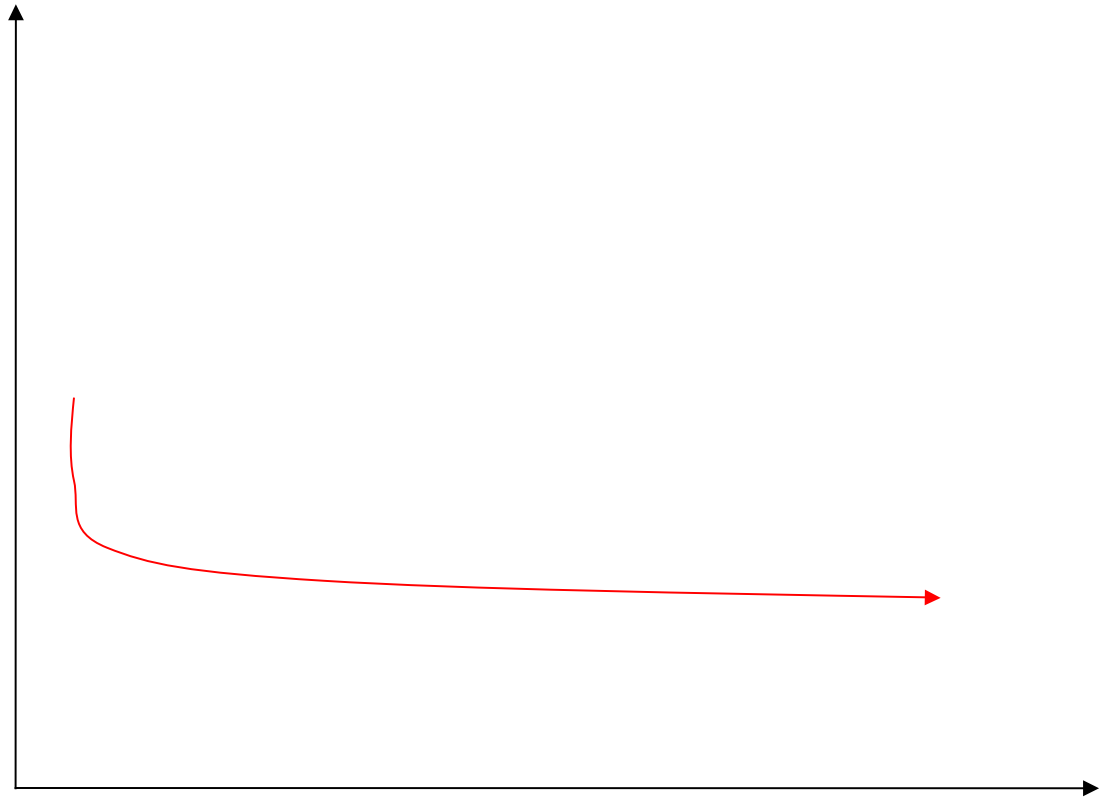

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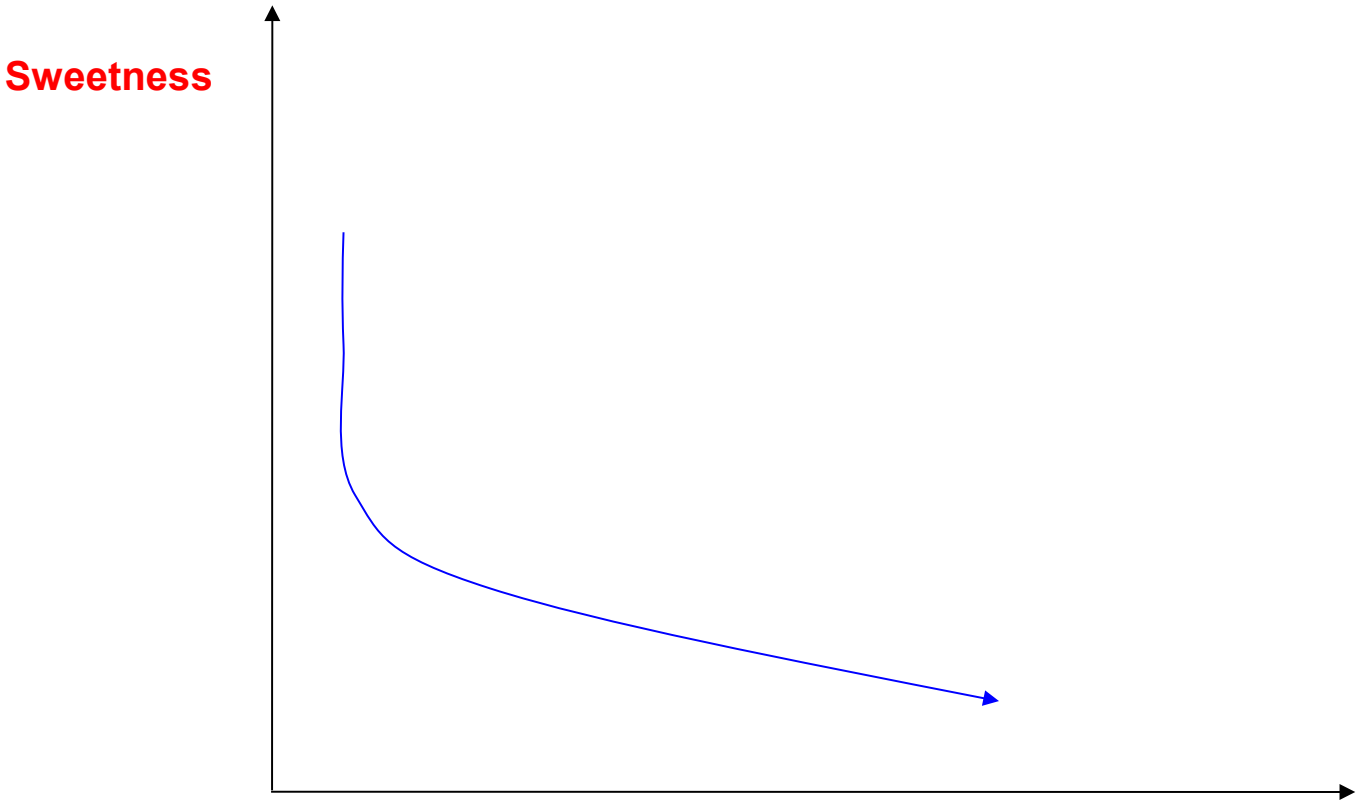

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In tasting: Pepsi is better

In quantity: Coca Cola it is better

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		Managerial Model	
		Classic	**Complex**
FEATURES	**Environment**	Almost stable	Almost turbolent
	Approach Vs Future	Based on projections of historical series	Based on megatrend
	Planning new strategies	From the top-down searching for Harmony understanding order.	Even bottom-up, accepting conflicts, disorder
	Shape of the organisation	One-mind	Multiple-mind
	Prevailing manag. style	Based on rules and principles from the top	Self-organisation on the ground of a shared view
	Duty of the manager	Planning and control	Create and mantaining the condition for the best perfformance
	Duty of the personnel	Performance of task	Taking responsibilities and being pro-active
	Decision-making process	Determined Path	Undetermined path
	Enrterprise environemnt	Industraila system	Eco-system
	Contex interaction	adaptation	Co-evolution
	Success indicator	balance and stability	Displacement and change
	OVERALL TARGET	**STABILITY** (reduce complexity)	**ELASTICITY** (Absorb complexity)

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*Classical management theory try to build **a fail-safe world for companies**- **a** world without all mistakes and fails*).
Complexity approach assumes that future is **almost unpredicatable** so it is cruciale learn **to manage the unpredicatbale** just to leaeve open the larger number of options as possible: ***a safe to fail world*** where mistakes and fails are something sure sooner or later.

Anticipation

Anticipation involves systematic thinking about any known, likely, plausible and possible implications of the innovation that is to be developed , which requires that innovators understand the dynamics that help to shape the innovation . The aim is to envision desirable futures—because futures cannot be predicted—and organise resources to steer the innovations in the right direction.

This requires **early inclusion of stakeholders** and the **wider public who engage** in "a dedicated attempt to **anticipate potential problems**, assess **available alternatives**.

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Reflexivity

Reflexivity is about critically scrutinising one's own activities, commitments and assumptions, and being aware **of the limits of knowledge and the fact that one's reality might not be universally held.**

Furthermore, innovators are expected to engage in second-order reflexivity, where they scrutinise how their underlying value systems and beliefs **influence the development of the innovation.**

In the end, innovators should not only live up to their role responsibility but also their wider **moral responsibilities** . Reflexivity can be enhanced by **early inclusion of stakeholders and the public who deliberate about the innovation at stake.**

Inclusion and Deliberation

It is about the **upstream engagement of stakeholders and the wider public** to open up discussions and to interrogate the social, political and ethical implications that the development of the innovation would bring. One could say that responsible innovation involves an "**active engagement of stakeholders for the purpose of substantively better decision-making and mutual learning**"
Therefore, one could say that stakeholder inclusion focuses more on questions surrounding **who to involve**, during which stage of the innovation process, and whether the stakeholder network is representative. On the other hand, deliberation focuses more on the **actual discussions that should lead to decision-making**, and pays less attention to obstacles for inclusion or representativeness of the stakeholder network.

Inclusion and Deliberation

The political part of deliberation is central to responsible innovation, and ideally stakeholders would be able to negotiate the terms of their inclusion and deliberation, including the politics of deliberative engagement. For example, **they would be able to discuss the substantive bias in responsible innovation that ethical concerns outweigh economic concerns.**

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Responsiveness

Responsiveness is about having the capacity to **change the shape or direction of the innovation in response to values of stakeholders and the wider public**. Furthermore, it requires a collective institutionalised response and co-responsibility for responsible development of the innovation in the light of new knowledge, perspectives, views and norms that emerge during the innovation process.

In other words, there should be “a willingness among all participants to act and adapt according to these ideas”.

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Social innovation

Social innovations are: "explicitly aiming at the creation **of social value and thus at positive social change**. Hence, in this case, the 'social' denotes that the purpose of social innovation is to meet pressing social needs and **to improve human and environmental well-being**" social innovation **overlaps conceptually with responsible innovation, especially when it comes to the drivers for innovation and the outcomes of social innovation processes**. For example, social innovations are also driven by the desire **to solve grand challenges and to respond to pressing social needs**. Furthermore, social innovation aims to enhance **social and/or environmental well-being**. Stakeholder engagement and deliberative approaches also take place in social innovation. For example, less formalised social innovations are often developed based on **co-creation with target beneficiaries**.

The evolution of concept of innovation within the complexity model

Sustainable Innovation

sustainable innovation overlaps also conceptually with responsible innovation. Sustainable innovations are also initiated in response to grand societal challenges, and commonly climate-change-related challenges. Furthermore, sustainable innovation increasingly addresses complex challenges which require the development of complex systems-shaping solutions. The fact that corporate sustainable innovation has already received considerable attention from researchers, managers, and policy makers is another important reason.

Frugal Innovation

General Features of the Practice

Why we need it?

The **Collingridge dilemma** is a methodological quandary identified by David Colingridge a British Researcher in which efforts to influence or control the further development of technology face a double-bind problem:

An **information problem**: impacts cannot be easily predicted until the technology is extensively developed and widely used

A **power problem**: control or change is difficult when the technology has become entrenched.

PRACTICE UNI PDR 27

The reference practices, adopted exclusively within the national domain, are among the "European standardization products" as required by EU Regulation n.1025 / 2012 and are documents which introduce technical requirements, drawn up on the basis of a fast process, limited to the authors, under UNI's operational leadership. The reference practices are available for a period not exceeding five years, maximum time from their publication, within which they can be converted into a regulatory document (UNI, UNI / TS, UNI / TR), or they must be withdrawn.

The general principle is the consideration that it is possible to codify the **mechanisms through which novelty entrants into the world are usually introduced**, partly using the principles of ***fuzzy logic*** and thus the characteristic elements through which innovation can be governed.

By dealing, in particular, with responsible innovation and not innovation tout court, the practice deals with three specific aspects:

- the sharing of the purposes
- the use of resources
- managing actual or potential risks

Sharing innovation purposes implies the need to define a system in which strategic decisions of collective interest in innovative matters are not a prerogative of a few but take into account the explicit or latent expectations of the various stakeholders and the amount of resources available, with a view to defining a sort of priority list on which to invest.

The use of resources, certainly linked to the former as regards the choice of their destination, also raises the issue of the efficiency of using the resources themselves. It is not so much the efficiency through which these resources are translated into results: the term efficiency in this context assumes the connotation of the transparency and the congruence of the resources employed with respect to the activities actually carried out, avoiding opportunistic behaviors sometimes made possible by the fact that those who evaluate congruity from an accounting point of view generally do not have the skills to evaluate congruity from the scientific and technical point of view.

The third aspect of managing actual and potential risks should be considered in the light of the difference between the meaning of actual risk and potential risk, particularly when referring to the innovative phenomenon. In fact, some innovations are enabled by the technique even before they have reached a full scientific knowledge of the phenomena involved and their direct and indirect effects. In cases like this, people may feel threatened, but the actual risk is not objectively reckonable, if not empirically. In this case, the so-called precautionary principle is introduced as a structural element of an approach to innovation that can be defined as responsible.

On the contrary, in its constant search for a balance between risks (actual or potential) and the benefits produced, through the search for responsible behaviors implemented in a timely manner in relation to what the contingent situation requires, Preautionary Principle is by its own extension a tool to make certain risks acceptable to a greater extent and quality of benefits for the community, thus making possible the industrial development of innovations whose impacts are not yet fully known scientifically.

Each of the three aspects mentioned above interpels the mechanisms of civil society and, at least in theory, of democratic participation. The fact that such mechanisms are little applied to the governance of innovation processes, left in fact in a state of fragmentation and outside of a multi-stakeholder systemic approach, justifies the fact that one can think of filling this gap even through the stabdarisation techical approach.

Result Response Requirements for Responsible Innovation

A) compliance with legal provisions applicable to their business sphere;

B) respect for the objectives which it itself has set itself;

C) invest on an annual basis a share of at least 5% of value added in R & D activities calculated on the basis of the average of the last four financial years;

Result Response Requirements for Responsible Innovation

d) if the company was interested in the precautionary principle, invest on an annual basis a share of not less than 1% of turnover (based on the products/services for which this principle applies) calculated on the average of the last four years, in research and independent development specifically aimed at eliminating, where possible, threatened threats and/or anticipating the adoption of preventive measures against actual risks.

Result Response Requirements for Responsible Innovation

Define the significant scope of your business through a systematic and shared confrontation with stakeholders.

Adopt precautionary and preventive measures necessary for proper risk management to apply the precautionary principle

Find the most appropriate indicators for describing your performance

Result Response Requirements for Responsible Innovation

Review and manage indicators through stakeholder feed back. Identify goals in relation to established indicators

Review performance in relation to each indicator Build relationships with industry-leading supply chain suppliers, business networks, and research organizations

Spreading knowledge to raise stakeholder awareness about the actual and /or potential impact of innovation introduced in society and the environment.

Graphite *for writing from Brazil or Mexico*
Wood *from Sweden*
Rubber *the eraser from Thailand or Malaysia*
Finally the ***metal*** *to link the eraser from Cina or Mozambico.*

The Pencil

Innovation and Leadership

Thank you for your attention!

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