RISK GOVERNANCE FOR SUSTAINABLE TERRITORIES: THE FRENCH CASE AND SOME CHALLENGES

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INTRODUCTION

During the last fifteen years, in France, three aspects where classically considered to prevent the occurrence of industrial accidents: reducing risk at its source; limiting the effect of an accident (mitigation), and protecting from its consequences (now reducing vulnerability). At present, two era are distinguished in French risk management: the before and the after Toulouse AZF explosion. With more than 30 deaths, thousands of wounded and at least 1,5 billion euros of damages in a radius of 3 kilometers (Dechy and Mouilleau, 2004), the Toulouse AZF explosion has revealed the needs of considering more actively land use planning in risk management and reducing the vulnerability around the Seveso sites. Indeed, after this disaster and others (Enschede in 2000, Buncefield in 2005…), one of the conclusions is that controlling major accident hazards by reducing the risk on-site is not sufficient to promote a sustainable development for both industry and urban areas without LUP in the next decades. Control regulations such as Seveso were limited to achieve a zero risk faith. One of the challenges of the LUP tools is to deal with historical dimension by addressing retroactivity.

By considering the significant correlation between the implementation of industrial activities and the thickening of the urban area, the law has separated two dimensions defining risk, “Hazard” and “vulnerable stakes”. This approach is based on natural risk studies and natural “risk prevention plans” experience feedback (NRPP, Natural Risk Prevention Plans). Integrating notion of stake and vulnerability in industrial risks definition reveal the interaction between an industrial activity and the territory on which it is located. That shows how risk perception and representation has changed since the integration of the Seveso II directive recommendation within the French regulation and the deficiencies noticed after the Toulouse accident in 2001 about how public policy and land-use planning are closely linked with risk management.

This paper will give in the first part a descriptive section, with an overview on how technological risk Land-Use Planning (LUP) is managed in France in the aftermath of Toulouse disaster. These regulated practices are therefore shared and put in the scientific debate. We will then raise some challenges and propose what we do think the research needs are. In particular, we will advocate for the need to create a consortium or a working group on LUP and risk governance. In this second section, we will go back to some element of theory about LUP and suggest a research agenda for a more sustainable LUP.

1. INDUSTRIAL RISK PREVENTION IN FRANCE IN THE AFTERMATH OF TOULOUSE DISASTER

France has more than 200 years of history in the regulation of risk prevention related to dangerous facilities. Between 1780 and 1800, polluting factories were moved out of Paris and a Napoleon decree established three classes of hazardous activities. This 1810 decree can be considered as the first regulation addressing risk prevention and enforcing the concept of “safety distances”. However, given the impossibility, in scientific terms, to assess

a generic applicable distance between factories and urban settlements, the decree left this decision and the responsibility to deliver a permit to operate to national authorities, national representative at local level or even local authorities depending on the “level of hazard” of the activity.

At national level, with respect to the licensing procedure, the modern legal references are the law No. 76-663 of July 19, 1976[1] on classified installations for environmental protection and its related decree No. 77-1133 of September 21, 1977.
Article 3 of the 1976 law states that « The authorisation for such installations may require that they are located away from residential accommodation, from buildings normally occupied by third parties, establishments open to the public, watercourses, roads, reservoirs, or areas scheduled for residential use by town-planning documents binding on third parties. » Moreover, « When an application for authorisation concerns a classified installation which is to be erected on a new site and which may create, through the danger of explosion or emission of noxious products, severe risks for the health or safety of the local population and the environment, easements serving the public interest may be imposed on the use of the land, as well as on work carried out under a building licence. » This latter classified installations are knows as AS (“Autorisation avec Servitudes”, i.e. authorisation with LUP restrictions) or top-tier SEVESO establishments.

Land-use planning policy in risky areas was supported by the law of n° 87-565 of July 22, 1987 on civil security management, on forest fire protection and on major risk prevention. This law strongly enhanced the juridical tools to preserve land-use restrictions around top-tier SEVESO establishments. This was completed by the law of December 13, 2000 on solidarity and urban renewal that makes mandatory for local authorities to account for industrial risk in their LUP documents.

Back to the 80’s, LUP competencies were transferred to local authorities. In risky areas, both the local state representative and local authorities could use complementary regulatory tools to ensure that risk concern is accounted for in LUP. The principles of land-use planning enable management of the construction of new industrial sites and the development around existing sites.

The Toulouse accident, in 2001, has been, in France, a turning point in the industrial risk prevention process. Indeed, with more than 30 deaths, the thousands of wounded and around 27 000 residences damaged in a radius of 3 kilometers, despite the controversy on the direct causes, several lessons were identified according the deficiencies in risk assessment, risk control and LUP historical management (Dechy et al, 2004, 2006).
The Toulouse disaster is a case history to illustrate the LUP conflicting situation that was observed in the 20th century with the co-development of the urban area and industries. The history of Toulouse and its chemical plants shows that the urban area has overtaken the chemical plants despite the former removal history of the high-risk explosive factory (Dechy et al 2005). Retroactive measures (remove houses or industries to reduce risk) could hardly be taken. It was also a shock under a “zero risk” faith and about the limits of control regulation such as Seveso ones.
The corrective actions were designed to operate at several levels of the sociotechnical system and several stages of the risk control procedures.

This accident has revealed the following needs:

1. Control of the risks by acting on their source. This mainly consists in improving the way the risks control demonstration is carried out within the framework of the Safety Studies (SS).

[1] The 1976 law was codified in the legislative part of the Environmental Code in 2000 (Livre V – Titre 1).

2. Reduction of the vulnerability around the Seveso sites (High Threshold). This consists in using the experience of the Risk Prevention Plans, carried out in the context of natural hazard, and proposes LUP measures.
3. More implication and more dialogue with the various actors in the risk prevention process. This consists in:
   - instituting a greater participation of the employees in the risks control process, with a widening of the Hygiene, Safety and Working Conditions Comity (HSWCC) missions;
   - going towards more implication of the various actors – in particular the public or neighbours - of risk prevention using the Local Committees of Information and Dialogue (LCID).

These three objectives aimed at increasing the transparency of the risk analysis process, and at going towards a greater coordination between the different actors involved in the preventive risk management process.

The LUP measures in hazardous areas are under the responsibility of the French Ministry of Environment, Sustainable Development and Land-use Planning. Three other Ministries are involved: the Ministry for Industry, responsible for the control Inspectors within the DRIRE now DREAL, the Ministry for the Interior and the Ministry of Labour – share the responsibility for major hazards prevention and control.

Seven years after the SEVESO II directive in 1996, the law no. 2003-699 of July 30, 2003 on the prevention of technological and natural risks and the repair of damage added new measures to the pre-existing set of legislative tools. This law inspired by the lessons learnt from the AZF accident in Toulouse and from the major floods in the southern part of France in 2002 has proposed guiding principles for the prevention of technological major accident hazards. This law has insisted on the operator's responsibility and the primacy of risk reduction at source but also to reduce historical vulnerability (retroactivity). This new law represents a step forward in the land-use planning approach: two new tools dealing with top-tier SEVESO establishments enable to improve the efficiency of limitation of future construction and to deal with existing situation of concern:

- For new installations on existing sites, or modification of existing installations that creates additional risk, the constraint imposed on land use (servitudes) because of that additional risk will be financially compensated for by the operator of the installations creating the risk as it was the case for new sites.
- Technological Risk Prevention Plans (TRPP) are LUP preventive measures (the French acronym is PPRT) that will be defined and implemented in the areas affected by industrial risk created by top-tier SEVESO establishments or sites. These plans aim at mitigating the residual risk by regulating LUP for existing situations, after prevention measures at source have been taken. It therefore addresses the need to reduce the historical vulnerability as a consequence of the industrial and urban development of the 20th century.

1.1. Operating permits procedure

Concerning the decisional roadmap and the different responsibilities, as in the majority of European regulations, the Operators must be given the permit, license or Prefect Authorization to set up and operate a plant. The Prefect – the national representative at local level - gives it using the advice from the Inspectors of the control authorities (within DRIRE and now DREAL), which is responsible both for the assessment of the Safety Report and the consultation of the local public Authorities and stakeholders. Industrial activities are classified

according to their potential hazards and eventually to their potential impacts on the environment:

- Low Hazard: declaration scheme[2] (D). A simple declaration (of compliance to some dedicated regulations) is required at the Prefecture.
- Medium Hazard: authorization scheme[3] (A). A safety report and an environmental impact assessment are compulsory and are assessed by control authorities.
- High Hazard: authorisation scheme with land-use restrictions[4] (AS, or top-tier SEVESO). Land-use restrictions are possible in addition to A establishment requirements.

With respect to A et AS establishments, the safety report – under the responsibility of the operator - aims primarily at demonstrating risk[5] control and management and provides relevant information to the control administration for the authorization, refusal or authorisation subject to conditions.

Moreover, in the case of SEVESO classified establishments, on the one hand, the safety report requires a more detailed risk assessment documentation, and on the other hand, the Prefect supported by control inspectors (DRIRE and now DREAL) is enable to evaluate the compatibility of the establishment to its environment using a national acceptability matrix[6] which defines the rules depending on the combined probability-gravity parameters.

1.2. Safety report and Risk matrix

In the safety report, the hazardous phenomena and associated major accidents are characterised according to three parameters:

- Probability: it is assessed by class of probability, according to a national scale of five categories of probability from A (> 10-2/year) to E (<10-5/year). The characterisation method is left to the choice of the operator. Within this approach, real performances of risk control measures to reduce the probability of events occurring are taken into account. The probabilities of initiating events are assessed taking into account operating feedback or incident DATAs from the operator or the industrial sector. The operator must demonstrate performance of risk control measures.
- Intensity: this is determined by calculating effect distances associated with national effect thresholds corresponding to four types of effect: significant lethal effects, first lethal effects, irreversible injury, reversible injury or broken glass. Distances are not generic but calculated for each hazardous phenomenon taking into account barrier performances (response times, effectiveness) and site conditions (weather conditions, etc.).
- Severity of effects: this is established using intensities by assessing the number of potential victims in the accident's effect envelopes (significant lethal effects, first lethal effects and irreversible injury). Severity is categorized depending on the number of victims for each type of effect assessed. A national scale is imposed with five categories of gravity.

[2] About 450,000 installations;

[3] About 61,000 establishments.

[4] About 600 establishments.

[5] The 2003 law indicates that accidents should be assessed using probability, kinetic, intensity and gravity parameters

[6] Known as the "MMR matrix" (*Mesure de Maîtrise des Risques*, i.e. risk control measures).

Table 1. Severity scale depending on the intensity and on the number of people that are exposed

Severity	Significant lethal effect threshold	Lethal effect threshold	Irreversible effect threshold
Disastrous	>10	>100	>1000
Catastrophic	1 to 10	10 to 100	100 to 1000
Major	1	1 to 10	10 to 100
Serious	0	1	1 to 10
Moderate	0	0	<1

Once the hazardous phenomena and major accidents have been characterized in the safety report according to probability and severity scales, the Prefect supported by control inspectors (DRIRE/DREAL) could use a national acceptability matrix to make decision. Three areas are defined:

- An unacceptable area (graded NON) for which the risk is deemed too high: the installation cannot be authorised in its current state.
- An acceptable area for which authorisation can be given.
- An intermediate area (graded MMR for risk control measures) in which authorisation is given after verification that all risk control measures at an acceptable cost have been put in place.

Table 2. The MMR risk matrix

Probability / Gravity	E	D	C	B	A
Disastrous	Non	Non	Non	Non	Non
Catastrophic	MMR	MMR	Non	Non	Non
Significant	MMR	MMR	MMR	Non	Non
Serious			MMR	MMR	Non
Moderate					MMR

1.3. Technological Risk Prevention Plans: LUP for existing situations

The 2003 law created technological risk prevention plans (PPRT) having the purpose of protecting people. Their objective is to resolve difficult land-use planning situations inherited from the past and to set the framework for future land-use planning.

These plans aim at mitigating the residual risk, after risk prevention measures at source have been taken. They delineate a perimeter within which requirements can be imposed on existing and future buildings:

- Restrictions of future construction and land use.
- Consolidation of existing constructions (blast-proof windows…).
- In the areas exposed to very hazardous risks, existing buildings and constructions could be expropriated.
- In areas exposed to hazardous risks, owners could be given the right to force the city (or local community in charge of LUP) to buy their real estate.

Moreover, additional risk reduction measures at sources could be investigated if their cost balances the real estate measure cost that is avoided.

These plans are elaborated on a local level under the Prefect responsibility, after a public consultation and in partnership with relevant local stakeholders. Once approved by the local state representative (*Préfet*), it becomes a LUP regulation.

1.4. Systematic method in use for LUP in risky areas

In order to support the planning activity, the Mayor is informed by the mean of an information document ("*Porter à Connaissance"* information to take account for) by the Prefect on the risk to be aware of and that should be accounted for in the LUP documents of its town (SCOT, PLU).

The *Porter à Connaissance* is mainly based on the she safety report outputs. Following the 2003 law and the regulatory developments with respect to the safety report risk assessment, a Circular has just been issued to deal with this new aspect (especially the probability parameter): Circular of May 4, 2007 on technological risk information - *Porter à Connaissance* - and land-use planning around classified installations. It is stated that this information document should include two parts:

- A first part dealing with the Hazard (named in French *aléas*[7]*).*
- A second part dealing with LUP recommendations based on the *aléas* levels.

Moreover, in addition to LUP tools (PLU, "Plan Local d'Urbanisme" or local LUP map and codes) the *Code de l'Urbanisme* enables the Mayor to refuse a building permit if he judges that the "constructions, with respect to their location or dimension, are of such a type as to put public safety or health into jeopardy". Finally, the Prefect could use two strongly-effective tools:

- The "project of general interest" (*Projet d'Intérêt Général*- PIG). The PIG enables the Prefect to override the decision concerning the land-use in risky areas if the latter has not been taken into account enough.
- The land-use restriction around top-tier SEVESO establishment (*Autorisation avec Servitudes*).

French Land-Use Planning is based on the national regulation for construction "*Code de l'Urbanisme"*, which Article 110 prescribes that the destinations of land-uses must ensure the public health and safety and, specifically, that the prevention of technological risks are taken into account within the urban instruments (Article 121-1).
Urban planning is performed at two levels: the first is the *Schema De Coherence Territorial* (SCOT), defining a general city-regional level project coherent with the principles of sustainable development. The Schema consists in a report of the current situation and in a series of maps and plans outlining both the present and the future situation up to 30 years (i.e. strategic planning). The second level is the *Plan Local d'Urbanisme* (PLU), defining the general regulation for land-use within the Municipalities. The PLU contains, for instance, the zoning map and the rules applicable to the land covered by the plan itself. It is established under the responsibility of the Town Council, with the Mayor directing the procedure.

[7] Probability that a dangerous phenomenon creates effects of a given intensity over determined period of time at a given point of the territory. (French word, not translated because of its specificity).

1.5. What "tolerable" means in the French framework

The "tolerability" in the French framework is well-defined according to the risk prevention at source (safety report and MMR) and LUP approaches.

Table 3. The generic relation between tolerability approaches and risk management policy

Tolerability approach	Related risk management policy	Objective	French Regulatory text
Endpoint values	Safety report	Used by the operator evaluate distances for each accident (i.e. intensity)	*Arrêté du 29 septembre 2005 relatif à l'évaluation et à la prise en compte de la probabilité d'occurrence, de la cinétique, de l'intensité des effets et de la gravité des conséquences des accidents potentiels dans les études de dangers des installations classées soumises à autorisation.*
Risk Matrix	Permit to operate: MMR	Used by the prefect to evaluate the compatibility of SEVESO establishment to the environment	*Circulaire du 29 septembre 2005 relative aux critères d'appréciation de la démarche de maîtrise des risques d'accidents susceptibles de survenir dans les établissements dits « SEVESO », visés par l'arrêté du 10 mai 2000 modifié*
Individual Risk	LUP: PPRT around top-tier SEVESO site	Used to determine LUP zoning for existing and future building	*Guide PPRT, MEDD-DGUHC, 2005*

1.6. Endpoint values

French major accident risk regulation refers to endpoint values that are used to calculate "intensity" of phenomena.

Table 4 . Endpoint values adopted in France

Effects	**Level of effects on human**			
	Significant lethal effect threshold	**Lethal effect threshold**	**Irreversible effect threshold**	
Toxic	Lethal concentration 5%	Lethal concentration1%	Irreversible effect	
Thermal	8 kW /m2 or (1800 kW/m²)^4/3.s	5 kW / m2 or (1000 kW/m²)^4/3.s	3 kW / m2 or (600 kW/m²)^4/3.s	
Overpressure	200 mbar	140 mbar	50 mbar	**Indirect** 20 mbar

1.7. TRPP national regulatory principle

The following zoning principles are set out in the national PPRT guide.

Tableau 5. TRPP zoning principles

Regulated zones	Future land-use planning and construction measures	Possible real-estate measures
Dark red	Ban on new construction	**Expropriation Relinquishment**
Light red	Ban on new construction but possibility to extend existing industrial buildings if they are protected	**Relinquishment**
Dark blue	New construction possible depending on limitations on use or protection measures	
Light blue	New construction possible depending on minor limitations	

These general zoning principles are related to the Hazard (*aléas)* levels (combination of intensity and cumulative probability).

Table 6. Hazard zonning principle

Maximum intensity of the toxic, thermal or overpressure effects on humans at a given point	Very serious *Significant lethal*			Serious *Lethal*			Significant *Irreversible*			Indirect
Cumulative probability distribution of dangerous phenomena at a given point	>D	5E to D	<5E	>D	5E to D	<5E	>D	5E to D	<5E	All
"Aléa" level	VH+	VH	H+		H	M+		M	Low	
Zoning	Dark red		Light red			Dark blue			Light blue	

After the approval from the side of the involved Authorities, the Land-Use Plan (PLU) is submitted to the community's enquiry.

With the new French legislation, it has been recognised that the issue of the information to the public must evolve. In this perspective, the 2003 law allowed the creation of local risk-information committees (CLIC) around top-tier Seveso sites by the Prefect.
In order to ensure the long term commitment and the acceptability of the PPRT, the principle of dialogue with local stakeholders established throughout the process.
Dialogue (*concertation* in French) takes two forms:

- Partnership: this brings partners together through participation at working meetings and consultation over the PPRT project. The partnership is made up of the CLIC (Local Information and Dialogue Committee), the operators of the industrial sites, the relevant communes and the inter-communal structures that handle land-use planning.
- Dialogue: this brings the general public together and aims to create a common risk culture with local stakeholders. This happens through information and exchange meetings, distribution of PPRT documents, etc.

This improvement of the communication and the involvement of the public within decisional processes aim at achieving a risk-informed LUP approach. Finally, before approval the PPRT project is submitted to the community's enquiry.

1.8. A new dialogue structure in major industrial risks prevention process in France

The new dialogue aims to provide spaces of exchange and meeting between various local actors or stakeholders having jointly concerns and an interest for the questions relating to the industrial environment is revealed in France through the existence of various place or structures: public investigations, local committees, Permanent Secretariats for the Prevention of Industrial Pollution (SPPPI).
These various forms of structuring the space of exchange intervene at different times during decision-making process. Our interest goes on the place of these spaces of dialogue within the framework of the control of the urbanization around Industrial site.

1.8.1. Spaces of information and dialogue existing before the installation of the CLIC

The CLIC structure, introduced by the n° 2003-699 of July 30, 2003, comes to redraw and officially recognize the place of the coordination and dialogue between the actors involved in the industrial risks prevention process and more especially in the urbanization control process around the industrial sites.

- **The public investigation**

The public investigation is a procedure established before the administrative decisions that can impact freedoms and basic rights. To this end, this procedure consists in informing and collecting the appraisals, suggestions and proposals of the public before the decision-making[8].
Governed by the law Bouchardeau n° 83-630 of July 12, 1983 relating to the "democratization of the public investigations and the environmental protection", the public investigation is a procedure initiated by the Prefect and control by an investigating police chief or a board of inquiry (if the file is sensitive) indicated by the President of the Administrative Court.
The investigating police chief (or a board of inquiry) has, starting from a departmental list of aptitude:

- o To inform. He places at the disposal of the public the files and documents relating to the investigation at the beginning of the procedure.
- o To organize. He can ask for additional information, decide lonely or in the presence of the petitioners of the organization of the public meetings; he can solicit the administrative judge on the realization of an expertise dependent upon the petitioner.
- o To follow-up. He is in-charge of collecting all the observations and remarks and of writing a report addressed to the various administrative authorities.

It is to be specified that this type of investigation excludes from its field of application work carried out in order to prevent a "serious and immediate danger"[8].
The space of exchange is:

(i) opened to all people concerned with the decisions;
(ii) centered on a decision;
(iii) limited in the time. Upstream of the decision-making but downstream of the technical elements having contributed to framing the decision.

- **The Permanent Secretariat for the Prevention of Industrial Pollution (SPPPI)**

This structure does not have a legal existence. It joined together actors on a local scale such as the State through its services (e.g. DRIRE), the industrialists, the local communities,

[8] Article 1 of the law n°83-630 du July 12, 1983 relative to « démocratisation des enquêtes publiques ».

associations for the protection of environment, media, experts…) around questions having a link with the industrial environment. There are 11 SPPPI on the French territory.
It is the Prefect who defines the composition and specifies the missions of the SPPPI. The SPPPI of Area PACA is one of the oldest. Placed under the authority of the Prefect and animated by the Regional Division of Industry, of Research and of Environment (DRIRE), this one was decided in 1971, and was made operational in 1972, following problem raised by the concentration of industrial site around “Etang de Berre” region in order to ensure balance between the economic dimensions and the the environmental quality.
The principal missions allocated with the SPPPI are:

- A mission of information: information of the public on pollution and the means of reducing them.
- A mission of strategic and operational orientations: to promote policies of lute against the harmful effects and the installation of an anti-pollution plan for the industrialists.
- A mission of orientation of the expertise concerning the local conditions.

Within the framework of the control of the urbanization around the industrial site, the extent of the sphere of activity of the SPPPI includes the industrial basin. In these terms, the SPPPI has a mission of information and centralization of the problems common to various industrials site.

Lets notice that neither the law n°2003-699 of July 30, 2003, nor the decree n° 2005-82 of 1 February 2005 relating to the creation of the local committees of information and dialogue pursuant to the article L 125-2 of the code of the environment, nor the circular n° 00908 of May 15, 2001 relating to the installation of the interdepartmental local commissions of coordination (CLIC) clearly specifies the interactions of this structure of dialogue with the new CLIC and does not recognize its official existence.

- **Local committees**

Existing in various forms, having various objectives, and having an official structure or not these local committees are multiple. One finds there the Local Committees of Information and Safety (CLIS), the Local Committees of Information and Monitoring for nuclear power (CLIS), the Local Committees of Information and Exchange (CLIE) and more recently the Local Committees of Information and Dialogue (CLIC).
The table below presents the forms and mission of the first three structures.

Tableau 7. The three shapes of local committees

	CLIS Local Committee of Information and Safety	**CLIS Local Committee of Information and Monitoring**	**CLIE Local Committee of Information and Exchange**
Framework	Official structure of dialogue and consultation around the nuclear sites. Initiated by the Law Bataille 91-1381 of 30-12-1991.	Official structure of information and monitoring around the of waste treatment installations. Within the framework of the Barnier decree of 29-12-2003.	Nonofficial structure. Created on the initiative of SEVESO companies.
Participants	Two colleges Named by the Prefect. 1/Mayors according to the site settling. 2/Qualified People (Expert, Personnel ECA, Trade unions, Associations, Institutions)	Named by the Prefect: 1/ State services. 2/Industrialists. 3/Territoriales communities. 4/Environnemental associations.	Guests by the company. Variable composition 1/.State services. 2/. District representatives. 3/Mayors; CHSCT. 4/Environmental associations.

Organization	Plenary assembly. A bureau. Working groups.	A president (Representative of the Prefect). Meetings, Visits on sites, Budget definite. Documents given by the site owner.	1/ Regular Meetings. Agenda fixed by the industrialist. 2/Presentations and debates in the course of meeting. 3/Budget supported by the industrialist.
Objectives	1/ To develop the right to information of the citizens concerning the sites activities. 2/Animation/Debate on safety.	1/ To promote the public information. 2/ Dialogue, concertation and monitoring authority.	1/ To allow the industrialist to understand expectations of the local residents. 2/ To inform the residents on the life of the industrial site, its constraints, its dangers and its evolution.

Within the framework of the urbanization control around the Seveso sites, it is the CLIE structure that captures our attention because of its proximity with the new CLIC structure. Indeed, this nonofficial structure creates on the initiative of industrial, aims at establishing a confidence relation between two principal actors: the industrialist and the local resident. This confidence relation is based on a reduction of the lack of information and knowledge between the "local resident" and the "industrialist" that posses a technical expertise concerning his company.
However, the role of the CLIE in the decision remains vague. This is reflected by the following points:

- The recourse to the expertise. The neutrality of the expertise, required if a conflicts happen, could be called in question, this owing to the fact that the CLIE is at the industrialist initiative.
- Means. Financial means that are necessary to the CLIE operations depends on the industrialist. Within the framework of the urbanization control around the industrial site, it is necessary to recognize the responsibility for the trio Industrialist /State/Local communities.

1.8.2. The Local Committee of Information and Dialogue (CLIC)

By many facets, the installation of this new structure of information and dialogue, which is represented by the CLIC, has strongly changed the practices in industrial risks prevention process in France.
Indeed, introduced through the July 2002 circular of the Ministry for Ecology and Sustainable Development (MEDD) that recommend to the Prefects the installation of the "CLICs by anticipation", this "pilot structure" became since 2003 an opportunity for the various actors concerned with the major industrial risks to coordinate each other and to be able to give their opinions concerning information provide within the Safety Studies and the Technological Risk Prevention Plans.
It was necessary to wait until February 1, 2005, with the promulgation of the decree n° 2005-82 relating to the creation of the local committees of information and dialogue pursuant to the article L 125-2 of the Code of the environment, to see the role, the missions and the framework of the CLIC specified and fixed.
This committee, creates by Prefect of department decree for any Seveso high threshold site, is limited to 30 people. The CLIC is structured around five colleges of actors [9] including:

[9] Article 2 of decree of February 1, 2005 concerning the CLIC.

- The "administration" college:
  - Prefects, or their representative;
  - a representative interdepartmental services of defense and civil protection;
  - a representative departmental services of fire and rescue;
  - a representative services in charge of the inspection of the classified installations;
  - a regional or departmental representative of the equipment division;
  - a representative services in charge of the factory inspectorate, employment and vocational training.

- The "local authorities" college: deliberating assemblies of the local and territorial communities or the publicly-owned establishments of the concerned inter-commune co-operation.

- The "owners" college:
  - Management representatives.
  - If necessary, a representative of the authorities managers of the works of road, railway, harbour infrastructure or of inland navigation or modal multi- installations located in the perimeter of the committee.

- The "local residents" college: Representatives of the local associative world, residents located inside the zone covered by the local committee and, if necessary, the qualified personalities.

- The "employees" college:
  - Employee representatives proposed by the delegation of the personnel committee of safety, health and working conditions.
  - If necessary, it includes employee representatives of each concerned establishment, at a rate of at least a staff representative per establishment, proposed per the delegation of the personnel of the committee of hygiene, safety and the working conditions among its members or, failing this, per the union delegates.
  - The members of the committee of hygiene, safety and the working conditions and the union delegates are replaced when their mandate of member of the committee of hygiene, safety and the working conditions or of union delegate ends.

The CLIC is concerned with various actions:

- Give opinion. It is associated the development of the Technological Risks Prevention Plans (PPRT). It can give a report on the project of plan. It gives observations on the information memoranda provide by the authorities and the owner to the citizens.
- Receive information. Technical information such as on the accidents having perceptible consequences outside the site, the critical analyses, EDD (Safety report), emergency and information plans concerning the becoming of the owner and the operation such as extension projects or modification of the installations.
- Give information to the public (citizen).

The CLIC must meet at least once per year. It can call upon recognized experts to carry out a third expertise. The majority of colleges must approve the recourse to the expertise. In fact the Ministry of environment finances its operation.

The formulation of the final opinion of the CLIC is done in a concertative process than approved by the majority. Thus, if the opinions and the decisions are approved by half of the members present or represented, the voice of the president is dominating. This rule, specified within the framework of article 5 of the decree, leaves a large range to interpretation on (i) the representativeness (per a number of college or a many people in the colleges) and (ii) the distinction between the concept "of opinion" which represent a lighting or a recommendation for the action and the concept of "decision" which implies to take the responsibility for the action. This last point can appear problematic when the CLIC has to come to a conclusion about the proposal for a Regulation of the PPRT.

Another characteristic of this CLIC structure is that the number of people present, within the CLIC meeting, is open if the president considers the people likely to bring lightings to the debates.

This various information concerning the CLIC structure shows that this last one can face a paradox as for its relation with the State. Indeed, in one hand a designation and a right of veto to the balance if an equilibrium happened between the colleges and in an other hand the potentiality of being autonomous of the industrialist means (e.g. the CLIE).
In what follows, is presented the new procedure used for urbanization control around the industrial site Seveso high threshold in France. This one takes the form of Technological Risks Prevention Plans (PPRT in French or TRPP in english) and is the continuity of the "vulnerability" approach applied by the French administration within the framework of the natural hazard.

In what follow, we will present the challenges and perspectives on LUP based on the observations of the limits of the French model.

2. CHALLENGES AND PERSPECTIVES ON LUP

Decision-makers (local, national and European) and experts involved in land-use planning activities in the vicinity of hazardous industrial facilities are often confronted with major technical and socio-political challenges and difficulties. In addition to, and complementarily with existing initiatives, we suggest that a dedicated working group on land-use planning can be launched. The present section describes the rationale, goal, and possible actions/deliverables to be undertaken/provided by this group.

2.1. Background: Industrial hazards and land-use planning

- **Industry and cities: getting closer and closer**

Historically, the development of industrial activities has been driven by the location of supply sources (raw materials; energy; workforce/manpower; etc.) and demand sources (markets; transportation networks). At first, industrial facilities were often established within reasonably safe distance of the then-existing urban areas.

Rural-urban migration, demographic pressure and urban sprawl have induced a increasing concentration/density of vulnerable assets (population; buildings; technical networks; critical infrastructure) around industrial facilities. Consequently, the level of potential damage and cost of industrial accidents has equally increased. This was tragically demonstrated in the past (Flixborough, U.K.; Seveso, Italy; Bhopal, India) and confirmed in a recent past: AZF plant (Toulouse, France); Enschede (The Netherlands) and Buncefield (UK). As an additional aftermath of these disasters, and in addition to economic costs, social acceptability of industrial facilities and related risks has been increasingly put to a test.

In most of industrialised countries, the mitigation of technological accidents and disasters usually rests on two major pillars: first, safety measures and risk reduction and control in industrial facilities; second, limitation of structural and human assets exposed to the consequences of industrial accidents. Land-use planning belongs to this second category of measures. In Europe, the so-called Seveso I and II EC Directives provide a regulatory framework for land-use planning in the vicinity of hazardous industrial facilities and transportation routes. Such regulations either ban urban development, or condition this development to a compliance with technical features (e.g.: building codes; function of buildings; population density; etc.).

It is the time to recall some statements were made by the European Parliament (EP) 2 weeks after the Toulouse disaster. The EP asked, in a context of sustainable development (safety, employment, environment), for a new risk management based on the logic of "risk removal". The EP also "called on the Member States to initiate urgently an in-depth review of policies on regional and urban planning in the vicinity of risk sites, including as regards the fiscal aspects". The EP "considers that, in the case of high-risk industrial sites, consultation procedures between public authorities and elected representatives, local residents, industry and staff representatives should make it possible to restructure these sites". Mathieu and Levy (2002) made an estimate of more than a million people that live in the vicinity of French's 1240 Seveso II sites (in 2001). On the other hand, the EP is "bearing in mind that the chemical sector employs several million people in the European Union, and in particular 900 000 people in France". The EP "invites the EC to learn from this experience by proposing law and control reinforcement (under the Seveso II Directive) which could lead to the extension of safety areas, including retroactively". Finally, the EP "strongly opposes any attempt to relocate dangerous sites to countries where environmental and social standards are lower than those in force in EU territory, and urges the Member States and the Union to implement all possible technical and financial measures, and take all political steps, to achieve this objective".

- **Land-use planning: a technical and political challenge**

There is a general recognition today that land-use planning in the vicinity of industrial facilities is no easy task. Difficulties include:

- Risk analysis: selection of accident scenarios; evaluation of chemical and physical characteristics of hazardous phenomena (heat and pressure wave; toxic); calculation of related probabilities (of exposure, of event etc.); etc.
- Risk analysis: inventory and mapping of human and technical assets exposed to potential accidents; assessment of vulnerability, resistance and coping capacity; identification and protection of critical infrastructure; etc.
- Risk analysis: Although usually located in areas free from natural hazards (flooding; landslide; earthquake; etc.), industrial facilities remain exposed to natural disasters (e.g. Tüpras refinery in Turkey, 1999; coastal industries after Katrina Hurricane in Louisiana, 2005). Multi-hazard risk analysis remains a methodological and technical challenge.
- Risk management and control: safety measures are designed and implemented to reduce risk at source; some others are under public oversight due to negotiation within the LUP procedure; their performance within duration is of public interest and should be controlled by inspection. The transparency on this control process and the information of local stakeholders remains to be developed.
- Socio-political aspects: public acceptability of industrial risks often rests on the availability of appropriate risk communication campaigns. Despite findings of research in risk sociology, the design of efficient risk communication remains a challenge;
- Socio-political aspects: land-use planning regulations confront local authorities with the difficult task to enforce constraining prescriptions. These often trigger discontent from the

public, hence advocating for more participatory decision-making processes. Again, despite advances in political science, this field still deserves additional research efforts.

In other words, considering land-use planning as an instrument for industrial risk management raises both technical (risk analysis) and socio-political (management, control and governance) sets of issues.

- **Advocating for a dedicated working group**

There are already several programmatic initiatives and working groups dedicated to land-use planning for industrial risk management. In addition, existing European think tanks address both technical and political issues (incl. follow-up of public policies) related to land-use planning and industrial risk management. As an example of existing research clustering activities, the LUP-dedicated working group of the EU Joint Research Centre (Ispra, Italy) has produced several publications and policy-relevant recommendations.

Existing European projects[10] on LUP include:

- LUPACS: Land-Use Planning Around Chemical Sites.
- TRUSTNET-IN-ACTION: Inclusive risk governance around industrial facilities.
- RISKCOM: Risk communication. Leonardo da Vinci programme.
- MITRA: Monitoring and risk management for the transportation of hazardous goods.
- STARC: Science and Society.

In addition to the above, land-use planning aspects of risk management have been identified by the *European Technological Platform on Industrial Safety* (ETPIS[11]) as research topics for the 7th Framework Programme. These topics include:

- Impact of natural and man-made hazards (incl. Malicious intent and terrorism) on industrial safety.
- Governance of the industry-State-municipality nexus and involvement of civil society stakeholders in decision-making.

In particular, the optimisation of land-use planning on technical and governance aspects has been identified by the partners of the ETPIS. According to the Strategic Research Agenda (SRA) of the ETPIS, "*land-use planning around hazardous installations is a powerful concept to enable the sustainable development of both the industry and the urban areas with a long term vision. Practices and approaches are quite different across Europe because of the risk assessment approaches and also the juridical tools implemented by the authorities to define the zones and their use. Research is needed to understand the reasons of the discrepancies across Europe on the technical and governance aspects, and then propose an harmonised approach which will avoid that regulation in some countries is too severe or not enough and then create inequitable framework for the industrial development*"[12].

In other words, there is a clear need today for additional research on land-use planning as an instrument of industrial safety, and in particular for risk management in the vicinity of hazardous facilities and transportation routes/infrastructures.

[10] Examples of projects funded by the 6th EU Framework Program.
[11] Visit Website : www.industrialsafety-tp.org.
[12] To access the SRA (.pdf format), visit www.industrialsafety-tp.org.

2.2. Workgroup "Land Use Planning" and "risk analysis and risk management process"

2.2.1. Some definitions

Land Use Planning (LUP) is composed of:

- The "Land" that can be represented by:
  - spatial dimensions (X, Y, Z) ;
  - stakes as building, infrastructures, etc.;
  - stakeholders (ex. Industrialists, administrations, mayors, public, etc.) ;
  - decision-making levels and processes: Local, regional, national, European, etc.
- Hazards: natural and man-made. Possible interactions: NaTech; "domino effects; etc.
- Planning activities, defined as *"An act of formulating a program for a definite course of action*" or "*the act or process of drawing up plans or layouts for some project or enterprise*" or also "*the cognitive process of thinking about what you will do in the event of something happening".*[13]

It remains difficult to separate the two notions "prevention" and "planning". Acting in "prevention of events" can be done by: defining measures aiming at managing stakeholders; and/or: defining measures aiming at managing land and stakes. Programme formulation requires the definition of a duration: short term or longer term.

2.2.2. Risk reduction measures

When risk is defined as a noun, the dictionary tells us that this word mean "*a source of hazard*"[14] or "*a venture undertaken without regard to possible loss or injury*". When risk is define as a verb, the same dictionary tells us "*Expose to a chance of loss or damage*", "*take a risk in the hope of a favourable outcome*".

As we can notice in theses definitions the following aspects are called to contribution

- *Stakeholders.* The person (s) who is (are) exposed to a chance.
- *Stakes.* What is judged as important by an actor or an Organization.
- *Actions, scenarios or measures*. Framing chances
- *Hazard.* Chance, positive and negative consequences.
- *Consequences.* Positive and negative.
- *Decisions.* Choosing actions or/and measures to reduce the negative consequences.

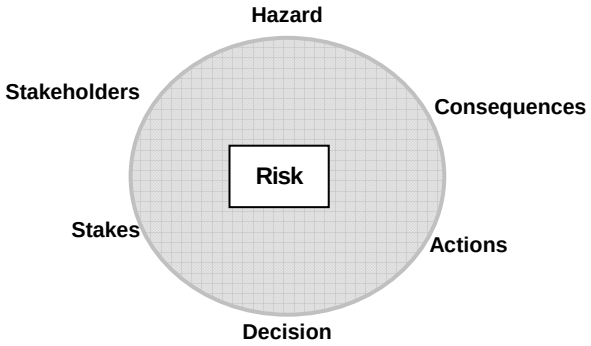

Figure 1. Concepts inherent to risk

[13] http://www.websters-online-dictionary.org/definition/planning.

[14] http://www.websters-online-dictionary.org/definition/risk.

Looking to these definitions of "LUP" and "Risk" we can define the LUP, in the context of a LUP Workgroup, as "*a set of actions, programmed by stakeholders, aiming at reducing vulnerability of actors sharing a specific land. These actions are taken under the responsibility of a decision-maker and/or open to dialogue with other stakeholders. These preventive actions have a specific duration (punctual, short term, long term) and can take two specific forms: actions aiming at regulating stakeholders and actors and/or actions aiming at regulating land*".

2.2.3. Scientific disciplines relevant to a LUP Working Group

The very nature of LUP requires the contribution from several disciplines, hence calling for a multidisciplinary approach (Figure 2):

- **Social sciences (ex. economic, law, etc.).**
  - Decision sciences.
  - Computer sciences.
  - Engineering sciences (chemistry, etc.).

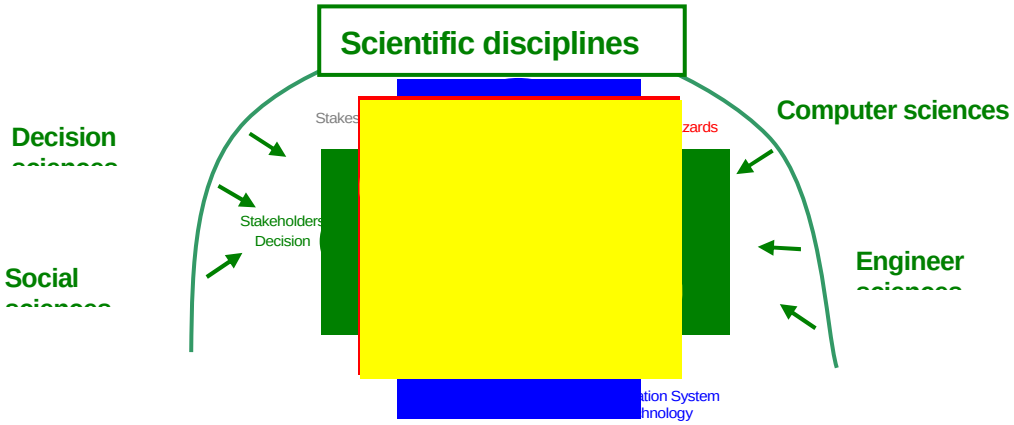

Figure 2. Multidisciplinary scientific contribution to Land Use Planning (LUP)

2.3. Rationale, goals & implications for data management

Rationale of this working group

The aim of this working group is to contribute, on a scientific and applied research basis, to an improved *integration* of hazardous industrial activities (facilities and transport) in their direct spatial and socio-economic environment. This integration depends heavily on a land-use planning approach (incl. building codes). We do emphasise the relevance of land-use planning as a way to reduce industrial risks.

This interest in land-use planning issues has for instance been demonstrated in different scientific communities[15]. The European Commission also acknowledged the relevance of land-use and planning approaches to industrial hazards, as witnessed by the relatively recent establishment of a working group on *Land-use Planning in the Context of Major Accident Hazards*.

[15] « *ESReDA Seminar On The Geographical Component of Safety Management:Combining Risk, Planning and Stakeholder Perspectives* », Karlstad (Sweden), 14-15 June 2005

Goals of this working group

This working group shall aim at the following three major objectives:

- *Before* industrial accidents:
  - Develop methodologies for hazard impact quantification in relation to accident scenarios. This task includes probability-based risk analysis around industrial facilities.
  - Assess and reduce vulnerability of industrial activities to external threats (natural and man-made).
  - Standardise methodologies for identification, ranking and mapping of human and structural assets exposed to the consequences of industrial accidents. This task includes methodologies for vulnerability assessment.
  - Develop land-use planning regulations that reduce social exposure to industrial hazards.
  - Establish industry-State-society dialogue and governance protocols to improve social acceptability of industrial risks. This task includes modelling of and support to decision-making.

- *During industrial accidents:*
  - Conduct research for the design and benchmarking of plans and procedures for the management of industrial accidents and other emergencies.

- *After industrial accidents:*
  - Set up contingency planning for continuation of industrial activities (production; employment).
  - Learn lessons from the management of major accidents, crises or disasters.
  - Update land-use planning regulations according to lessons learned.

Implications for data management

The three objectives indicated above have direct implications in terms of methodologies and data management (collection; monitoring; analysis; storage/dissemination). These include:

- Methodologies:
  - Analysis of natural hazard impact on industrial safety (risk analysis; “domino” effect).
  - Assessment of the consequences of industrial accidents on the natural environment.
  - Assessment of social vulnerability to industrial accidents (including: economic impacts of accidents; cost-benefit analyses).
- Data management:
  - Protocols for data collection, assessment (reliability; confidence) and analysis.
  - Technical data (industrial systems; natural processes) and socio-economic data.
  - Data on storage/transport activities (logistics; fluxes).
  - Improvement of post-accident analysis: methodologies; data collection; data bases.

2.4. Tasks of the working group on land-use planning

Four categories of tasks can be done within the LUP workgroup:

- **Technical contribution.**
  - ***Benchmarking***. Analytical study of the EU-wide survey of current practices in land-use planning around hazardous industrial activities. This benchmark should include a review of: existing regulations; risk assessment methods and tools; protocols for data collection, assessment and analysis; procedures for stakeholder involvement in land-use planning and risk management; etc.

- **Scientific challenges for LUP in risk and danger sciences.**
  - ***Production of knowledge:*** identify and understand features, processes and indicators related to social vulnerability in the vicinity of hazardous, industrial facilities. Assess and model socio-economic impact of major industrial accidents; develop cost-benefit analysis tools for assessment of planning policies.
- **Scientific networking.** All around Europe, different PhD students work on the thematic of LUP in the context of a specific scientific discipline. This workgroup propose to support scientific exchanges between universities.
- **Valorization of research results.**
  - ***Production of methods and tools***: see that knowledge produced (see above) is properly translated into applicable methods and tools that meet and match the needs and requirements of end-users. These include: industrialists; local authorities; State services; citizen organisations; etc.
  - ***Dissemination and training:*** edit books, guides, technical reports related to land-use planning and major industrial accidents; organise workshops and seminars to disseminate results and best practices.

Although first implemented at the EU level, the activities listed above are meant to be developed in co-operation with other regions of the world (both developed and developing countries), as well as in interaction with other scientific and professional organisations.

Conclusions

This paper has given firstly an overview on the French approach on technological land-use planning. The Toulouse accident in September 2001 represents a turning point in the way technological risk prevention is currently taken in France. Indeed, after this disaster and others (Enschede in 2000, Buncefield in 2005…), one of the conclusions is **that controlling major accident hazards by reducing the risk on-site is not sufficient to promote a sustainable development for both industry and urban areas without LUP in the next decades.** Control regulations such as Seveso were limited to achieve a zero risk faith. One of the challenges of the LUP tools is to deal with historical dimension by addressing retroactivity.

In France, **territories** are considered as a **passive area** suffering damages due to the occurrence of industrial or natural risks and that should be protected from. **There is a need for a more "territorial approach" that considers territory as an active and dynamic component of the risk, which can also be considered as a "source of danger".** As a re-minder, the Toulouse explosion turned into a disaster also because of the vicinity of urban areas and industrial plants, originally situated far from each other, after the town expanded in the 20th century. As a consequence, the risk was not only created by the plant in itself but also by the interaction between both industrial and territorial activities on a limited space. The LUP procedures that framed these interactions have evolved through and are now better taking account of the hazard part with safety perimeters and of the vulnerability part. Major stakes and vulnerabilities assessment then require a detailed understanding of the concerned territories and stakeholders involved. It needs to be done in a large time scale to understand all the mechanisms and dynamics of these spaces.

One of the issue, is as the European Parliament to shift to a "removal strategy" when risks are too high. Indeed this is the result of the 20th (mostly) century development. The historical dimension, through retroactivity is expected to be managed through long time span. Indeed, to close a site, reduce its hazard potential or expropriate some inhabitants needs years.

We do think that a collective contribution must be given to improve the *integration* of hazardous industrial activities (facilities and transport) in their direct spatial and socio-economic environment and promote a sustainable development for both industry and urban areas in the next decades. We have suggested that an integrated approach to risk governance and LUP need the use of **benchmarking** techniques – at least across EU - to learn more about the existing regulations on LUP and risk management and propose new territorial approaches and tools. In other words, this benchmark should now integrate LUP practices rather than only risk assessment. It therefore could lead to develop some harmonisation and common regulation about LUP and vulnerability management on territories as it was done 30 years ago for the hazard part with risk control Seveso regulations.

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