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Building futures in contested industries: Which contribution of electronuclear scenarios in framing nuclear-related political decisions?

Stéphanie TILLEMENT

NUCLEAR ENERGY & THE INTERFACES WITH THE ENVIRONMENT

September 22-27, 2019   Saint-Pierre d'Oléron, France

AGENDA

1. OPENING REMARKS

2. NUCLEAR & SOCIAL SCIENCES

3. AN ILLUSTRATION FROM A CURRENT RESEARCH: FRAMING NUCLEAR ISSUES & DECISIONS

4. CONCLUDING REMARKS

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1. OPENING REMARKS

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- **From Industrial Engineering…**
  - → An inclination for **"socio-technical problems"**

- **… to sociology:**
  - → a **PhD conducted in collaboration with RATP**: How can railway safety be ensured while conducting major modernization projects?

PASSAGE INTERDIT AU PUBLIC DANGER

- **At the end of my PhD, 1st encounter with the nuclear world: a research-action with EDF on the future organization of work for the EPR in Flamanville**

- **Since 2011, an increasing focus on nuclear-related issues, through my participation in structuring projects**

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Avant Astrid, les autres ratés de la recherche nucléaire en France

L'USINENOUVELLE

L'EPR de Flamanville, chantier cauchemardesque pour EDF

EDF extends nuclear plant outages

By Energy Reporters | 21.05.2019 | Production

Le Monde

Nucléaire : la France abandonne la quatrième génération de réacteurs

Le projet Astrid de réacteur à neutrons rapides est mis à l'arrêt en catimini par le Commissariat à l'énergie atomique. Un coup dur pour l'avenir de la filière.

Nucléaire: l'EPR de Taishan 2 en Chine sur le point d'entrer en exploitation commerciale

Opinion | Rapport Pompili sur le nucléaire : plus partisan que factuel

Nucléaire : un rapport parlementaire pointe les « failles » du parc français

Dans un rapport remis jeudi, une commission d'enquête recommande de renforcer la sécurité des centrales, notamment en encadrant mieux le travail des sous-traitants.

■ **3 structuring research projects**

> The **RESOH Chair**:
>
> Investigating the human and organizational dimensions of **nuclear safety**

→ The **AGORAS** project (ANR & Investissement d'Avenir): Investigating the foundations & processes of the **governance of nuclear technologies** in the Post-Fukushima context

→ **PISE & PrISE** projects:

> An **inter-disciplinary** perspective on **nuclear-related decision-making processes**

CHAIRE RESOH

AGORAS
Amélioration de la Gouvernance des Organisations et des Réseaux d'Acteurs de la Sûreté nucléaire

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- **Immersing myself in the field of nuclear energy**

- **Qualitative methods of inquiry**

  → Observation of work situation *in situ*

  → Individual & collective interviews

  → Documentation analysis
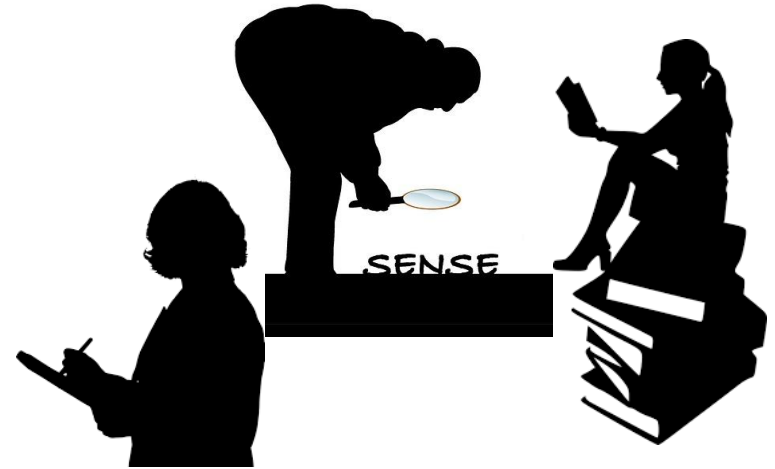
- **Common threads in my researches**
  → A **dynamic approach:** an attention to interactions between the different stakeholders, and between humans & non-humans

  → An attention to **time & temporalities**: replacing the interactions in their temporal trajectory, embracing past, present & future

  → An attention to **materiality**
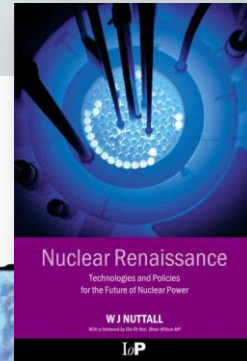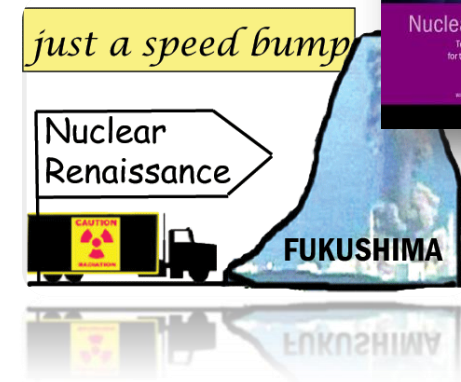
2. NUCLEAR & SOCIAL SCIENCES

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- **Increased public and academic attention for nuclear issues**
- **A *contested issue field* → major concerns about safety and sustainability**
- **And yet… increasing concerns about global warming and climate change → towards a *nuclear renaissance (Kaur, 2011; Hecht, 2012)?***

- **Nuclearity (Hecht, 2012)**
  - → not so much an essential property of things as it is a property distributed among things

- **Tensions between exceptionalism and normalcy (Schmid, 2018)**
  - → The example of the boundary between 'nuclear security' and 'nuclear safety'

- ☛ **The importance of social, organizational, political dimensions to apprehend nuclear things**

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Source: Reflets de la physique, n°60, 2018

- **France: an "extreme" case in the global energy landscape**
    → The importance of nuclear power in electricity production
    → The very specific actors' system that govern nuclear power
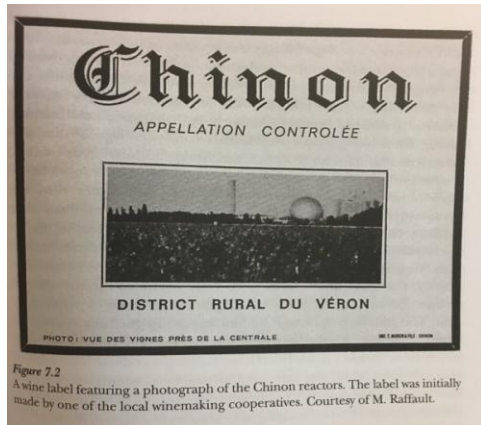   → Its singular temporal trajectory: its past, present and future

Source: Hecht (2004)

- **Nuclear power & national identity**

- "*If the 2007 presidential candidates have been so aggressive on the issue of nuclear "generation" during their debate, it is because the problem is not (and has never been) purely technical. It is the nation itself that is involved, it is the national identity and the French exception that pass through the generations, which must be located and resituated ... Compared to the rest of the world*" (Hecht, 2007, p. 187).
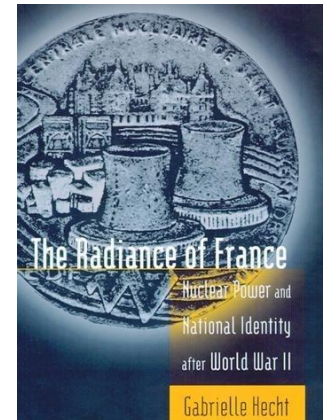
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3. AN ILLUSTRATION FROM A CURRENT RESEARCH: FRAMING NUCLEAR ISSUES & DECISIONS

- **The question of nuclear energy in France**
  - → The engagement of France in an energy transition process
  - → **Nuclear can not be excluded from reflections and decisions relating to the energy transition**

- **A context that…**
  - → … leads to many debates, regarding
    - the future of the nuclear industry (How to manage nuclear waste? What may be the future nuclear technologies?)
    - the articulation between nuclear power and other technologies of energy production, in the framework of the energy process
  - → …implies strong actions and tough decisions at the technological and political levels

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■ **The future of nuclear technologies is shaped by:**

- the international arena
  - 2000: GEN IV International Forum
- the French arena
  - The legacy of previous technologies
  - Bataille Law: new actors, including academics, called to engage
  - 2006 Law
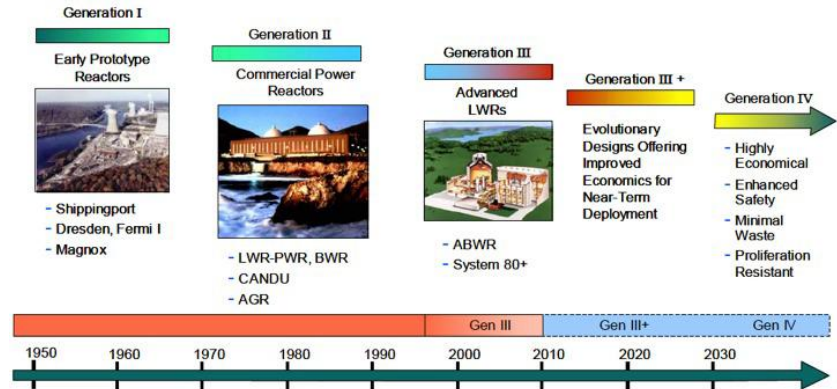
- **Sodium Fast Reactor**, the reference option :
  [ASTRID, the technology demonstrator]

  - *maturity, possible further improvements (safety, operability, economics)*
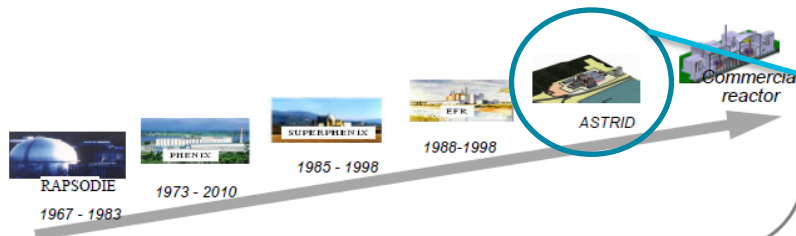
The 'evolutionist' master narrative

Source: Boullis, CEA, 2015

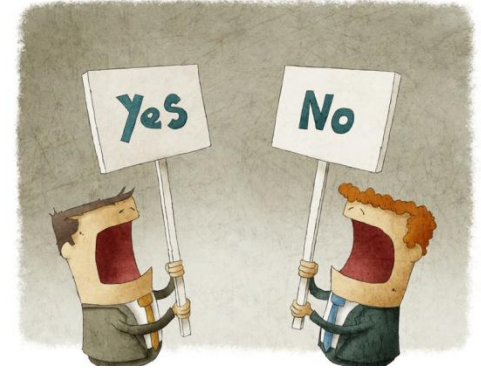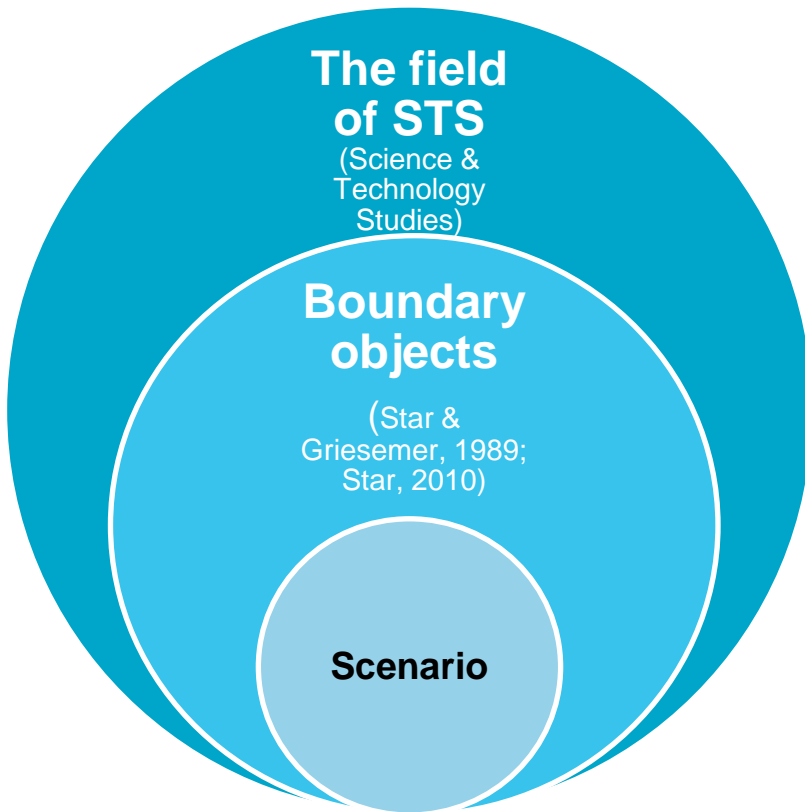■ **In contested issue fields, *different social worlds are overlapping and competing* to defend their own positions, agendas and versions of truth claims**

■ **Key challenge in framing debates and decisions related to uncertain, major and contested problems:** how to build robust, reliable, plausible (Lockie, 2014), credible knowledge about the future?

■ **Two main focuses in the OS & STS literature:**

   o the *professional groups* or "*epistemic communities*" (Dunlop, 2012; Haas, 2011)
- centrality of legitimacy, struggles for authority (Abbott, 2003) ,credibility of claims makers,
- experts' identities, status or reputation (Lefsrud & Meyer, 2012),
- rationalities of policy-makers (Wynne, 1982)

   o The *increasing role of models, forecasts and scenarios*:
- in building and conveying "anticipatory knowledge" (Nelson et al., 2008) and in reasserting control over the future in the face of uncertainties (Lockie, 2014)
- in framing the debates
- which can take a variety of types of forms
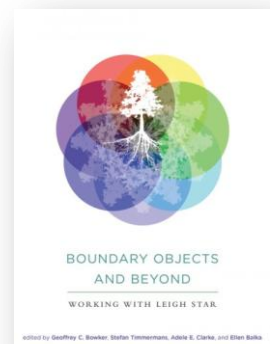- which are not purely descriptive tools, but performative ones.

The field of STS
(Science & Technology Studies)

Boundary objects
(Star & Griesemer, 1989; Star, 2010)

Scenario

SCENARIO AS BOUNDARY OBJECTS

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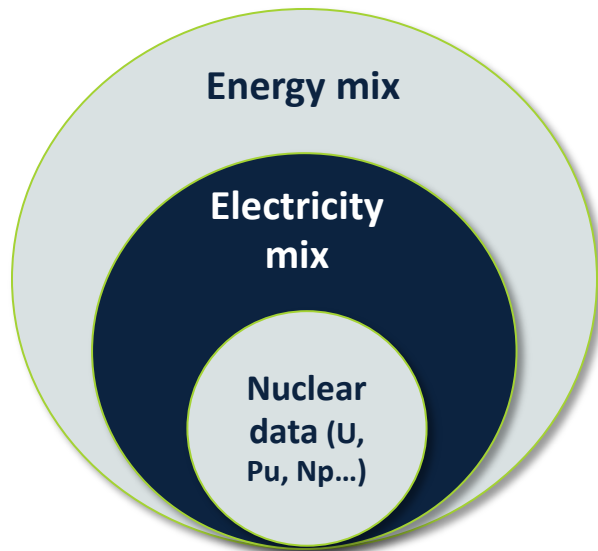
- **From the analysis of scenarios making to the analysis of their use → How do the scenarios may help in bridging research, industry and civil society?**

- **A project centered on 'blind spots' of previous researches:**
  - ➤ The implication of the political sphere in scenario-builiong and decision making processes
  - ➤ Different visions of scenarios and scenario-based practices according to the different social worlds or communities of practices

- **Main scientific goal:**
  - ➤ Developing a critical analysis of the content, roles and uses of scenarios that takes into account the diversity of involved actors and long-term (past, present, future) temporal dynamics

- **An approach based on the concept of "*boundary object*"**, which acknowledge the pragmatic, symbolic and political role of "artifacts… involved in the collection, management and coordination of knowledge […] subsequently distributed"

BOUNDARY OBJECTS AND BEYOND
WORKING WITH LEIGH STAR
edited by Geoffrey C. Bowker, Stefan Timmermans, Adele E. Clarke, and Ellen Balka

Energy mix

Electricity mix

Nuclear data (U, Pu, Np…)

■ **A focus on the role of *Electronuclear (EN) scenarios*** in framing debates and decisions relating to the place of nuclear power in the future French electricity mix and in bridging Academics, Industry & Politics

■ **Research questions**
  ○ How does the scenarios intervene in drawing boundaries between Research, Industry and Politics and informed & collective decision-making processes?
  ○ Under which professional and organizational conditions does the scenario cease to act as a boundary object?
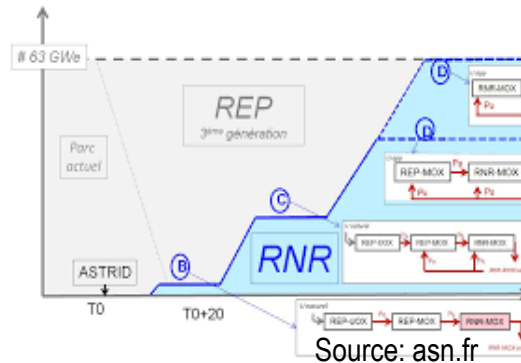
Source: asn.fr

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► **1st step: Focus-group gathering people from the same social social world**

- Political (P) group: Former Deputy, former President of OPECST, former President of ASN, Energy Head DGRI, CNRS Delegate at Research Minsitry
- Applied Research & Industry (I) group: SCK/CEN, CEA *3, EDF
- Academics (A) group: 2 physicists (IPNO, LPSC), 2 economists (PACTE, LEMNA), 2 sociologists (Univ. Aix Marseille, EHESS)

► **According to you, and in the light of your experience, to what extent do scenarios (and more specifically EN scenarios) intervene in the scientific, political, and industrial choices relating to future nuclear power?**

► **More specifically, what role(s) do the professionals of the different social worlds (political, industrial, academic) make scenarios play?**

► **2nd step: a feedback & discussion workshop**

SCENARIO, WHAT ARE WE TALKING ABOUT?

The scenario may be…

➢ **… a decision-making tool**
« Je me place dans un monde idéal où l'existence d'un scénario est un outil d'aide à la décision ». (P)

➢ **… a « black box »**
« En l'occurrence les scénarios ça peut être une grande boîte noire et les deux choses obligatoires, c'est les hypothèses de base… et effectivement les critères qu'on avait utilisés pour faire son analyse. Après qu'il en sorte ce qu'il en sort c'est deux choses différentes. » (P)

➢ **… an answer to a precise question**
« Ils sont juste des réponses dans un cadre prédéfini d'hypothèses, de modèles, qui essayent de répondre à une question posée. » ®

➢ **… a test tool**
« Un scénario c'est juste un outil de test et chacun teste ce qui est dans son domaine d'expertise, que ça soit photovoltaïque, stockage... » ®

➢ **… a description of possibilities and pathways**
« Les scénarios doivent donner un cheminement et comment on y arrive, quelles sont les différents chemins, les contraintes et les cols qu'il faut passer […]. Mais le scénario il a pour rôle seulement de dire quelles sont les possibles. »

➢ **… a way to produce a common speech**
« Faire des scénarios, ça a au moins permis de définir la ligne du parti » (I)

The scenario is not…

➢ **… a study**
« une étude n'est pas un scénario. Je prends l'exemple de l'étude de l'Ademe 100% renouvelables » (P)

➢ **… a forecast**
« Un scénario ce n'est pas un outil de prévision de l'avenir. […]C'est pour ça que finalement on a tous raison, parce qu'on fait des tests de laboratoire, ce n'est pas la prévision. »

« La seule chose dont vous pouvez être sûr de votre scénario, c'est que ça ne se passera pas comme ça. » ®

➢ **… the truth**
« On a aucune prétention de dire que notre prospective sera quelque chose qui va se vérifier. C'est juste des pistes de laboratoire dans le cadre de certaines hypothèses qu'on met, donc voilà… pour ne pas attendre que les scénarios soient la vérité » ®

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Panorama of possible uses and roles of scenarios…

► Answering to the question *versus* validating desired result
► Building arguments / shared narratives
► Deconstructing rhetorics
► Exploring the future
► Supporting fundings
► Justifying decisions that have already been made
► Postponing decisions / Not deciding
► Telling the « one best way »
► Provoking awareness
► Showing what is impossible…

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What to conclude from the diversity of definitions and roles?

➢ **Is diversity a problem? Or who allows debate and enriches decisions?**

➢ **How to manage this diversity? And how can decisions be made in spite of this diversity?**

A lack of normalization of scenario-making ... in a world where standardization is omnipresent

IDENTIFICATION OF SPECIFICITIES OF EACH SOCIAL WORLDS

■ **Nuclear power debates and scenarios: the perspective of each social world**

The 'P' social world	→**The object 'scenario' per se was globally less present** →**Nuclear policies qualified as "murky"** 　•A strong influence and authority of historical institutions active in nuclear industry and applied research 　•A recognition and legitimacy vis-à-vis policy-makers due to accumulated knowledge & experience 　•A privileged access to key decision- and policy-makers →**Often "flawed" debates** 　•Debates are often limited to a juxtaposition of positions 　•The legitimacy of knowledge producers and scenarios' builders is not always assured 　•A "leading voice" of historical institutions (nuclear industry & applied research) →**Robustness of the scenario-building process: instrumental, or deviant uses of scenarios** →**A necessary strong political support to foster academic research and R&D…** 　•Funding and managing the research →**… yet insufiicient and difficult** 　•No clear research strategy 　•Lack of expertise 　•Inter-temporal tensions *"Who is going to accept to spend tens of days, hundreds of hours on a subject that is not directly related to his constituency? Who will have the courage of backing it politically? EN scenarios are built in the long-term and another scenario thwarts it, which is the one of 'my turn', my election or my re-election. It's getting very tight!"*

■ **Nuclear power debates and scenarios: the perspective of each social world**

The 'I' social world	→**Scenarios central to this group**
	→**Key issue: the quality of scenario that are built**
	•The importance of characterizing precisely scenarios: the challenge of discussing explicitly the values and assumptions behind scenarios
	"There are scenarios at all scales with all perimeters; the important thing is to specify the scope in question. After this is a Russian doll game, there are scenarios of energy transition within which we can find electronuclear scenarios within which we can find scenarios related to the nuclear material balance."
	•Scenarios as a way to reach a convergence through the explicitation of values and assumptions
	•Policy-makers are responsible for explaining the values they want to promote
	→**An engagement towards building 'feasible', 'achievable' or 'realistic' scenario, opposed to 'normative' ones**
	→**The challenge of evaluating scenarios: towards a "police of scenarios"**
	→**the place and the role of scenarios in the decision-making, which is, according to the 'I' panel, threatened by the loss of legitimacy of institutional experts vis-à-vis the politics and civil society**

■ **Nuclear power debates and scenarios: the perspective of each social world**

The 'A' social world	→**A constant concern – all disciplines taken together – to be heard by civil society and politics**
	→**"simple" versus "complex" scenarios**
	→**The reliance to be placed on scenarios**
	• Often obscure or "black box" scenarios
	"We realized: 'but we can't do anything with it'! because we don't understand how they are built, to what question they answer, with what initial assumptions, and so, as we are a bit of scientists, we said: ' we can not be satisfied with that '."
	→**The key issue of evaluatio: an appeal for critical analysis, based on shared methodologies**
	"which experts to evaluate the experts?"
	→**The place and role of academics in this debate**
	• Identity-related tensions
	• An mabiguous relationship to industrials…
	• … and to policy-makers and politicians

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■ **The links between scenarios and policy-making according to 'P', 'I' and 'A' social worlds**

The 'P' social world	**→Decisions are often unrelated to scenarios** *"The sleight of hand through which we went from the GIF's reflections, Gen IV, to the launch of a specific reactor, which pleased the CEA ... A real sleight of hand. [...] All this makes one puzzled over the way in which we prepare for the future and I have the feeling that all this has been done regardless of the reference to any scenario whatsoever."*
The 'I' social world	**→A feeling of injustice : scenarios made by experts are not recognized at their fair value** *"The expert has never been so gagged, never eh! We take less and less into account his opinion! This is a subject of notable frustration!* *A2: That's a feeling ...* *I4: Yes, very deep!"*
The 'A' social world	**→Decisions are based on static images without any explication on the approach** *"The problem is the rendering of the policy-maker that has to take a decision. The politician sees only the final image, he sees the title, he sees "the scenario allows to say: 100% renewable, it's possible in 2050", good he retains only that, he does not see not that there is a whole way and that in this way there are pitfalls and that some pitfalls, we will not be able to pass them."*

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How to assess the value of scenarios?

Scenarios in the face of…
… values
… time
… authority
… conflict of interests
… skills & expertise
… legitimacy
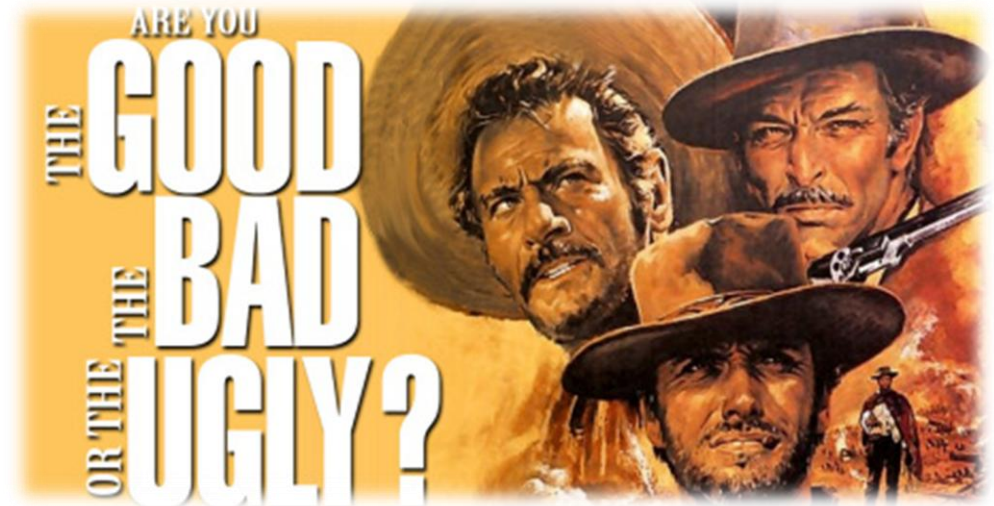
Image of a « good scenario » ?	
Scenarios making	Not trying to validate a predefined result (P) Spelling values on which scenario making is based out (I) Make scenarios with transparent and scientifically validated methods ®
Scenarios evaluation	Towards an increasing role of existing institutions: OPECST, CNE (P) Towards a « police of scenarios » (I) Towards a critical methodology of scenario analysis ®
Use of scenarios	Supporting a rational decision-making process (P) Bringing realistic and feasible answers to policy decision-makers (I) Improving knowledge and opening new avenues ®

Image of a « dominant » scenario	
Scenarios making	Monopolization of resources and data
Scenarios evaluation	Absence of evaluation and strategies aimed at preventing discussion
Use of scenarios	Defense of a « one best way » (P / I) Excluding and preventing any debates with the nuclear sector ®

Image of a scenario to manipulate	
Scenarios making	a scenario built on "hidden" hypotheses and implicit methods A too complex scenario ®
Scenarios evaluation	Absence of critical analysis An evaluation work nearly impossible because of the complexity of scenarios
Use of scenarios	Instrumentalising & manipulating Validating a predefined result or justify an already made decisions Deciding nothing

Meta category	Example of scenarios' uses
Scenarios as boundary-objects: Inter-disciplinary and inter-organizational cooperation →more informed decisions through knowledge transfer & translation	Building arguments / shared narratives Deconstructing rhetorics Exploring the future Showing what is impossible… Provoking awareness Supporting fundings
Scenario as an instrumental tool: Reinforcement of boundaries between social worlds, no knowledge transfer	Telling the « one best way » Answering to a question versus validating the desired results Justifying decisions that have already been made Postponing decisions / Not deciding

■ **Organizational and professional conditions**
- o Power relations: leading voice, leading technological way
- o Key role of political and public organizations (OPECST, CNE) and actors
  - o Inter-temporal tensions between the worlds of politics & nuclear technologies' development
  - o Turn-over of political actors: the issue of skills' construction and maintenance → no long-term strategies
- o The normalization of evaluation processes

Christian Bataille,
député porteur de la première loi sur le nucléaire

3

L'entrée dans
le champ démocratique :
la loi Bataille de 1991

DONNER SON NOM À LA PREMIÈRE LOI SUR LE NUCLÉAIRE?
CHRISTIAN BATAILLE NE L'IMAGINAIT CERTAINEMENT PAS QUAND
IL A FAIT SON ENTRÉE AU PARLEMENT EN 1988. IL S'EST VITE
INTÉRESSÉ À LA QUESTION NUCLÉAIRE, QU'IL A SUIVIE (ET SUIT

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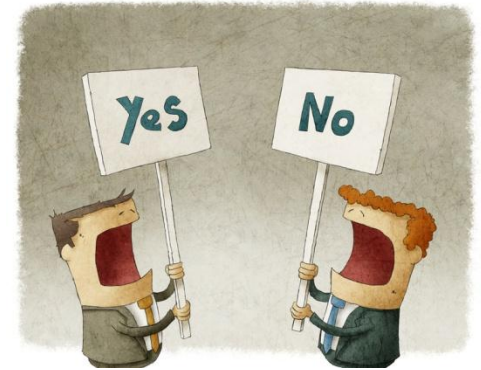Bretagne-Pays de la Loire
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4. CONCLUDING REMARKS

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■ **The importance of time & temporalities → how do past and projections into the future, influence present actions and decisions? And conversely, how, in present times, are past and future built or rebuilt?**

■ **The issue of uncertainties, unforeseeable things linked to nuclear power and its future → towards resilient scenarios or scenario-building processes?**

■ **Questioning further:**

  o the French singularity?

  o the nuclear singularity?

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Questions?

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An event: 3rd International AGORAS Conference

Governing risks beyond the "here & now"

23 – 25 Octobre 2019, Cité des Congrès, Nantes

Come and join us for this event!

Some publications

❑ Eydieux, J., Journé, B. et S. Tillement (2017). High-reliability organization seen through interstitial activities. *Gérer et Comprendre* English Language Online Edition (2): 1-11

❑ Eydieux, J., Tillement, S. et Journé, B. (2018). Discuter la sûreté et sa démonstration : négocier ce qui fait preuve. *Négociations,* (30), pp.37-52.

❑ Journé B. & Tillement S. (2016), « La construction d'une performance industrielle sûre : le cas du nucléaire ». In F. Meyssonnier et F. Rowe (Ed.) Organisation, Information, Performance. Presses Universitaires de Rennes.

❑ Tillement, S., Garcias, F., Minguet, G., & Duboc, F. C. (2019). Disentangling Exploitation and Exploration in Hybrid Projects: The Case of a New Nuclear Reactor Development. *Project Management Journal*, 8756972819870343.

❑ Tillement S., J. Hayes (2018) Maintenance schedules as boundary objects for improved organizational reliability. *Cognition Technology and Work,* DOI:10.1007/s10111-018-0530-y

❑ Tillement S. et Gentil S. (2016), Entre arrangements et empêchements dans le nucléaire: une analyse par l'activité de la coordination au travail. *Sociologie et sociétés*, 48(1), pp. 117-142.