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MOOK: The Knowledge Management Method Applied to a Gen IV Project. The Continuation of a Successful Story

Mr. Gilles Rodriguez

CEA, France

02 November 2023

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Meet the Presenter

Mr. Gilles Rodriguez is a senior expert engineer at the CEA/CADARACHE. He has been a project manager in GEN IV collaborations and international affairs since January 2022.

He graduated from the University of Lyon, France in 1990 (Chemical Engineering) and earned a Master of Science in Process engineering in 1991 (Toulouse).

He joined the CEA/CADARACHE in 1991 in support of Phénix and SUPERPHENIX operation (Fuel and Component Handling) & RAPSODIE decommissioning. He moved in 2004 to Japan to work on the Monju reactor as the CEA representative.

From 2005 to 2008 he worked on the coupling of Gen IV High Temperature Reactor with Hydrogen Production Process. From 2008 to 2013, he was Project Leader of sodium technology and components. From 2013 to 2019, he joined the CEA project on Sodium Fast Reactor: ASTRID (Advanced Sodium Technological Reactor for Industrial Demonstration), first as responsible of the Nuclear Island, then as Deputy head of the ASTRID project team (2016-2019). He served as Technical Director of the Generation IV International Forum from May 2019 until December 2021.

During his career, Mr. Rodriguez has contributed to over 120 scientific publications dedicated to GEN IV systems; hydrogen production; coolant performances and technico-economy. Since 2018 he has also been involved in Knowledge Capitalization innovative methods, winning in 2021 two awards for innovative Knowledge Management technique development and promotion.

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1.

What is Knowledge Management?

What is Knowledge Management ?

The most conventional

« KM: Knowledge management is the process by which an enterprise gathers, organizes, shares and analyzes its knowledge in a way that is easily accessible to employees. This knowledge includes technical resources, frequently asked questions, training documents and people skills. », Ourouk

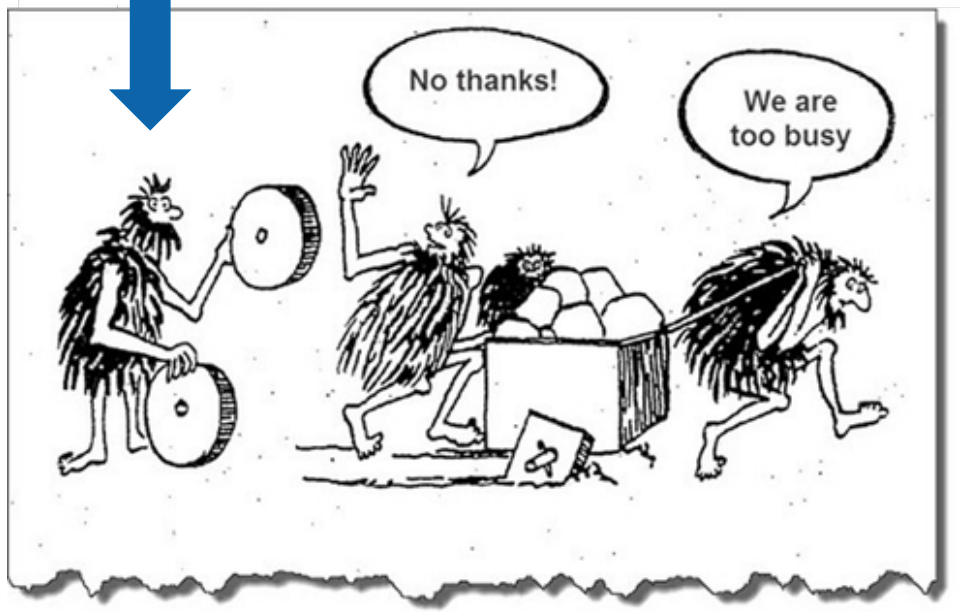
More pragmatic (It's lived !)

« Knowledge Capitalization is dedicating a fragment of your time today to fight against the dangers that the erosion of your knowledge could cause tomorrow. » (G. Rodriguez, Clefs CEA, 2020)

… done collectively, with method, including a large proportion of agility and a big toolbox! (Gilles Rodriguez supplement 2022)

Why is Knowledge Management so important now ?

- The nuclear renaissance we are living in many countries will need a significant increase of manpower and young generation.
- But how can we guaranty that this new generation will gain the most and the best from the olders and from the huge experience already gained from GEN IV reactors?
- How can we use methods being attractive, innovative, efficient and time saving?
- How can we apply these KM methods to all persons: experts, technicians, scientists, head of project, and with all GEN IV systems?
- How to convince people that Knowledge is the most valuable treasure they could gain?



Me as GIF (old) members sometimes in front of some Advanced Modular Reactors promoters ? (Just my personal feelings !!)

Why is Knowledge Management so important now ?

- Because our society and our companies are quickly changing and it is not in a way to simplify the Knowledge Preservation and Transmission.
- Before COVID, the cheapest efficient KM tool was the Coffee Machine to exchange with your colleagues => Since COVID the Coffee Machine is almost an empty space because of teleworking !
- Before COVID you may rely on old experts who get everything in their brain, their office, their computer => But since COVID the Big Quit phenomena has really increased. Who will stay more than 20 years in the same company, doing the same job?

- In the nuclear reactor field, projects are lasting more than a life: 5 to 8 years design / 10 y construction / 40 to 60+ y operations / 10 y decommissioning
- SMRs and AMRs are based on a series effect, but what if there is a big gap between two reactors construction? What about the supply chain?
- A.I. will all save us from our ignorance! But A.I. is only funding its intelligence on the data you put inside. If poor Knowledge is provided, A.I. will provide you poor answers.

Me when working at home. In this situation do interactions with my colleagues seem to be of first importance? Not really ! (Just my personal feelings !!)

KM attitude: Everybody can make personal improvements!

A KM based company is a paradigm shift:
Move from the squirrel attitude towards the meerkats !

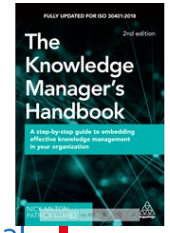
I am living in a silo attitude, and I am not sharing what I know

Table 19.1 The KM paradigm shift

From	To
I know	We know
Knowledge is mine	Knowledge is ours
Knowledge is owned	Knowledge is shared
Knowledge is personal property	Knowledge is collective/community property
Knowledge is personal advantage	Knowledge is company advantage
Knowledge is personal	Knowledge is inter-personal
I defend what I know	I am open to better knowledge
Not invented here	If it's from a credible source, we should use it
New knowledge competes with my personal knowledge	New knowledge improves my personal knowledge
Other people's knowledge is a threat to me	Shared knowledge helps me
Admitting I don't know is weakness	Admitting I don't know is the first step to learning

I know I am living in a community, and I am dedicating a part of my time to be in alert of the potential risk of knowledge loss

Réf :
Chap. 19 de



2.

Short recap of the ASTRID project at CEA

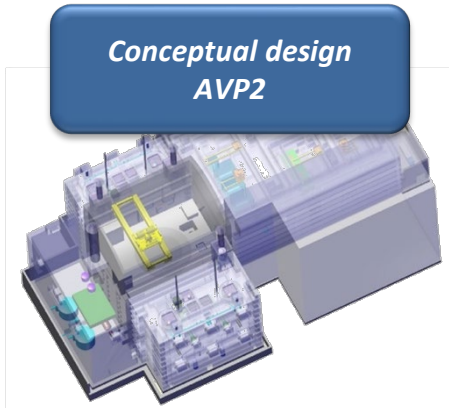
ASTRID PROJECT IN A NUTSHELL

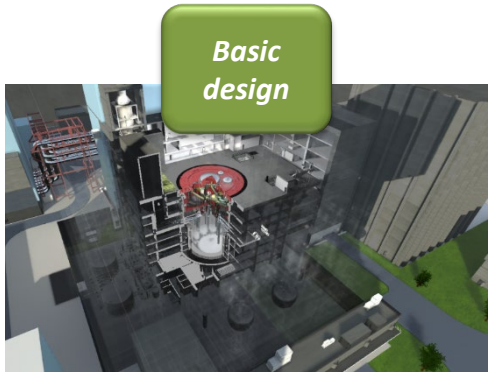
- From 2010 to 2019 a governmental multi-partners project gathering 15 companies and leaded by CEA (650 persons at its maximum).
- Designing an SFR reactor with the past SFR reactor knowledge but injecting innovations.
- Dedicated to electricity production and innovations to enhance safety and performances.
- Stopped in 2019 at its basic design phase. In 2018 we shifted to an ambitious KM process.

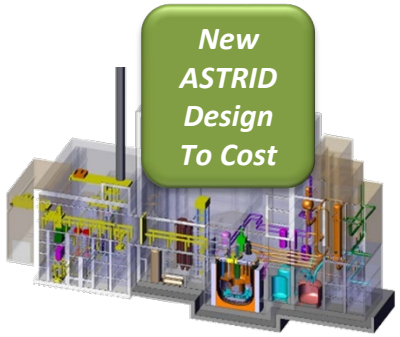
ASTRID for Advanced Sodium technological Reactor for Industrial Demonstration

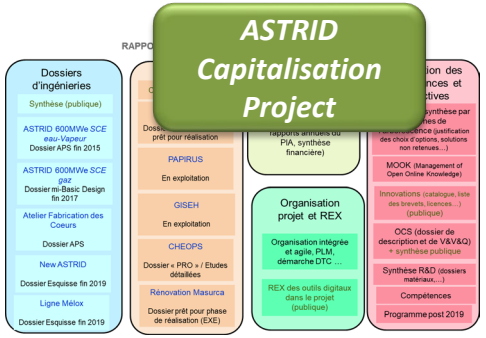
ASTRID PROJECT schedule: 2010-2019

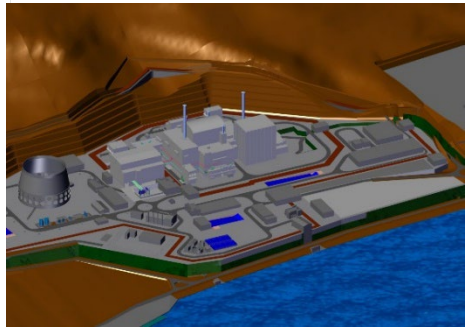
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Phases	Preliminary phase	Pre Conceptual design AVP1		Cost Killing	Conceptual design AVP2		P2C	Basic design	New ASTRID DTC	ASTRID capitali-sation phase

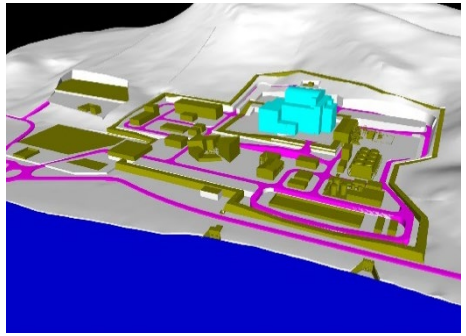










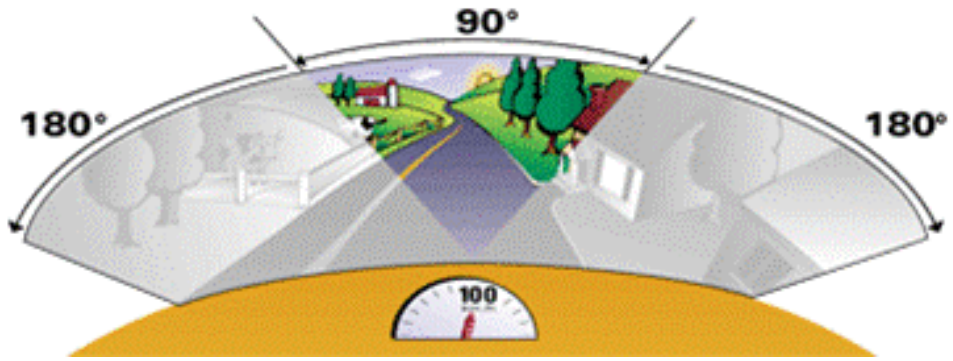


3.

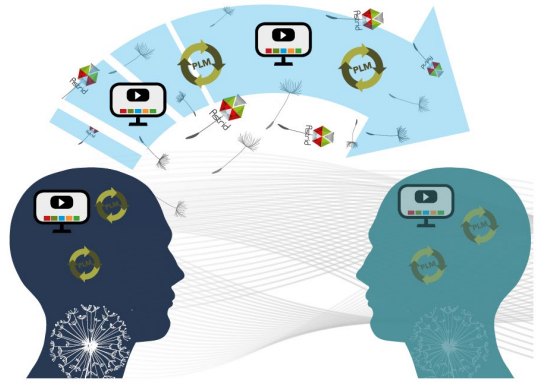
Making KM on the ASTRID project: what was the process?

Some basic ideas starting the KM process on ASTRID project

- Apply KM process to highlight the value of the actors and keep them engaged until the end of the project (KM is not a constraint, it is fun!!).
- Let's have the support of KM experts to get advices all along this adventure.
- Insist on project and studies contextualization.
- Let's use the video as a tool to simplify Knowledge Capitalization & Transmission.



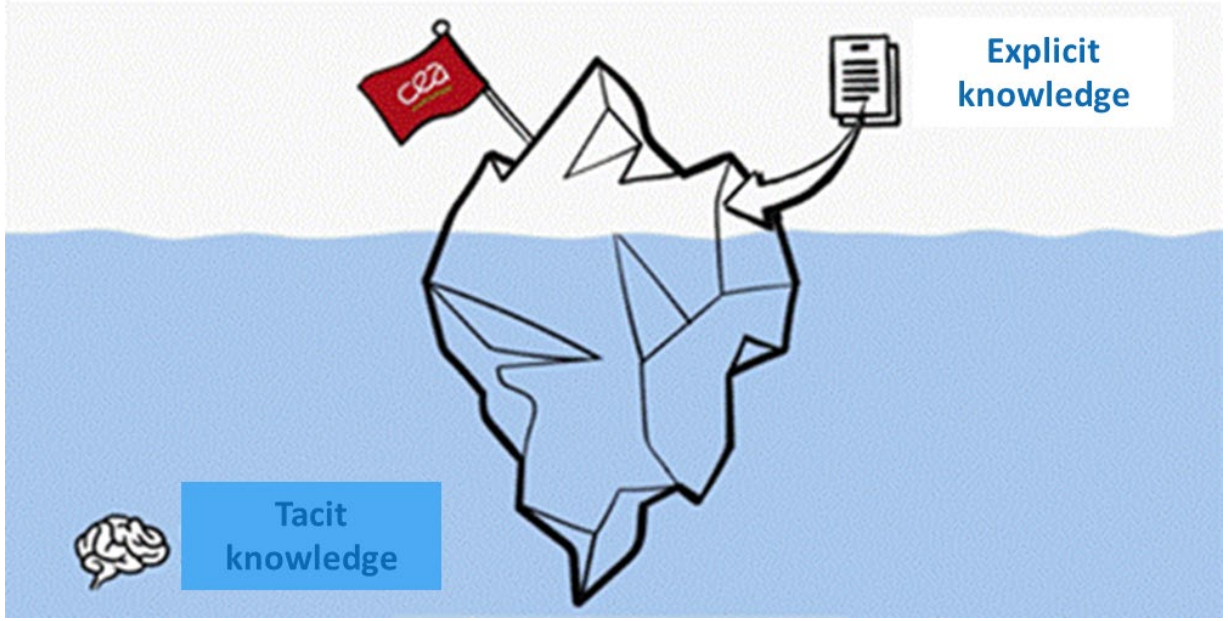
In a project – as in a car - when you are running fast, your viewing angle is shrinking



When you are doing KM, for a safe transmission, you have to re-open your viewing angle

Why using video recording for KM?

- We wanted some innovative tools and not asking the ASTRID team only to write their Testament.
- Apply KM process to highlight the value of the actors => in a video recording there are putting valuable footprints: image + voice.
- Young generations are no longer reading books, they are watching videos!
- We have taken the best interesting feedback: Open courses on Youtube / The GIF Webinars were precursor too (Thank you Patricia).
- A free talk is a better way to “extract” Tacit knowledge.



WHAT IS MOOK? MOOK = MANAGEMENT OF ORGANIZED ON-LINE KNOWLEDGE

M O O K

Management

Organisation of information

Knowledge Capitalization

Knowhow Capitalization

Methodology for the organisation of information

Link towards recommended written docs

Organized

Understandable by a technical identified audience

Interactives videos

Secured numerical access (it is not Youtube videos!)

Organized to ease knowledge transmission for those who need to gain this knowledge

On-line

Electronic Supports

On-line but with restricted access

Taken into account the IP defined during the project

Knowledge

I know…
…today,

Thus I am…
…the owner of a Knowledge,

And I will be…
…in a video,

So he (or she) will know.
…what I knew!

The video is the first KM connection, the written documents and deliverables are linked to go deeper in knowledge

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The MOOK in 5 steps

- **Step 1: Realize a selection of the material needed**

This first step selection is done jointly by all the teams project to define which subjects will require MOOKs, which will require only a synthesis report, which will need both. In addition we defined the list of interviews of key persons we wanted to record.

- **Step 2: Prepare your .ppt presentation**

Every expert has to prepare its PowerPoint format (.ppt) presentation: the backbone of the future MOOK. The preparation of the .ppt presentation has to respect strict rules.

The whole .ppt presentation should represent a total of 20 to 40 slides max, allowing a video recording duration of 30 to 50 minutes maximum.

The MOOK in 5 steps

- **Step 3: Record your video-presentation**

The video recording can be done in two manners:

You can do it in your office using a specific tool of PowerPoint Microsoft Software where you can record in video mode your own .ppt presentation in slideshow mode. By this way the expert can record its own video-presentation in his office. You can also do it in a dedicated video lab.

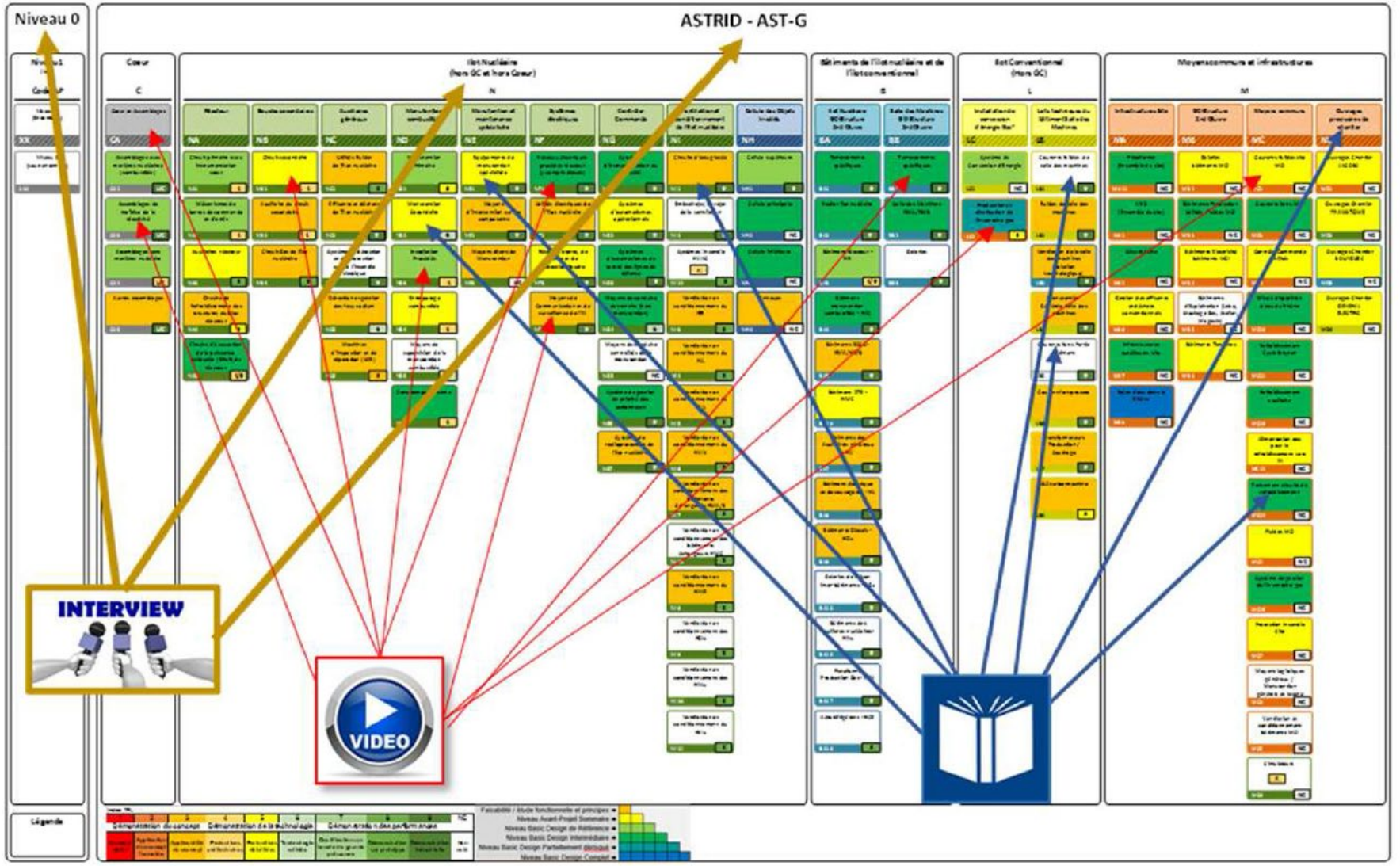
- **Step 4: Do the video "cleaning" and chaptering**

The phases of video-cleaning and chaptering were done with a small, cheap and easy-to-use software: CAMTASIA (used by the Youtubers to touch up their videos). The obtained material is a video-recording done by an expert, 90% of the job have been done.

- **Step 5: Implement the video inside the database and realize the trace links with all the recommend documentation and deliverables**

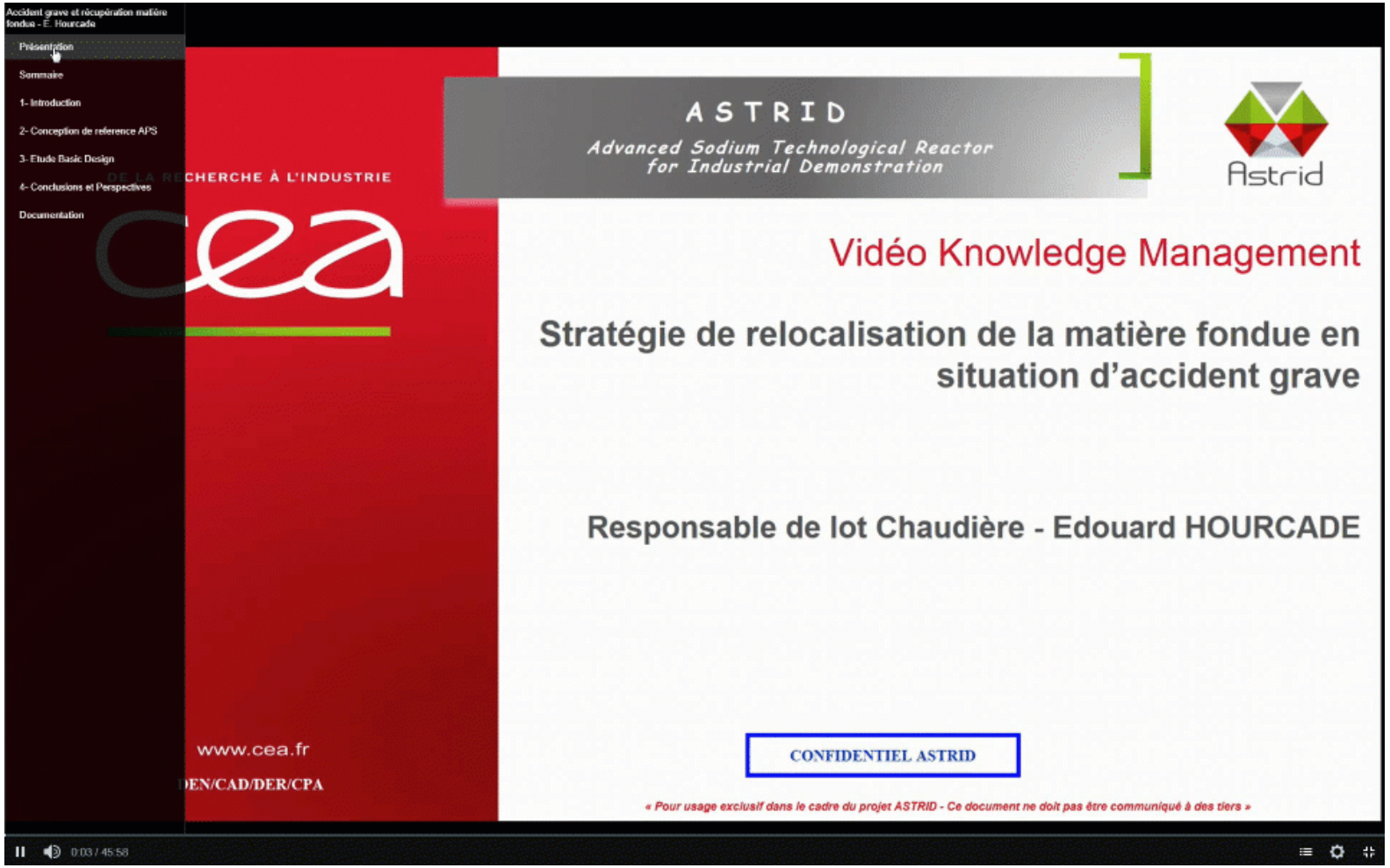
This final step is devoted to address the post-treated video in the PLM Software. The most important now is to realize the trace link between this video positioned in the project PBS and all the related documents recommended by the expert in its video. This net positioned inside the PLM Software is the final material called MOOK. Now the MOOK network is created!

Step 1 – Selection of the knowledge actions



Step 3 – The recording (done in 1 shot)

Step 4 – Post treatment => The Chaptering



A MOOK after chaptering

MOOKs: Several means of doing them but with the same rules

The KM initiative feedback

- The Project Result: In less than one year the ASTRID Project was able to define its own KM Methodology assessed on-line by KM French experts.
- It was produced more than a hundred of MOOKs realized by CEA actors and by partners.
- These MOOKs are all interconnected inside the ASTRID database according to the Project Product Breakdown Structure.
- They are therefore realizing a rich network (High Level GPS Project) with about 2000 documents highly rated and recommended by the experts. These 2000 documents were pre-selected by the experts among the 25000 documents produced by the project during its whole duration.
- The Easy-to-do MOOK tool appears to be the most convenient way to allow experts to transmit their knowledge. It is simpler and less complicate than writing “Academic Knowledge Capitalization synthesis reports”.
- For the young generation it is a smart approach : It is much more fun and efficient to start watching videos, than being lost in an electronic library with some keywords for the documentation search.

4.

Doing KM on ASTRID and after the ASTRID project: the beginning of the successful story

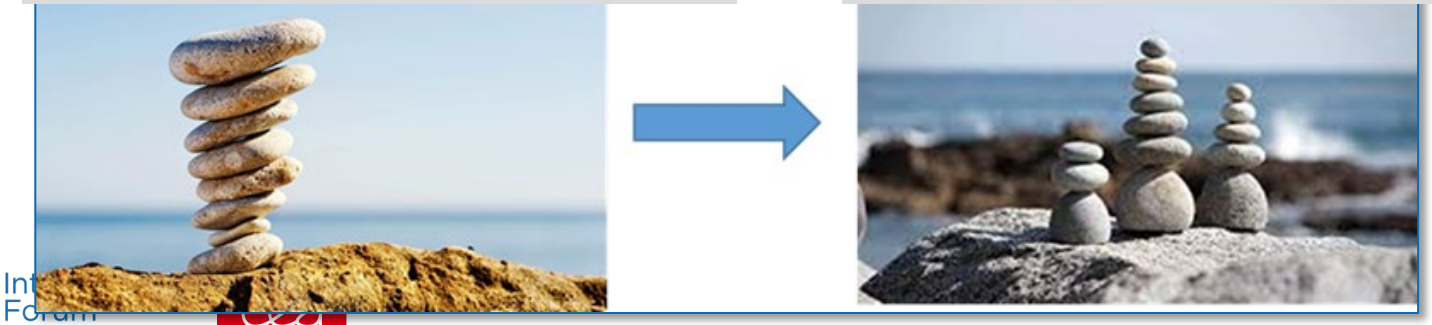
The Knowledge Management at CEA => From an experimental phase towards a strategic program

- **2018-2019 => Starting a Knowledge Management phase at the end of the ASTRID project**
  - Creation of more than 100 videos (MOOKs) all interconnected in a dedicated database network.
  - All the team have played the game with enthusiasm => proud to appear in this heritage!

- **2020-2023 => Confirm the first tries**
  - Communicate on this Bottom-up experience: Conference, Publications, articles, create a KM network inside and outside CEA, …
  - Try to be recognized for this effort: 2021 SFEN Price, 2021 Award on KM initiative at World Nuclear Exhibition (WNE).
  - Extend this initiative to other CEA domains (from Bottom-up to Top-Down).
  - Continue to Explain / Disseminate / Convince about the Key role of KM and operate KM actions.

From bottom-up initiative

To a Top-down strategy

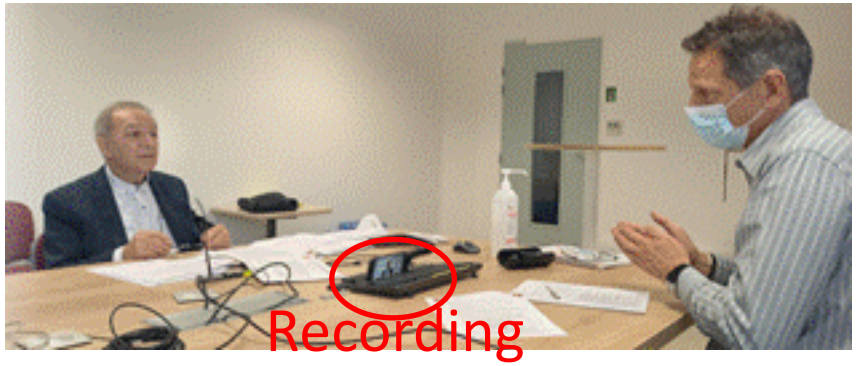


The MOOK tool is now designed and adjusted to many CEA situations

Debriefing session at CEA after viewing a MOOK on the Balance Of Plant. On the left the new team of designers, on the right the "alumni" of the ASTRID project

Recording of a CEA technician close to retirement explaining how he is operating his facility

All the OSIRIS Team ready for KM actions



A CEA retired employee (on the left) during a MOOK interview session (André = all in the head and its office is overcrowded !!)

A soon CEA retired employee during a MOOK interview session with its colleagues (Jean-Pierre = very well structured but with a huge Knowhow)

Christian Latgé a former GIF expert for its 1st day in retirement !

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A large communication of this KM initiative: winning two prizes has largely increased the audience and the network

Le temps, un élément capital pour la gestion des savo

— Le CEA mène des programmes de recherche et d'innova
préparer le nucléaire du futur, en ayant à l'esprit que les réali
industrielles dans ce secteur se préparent sur des temps lor
longs et qu'elles mobilisent des compétences multiples da
sciences de l'ingénieur (phase amont), de l'ingénierie et aus
industriel (phase de réalisation). La capitalisation du savoir es

Dès lors, comment s'assurer d'une gestion du savoir mieux organisée qu'une simple bibliothèque électronique de documentation ? Comment garantir l'accessibilité des informations aux générations qui concerne un domaine
sente la même structure
termes de durée, de canev
30 planches) et de donnée
à 30 documents permettar

AUTEUR
Gilles Rodriguez
(Direction des énergies)
Directeur technique du Génération IV International Forum (GIF).

Zoom sur

MOOK : un outil contre l'érosion du savoir

Comment préserver dans le temps un ensemble sûr de connaissances permettant le redémarrage rapide et efficace d'un projet dans un futur proche ou lointain ? La question s'est imposée à la fin du projet de prototype à neutrons rapides ASTRID, bien que la problématique intéresse plus largement la filière nucléaire. Pour y répondre, le MOOK, un outil numérique de capitalisation du savoir (*Knowledge Management* (KM)) a été développé dès 2019 et rapidement déployé.

Par la rédaction, Sfen

Le nucléaire est une industrie qui s'organise sur le temps long, aussi bien concernant l'exploitation des réacteurs que les activités de conception ou de recherche et développement (R&D). Assurer la transmission des savoirs et des compétences est l'un des enjeux majeurs de la filière pour laquelle un programme peut durer plusieurs décennies et concerner plusieurs projets interconnectés. « Capitaliser la connaissance c'est dédier aujourd'hui une partie de son temps à combattre les méfaits que l'érosion de notre savoir pourrait causer demain », résume Gilles Rodriguez, Directeur technique au Forum international Génération IV (GIF, en anglais) pour le Commissariat à l'énergie atomique et aux énergies alternatives (CEA). Le projet s'est arrêté au stade d'avant-projet de plusieurs variantes : deux puissances de réacteur (600 MWe et 150 MWe) et deux types de systèmes de conversion d'énergie (eau vapeur et gaz-azote). L'objectif de fermeture du cycle du combustible avec ce type de réacteur étant repoussé à la seconde partie du siècle par la feuille de route énergétique du gouvernement – la Programmation pluriannuelle de l'énergie (PPE) – la question de la sauvegarde et de la transmission du savoir s'est donc imposée. Le MOOK est l'une des réponses des parties prenantes, le CEA, Framatome, EDF et Bouygues Construction service nucléaire, à cette nécessité de préserver les acquis du projet.

Le MOOK a été développé en 2019 dans le but de capitaliser – c'est-à-dire collecter, partager,

Un MOOK, c'est quoi ?

Le MOOK est « une méthode pérenne de capitalisation des savoirs d'un projet nucléaire multipartenaires ». Le terme fait bien sûr référence au MOOC qui désigne un cours en ligne ouvert au grand public : *Massive Open Online Course*. Ce dernier permet, via des cours en mis à disposition depuis un serveur protégé car destiné uniquement à ceux qui ont à en connaître (car il faut transmettre le savoir tout en protégeant ce savoir et les savoir-faire). Et la lettre « K » pour *Knowledge* représente le cœur du sujet : le savoir.

« La genèse du projet remonte à 2017, se remémore Gilles Rodriguez. Nous avions alors reçu de très bons retours de nos webinaires interactifs conçus pour le Forum international GEN IV et ces webinaires nous ont grandement inspirés pour la conception du MOOK. De plus, plusieurs acteurs du projet ASTRID était déjà des consommateurs de MOOC. Enfin le constat était établi que les jeunes générations « consomment » aujourd'hui plus de support vidéo que de sup- donc vers le support vidéo pour transmettre le savoir de manière efficace et agile, et dès le début 2019 des vidéos sont tournées.

Préserver le savoir et son cheminement

L'objectif du MOOK est d'offrir davantage qu'une simple bibliothèque électronique de documentation, grâce à l'imbrication des vidéos d'experts et d'une série de documents précisément sélectionnés parmi des milliers. Les vidéos, de 30 à 60 minutes chacune, sont réalisées avec un support de présentation ou sous la forme d'une interview dirigée. Elles sont organisées de manière à toujours contenir certains éléments comme l'avis de l'expert sur le retour d'expérience, une liste de rapide à l'ensemble des sujets et des sous-sujets abordés, le MOOK trouve sa place dans une arborescence de contenus.

L'un des apports majeurs de ce format est la transmission dynamique du cheminement opéré à l'époque du projet abordé et des résultats, de façon que l'utilisateur du MOOK, même des décennies plus tard, comprenne le déroulement du projet et les raisons ayant conduit à l'adoption d'un choix technologique ou la méthodologie d'un calcul par exemple. Il y a un effort important de concrétisation des résultats présentés, ce qui permet de les justifier dans un environnement et des contraintes spécifiques. Ce dernier point est un facteur essentiel pour la reprise rapide d'un projet : un manque de clarté sur les mo-

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REGULAR ARTICLE — OPEN ACCESS

The knowledge management on the design of a generation IV sodium fast reactor project at CEA. The case and methodology applied on the Astrid project

Gilles Rodriguez[1,*], Philippe Amphoux[2], David Plancq[2], Edwige Richebois[2], Frédéric Varaine[3], and Philippe Bigeon[4]

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[2] CEA-DES Cadarache, IRESNE/DER/SESI, Saint Paul lez Durance, France
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Décerné à

G. Rodriguez, N. Devictor, P. Amphoux, E. Richebois, J.-M. Hamy, A. Dauphin, D. Settimo, F. Peysson

Pour le nouvel outil

« MOOK* Une méthode pérenne de capitalisation des savoirs d'un projet nucléaire multipartenaires - La dynamique de déploiement de cette méthode »

**MOOK : Management of Organized Online Knowledge*

Valérie Faudon,
Déléguée Générale

Philippe Dubuisson,
Président du Jury

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Your Presenter: Mr. Gilles Rodriguez, CEA, France
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Webinar #83: MOOK: The Knowledge Management Method Applied to a GEN IV Project. The Continuation of a Successful Story.

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5.

What are the plans lessons learned for the future?

Lessons learned and going beyond

I confirm!

2021: WNE Award Winner,

2023: Member of the WNE Jury on Skills & KM => Extend the network, learn from new innovative KM projects.

1. Be convinced that Knowledge Management is saving time & money. Then disseminate this message in your company to convince your staff. You will need their sponsorship.
2. Adopt the meerkat attitude, then find your tribe to create your community of practice (inside and outside your company).
3. Communicate on any success stories and good practices to increase the visibility of your actions and to recall that they are valuable actions => you are making daily efforts to save the time and money of your company.
4. KM is a wonderful framework for innovations. The new paths I intend to investigate for CEA: AI connected with all MOOKs, creating a Serious game on KM (name “KM Changer”), and creating KM in podcast to be listened during public transportation.
5. Trust to your KM Network. It is a collective effort: “Alone you may go faster, but together we will go further.”

Thank You for your attention!

> *"The transmission of knowledge is the only thing that allows humanity to progress, from generation to generation, leaving an indelible mark on the path to the future."*
>
> **A. Einstein**

For more informations if you wish to know more about KM actions: please contact me at gilles.rodriguez@cea.fr or follow me on Linkedin

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Upcoming Webinars

Date	Title	Presenter
18 December 2023	Characterization of U-233 for Thorium Fuel Cycle Safeguards	Madeline Lockhart, North Caroline State University, USA
31 January 2024	Revolutionizing Nuclear Engineering Education: Developing Virtual Labs for Neutron Detection, Geiger Counter, and Reactor Experiments	Jonah Lau, Purdue University, USA
28 February 2024	Analysis of the Reactivity Loss of the Phenix Core Cycles for the experimental validation of the DARWIN-FR Code Package	Victor Viallon, CEA France