

Digital Tools for Safeguards: The French TSO's Point Of View

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Abstract :

Technical support organizations' (TSOs) roles are mainly to provide technical expertise to State's nuclear safety regulator but they assist also national authorities for international safeguards implementation. Development of digital tools in this area is time saving and of major help to fulfil the various commitments in the frame of international safeguards agreements.

In France, the Non-Proliferation and Nuclear Material Accountancy Department (SNPC) of IRSN (Radioprotection and Nuclear Safety Institute) is the TSO that provides support to the French authority in charge of monitoring the implementation of international treaties of non-proliferation (CTE). Its four main activities consist in advising the French Authorities (CTE) and assisting the operators, managing declarations, escorting international inspections and assessing documentation. The SNPC department has developed many tools over the past years, presented in this paper, to gain in efficiency in its activities:

- *a tool dedicated to nuclear material declarations called GAUSS that collects and processes accounting data for the declarations linked to the safeguard agreement INFCIRC/290, to voluntary agreements INFCIRC/415, INFCIRC/549 and to bilateral agreements;*
- *a web-portal for the French Additional Protocol declarations called PASTEL developed for data collection and compilation process;*
- *a software called OSEILLE for the management of information related to inspections performed in France by EURATOM and IAEA (notifications, count of efforts, statistics, observations during inspections...);*
- *two web-portals called PIMENT and CENTIME and one application called GENIE for the gathering of data related to transfers of nuclear material, processing of this data and transmission of the notifications to the competent authorities.*

Key words: digital, tool, France, TSO, Additional Protocol, accountancy.

1. Introduction

In France, the Non-Proliferation and Nuclear Material Accountancy Department (SNPC) of IRSN (Radioprotection and Nuclear Safety Institute) is the technical support organization that provides support to the French authority Euratom Technical Committee (CTE) in charge of monitoring the implementation of international treaties of nuclear non-proliferation.

The four main activities of SNPC department consist in advising the CTE and assisting the operators, managing declarations, escorting international inspections and assessing documentation. The SNPC department has developed several software IT tools over the past years, presented in this paper, to gain in efficiency in its activities. It is of particular importance given the number of nuclear operators and the quantity of data to deal with to fulfill the international commitments taken by France. Indeed, the field of nuclear energy in France covers the full nuclear full cycle as well as many research facilities.

2. GAUSS - Declarations

The first tool developed almost 20 years ago is a tool dedicated to nuclear material accounting declarations. This tool, called GAUSS, collects and processes accounting data for the declarations linked to multiple French commitments in the safeguards area. It has been upgraded over the time and includes today features to produce reports for:

- INFCIRC/290: the safeguard agreement between France, EURATOM and IAEA;
- INFCIRC/415: the offer to provide additional information on production inventories and international transfer of thorium and uranium concentrates;
- INFCIRC/549: the offer to provide information on plutonium and highly enriched uranium inventories;
- bilateral nuclear cooperation agreements between France and Australia, between France and Japan;
- several internal annual reports for the French authorities.

As can be seen on figure 1, GAUSS allows to integrate data from different sources. It includes data from international accountancy such as Inventory Change Reports (ICR) as well as data from national centralised accountancy. The software then generates accounting reports for declarations linked to international agreements listed above based on computation of integrated data.

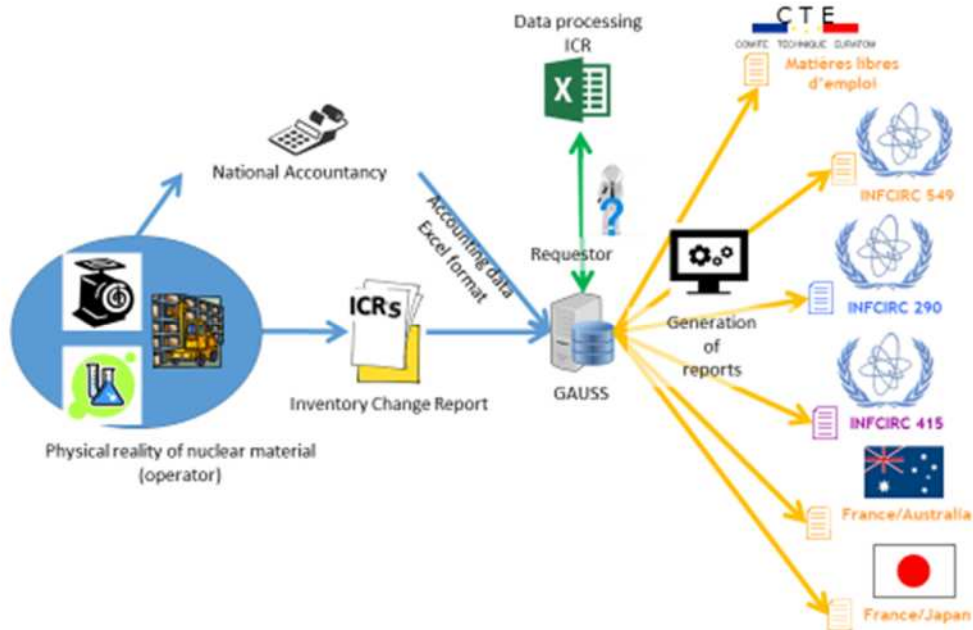


Figure 1 : Presentation of GAUSS inputs/outputs

The code, that has been upgraded regularly, processes the data and saves a huge amount of time to elaborate the declarations. It bounds links between data tables and allows to sort and select the data. For instance, to elaborate the monthly inventory reports, the tool is able to distinguish materials according to the agreements they are subject to. The reports produced can be downloaded as excel files.

A query tool is integrated to the software. It is a key component, very helpful for precise search as various parameters can be selected (type of operation, MBA, period of time, type of product ...). It is used for the verification of declarations but also for several questions that can arise from EURATOM controls in the field, for transit-matchings demands from IAEA, for analysis and reports. Each month, the database is supplied by the monthly data and backed up, therefore the query tool allows to search for data over the last 15 years.

The accounting tool GAUSS is therefore a software that helps to produce reports for declarations linked to international agreements and for national annual reports. Among the main advantages of this software, there is a reduced risk of errors for accounting data while recopying figures or computing and a huge time saving.

3. PASTEL – Additional Protocol

The CTE is in charge of drawing up the French declaration to submit to the IAEA under the terms of the French Additional Protocol INFCIRC/290/add.1. IRSN contacts French industry players (universities, research institutes, nuclear companies) quarterly and yearly through calls for declarations, informs them of their obligations, helps and assists them and collects their declarations.

For this purpose, IRSN has published a declaration handbook, enabling industry operators to determine whether they are concerned or not by the Additional Protocol and, if so, to draw up their declarations. An online declaration portal was also developed in 2014 to enable industry players to submit their declarations online. This web-portal is called PASTEL.

The purpose of PASTEL is, on the one hand, to collect declarations from industry operators, on the other hand to process these declarations in order to establish annual and quarterly French declarations.

The PASTEL web-portal is open during defined periods by the administrator for annual and quarterly declarations. During these periods, operators connect to PASTEL website, fill out their contact information, the useful information on the site required in case of complementary access, and the closing periods of their facility.

Then, operators can chose between several forms that refers to the different paragraphs of article 2 of the French Additional Protocol that look for the provision of information on activities carried out in cooperation with non-nuclear-weapon States (NNWS):

- form A (article 2.a.i): nuclear fuel cycle related public research and development activities;
- form B (article 2.b): nuclear fuel cycle related private research and development activities;
- form C (article 2.a.viii): planned cooperation activities with a NNWS for the next ten-year period relevant to the development of the nuclear fuel cycle;
- form D (article 2.a.vi): imports and exports from and to a NNWS of conditioned waste;
- form E (article 2.a.iii): manufacturing of Annex I non-nuclear material and equipment;
- form T (article 2.a.vii): exports of Annex I and II non-nuclear material and equipment to NNWS; this declaration is the only one made quarterly.

The software saves in its database the entry lines of the previous declaration period and suggests them to the user to ease the declaration.

IRSN agents can manage the list of the operators who made declarations, activate / block declarations, consult the progress of declarations by reporting parties, process declaration forms, enter declaration lines for an entity and generate the French declaration for additional protocol, to be transmitted to the CTE, before final transmission to the IAEA (figure 2).

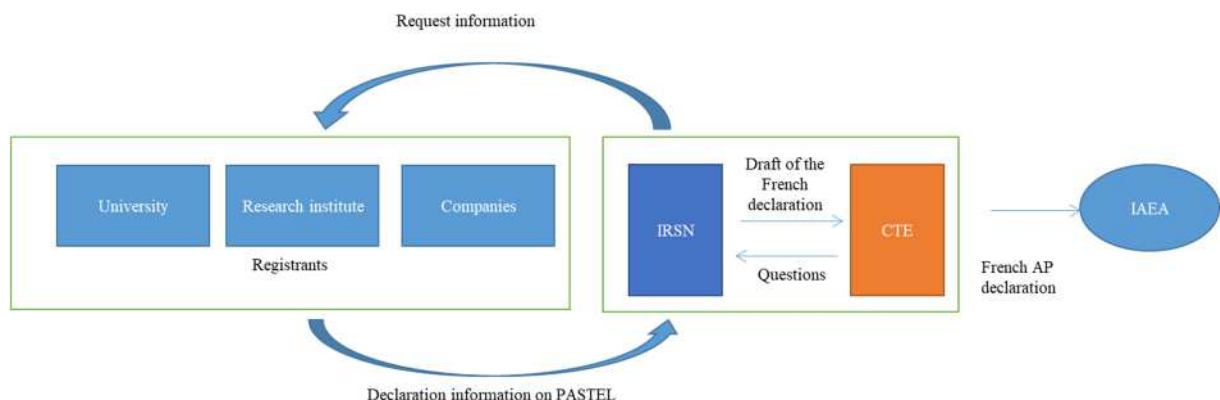


Figure 2 : Circulation of information for French Additional Protocol

PASTEL shows many advantages for the different players. The tool enables avoiding paper declarations and their inconvenient (paper waste, mail post delays or even loss). The implementation of this IT tool permitted the standardization of the declaration format for the contacted entities in accordance with suggestions from the Agency. It is also time saving for the operator (the declaration can be filled in even at the last delay before the closure of the

declaration) and for IRSN (data is instantly collected and ready to be gathered for the declaration). It is important as France declares yearly several hundreds lines. This web-portal has improved the efficiency of IRSN for the French declaration for the Additional Protocol. More information about the French Additional Protocol and the PASTEL portal can be found in the article number 1572 of INMM & ESARDA Joint Virtual Annual Meeting of 2021.

4. OSEILLE – Inspection notifications

A software called OSEILLE has been developed for the management of information related to inspections performed in France by EURATOM and IAEA (notifications, number of person-day of inspection, statistics, observations during inspections...). This software is operational since November 2020 and replaces and unifies small old software units.

The software is build up as two modules:

- the first one contains a list of all the French facilities and their material balance areas (MBA). It associates to this list the applicable documentation and the regulatory references: documents describing the technical characteristics of the facility due by the operator under EURATOM regulation (design information), control application documents (particular safeguards provisions) ;
- the second one records the inspections and their associated data (notifications, follow-up).

A process is set up for the management of inspections. When an advance notification is received from the European Commission or the IAEA under PDF format, it is OCRized by an integrated tool of the software OSEILLE. This enables the creation of an inspection record that gathers all the information regarding the inspection (type of inspection, MBA concerned, dates of inspection, inspection reference...). OSEILLE checks if the inspector announced is registered in the inspectors' lists. Then, an IRSN agent verifies the information and if everything is correct, a notification is produced to inform the French authorities and the operator of the inspection and whether it will be escorted or not by an IRSN agent as representative of the French authorities.

After the inspection, multiple documents are produced, which are all saved in OSEILLE and linked to the inspection record:

- inspection report written by the operator or IRSN agent if the inspection was escorted;
- post-inspection letter received from the European Commission or IAEA;
- response from the operator in case the post-inspection letter included observations.

IRSN can therefore have a glimpse of the status of the inspection and for example provide support to the operator for the response to the post-inspection letter.

With an entire fuel cycle industry and more than 300 international inspections per year, France stands as one of the most inspected countries in Europe. This software enables IRSN to have a global monitoring of the inspections on French facilities. It also produces statistics about inspections in France (number of inspections, observations, person-days of inspection...) that are used for internal reports or bilateral yearly meetings with inspection units. This gives a good insight into the trends concerning inspections. A specific attention is paid to the post-inspection letters, and the associated answers.

5. GENIE PIMENT CENTIME - Notification of imports/exports of nuclear material

All French operators that import or export nuclear material are subject to obligations linked to several international agreements. A common obligation is the transmission of a notification regarding the import or export of nuclear material with information concerning the nuclear material and the shipment. Depending on the regulation, these notifications are transmitted to EURATOM, to the IAEA, or to foreign authorities through the CTE or the French foreign affairs ministry (figure 3 details the process):

- EURATOM regulation 302/2005 requires notifying the European Commission of any transfer of nuclear material. EURATOM is then responsible of prior consent demand or receipt, notification or verbal notes exchange with different countries in accordance with multilateral agreements signed by EURATOM;
- international IAEA agreements cover, among other points, application of safeguards during the transfer of material from one country to another. France has signed undertakings that provide for the transmission of prior notification before any transfer of nuclear materials;
- intergovernmental agreements between France and other countries including Australia and Japan provide the framework for nuclear cooperation and set out the undertakings of each Party.

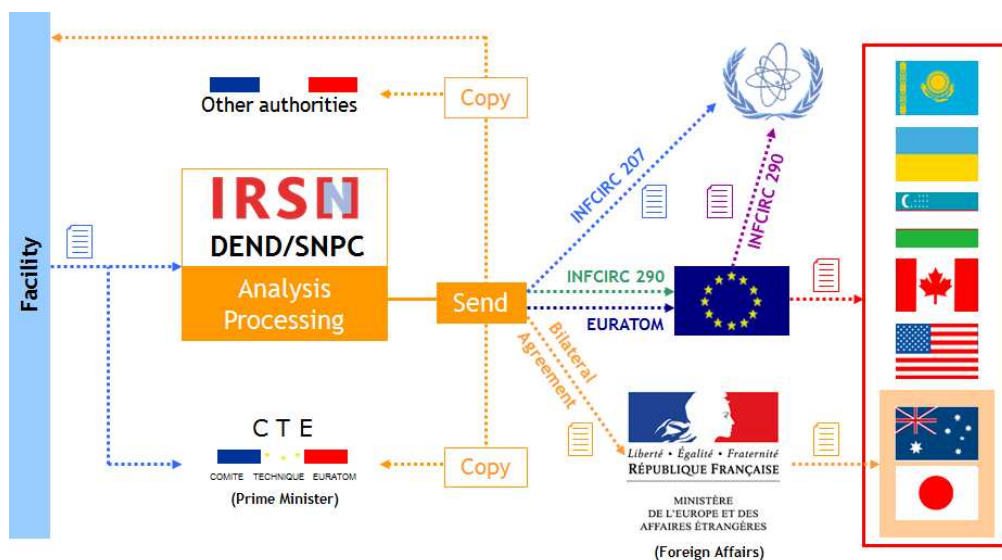


Figure 3 : Notifications emitted by IRSN for export or import

To assist French operators in drawing up their nuclear material transfer notifications, IRSN provides two web-portals for industry players to transmit the required information. For the implementation of these IT tools, security requirements were taken into account with restricted access, encrypted connection that ensures only authenticated users are authorized. These portals are called PIMENT and CENTIME. CENTIME is used by the operator EDF (Electricity of France) and PIMENT is used by all the other operators. They allow instant notification and make it easier for the operators that have to respect the period imposed by the regulation for the notifications. Features include also saving and managing all the reference parameters, including Euratom Supply Agency references, foreign facility addresses etc... PIMENT and CENTIME guide the operators to fill in information, and ensure the information is sent to the French authorities.

The web-portals communicate data to an application called GENIE that was developed for the gathering of data related to transfers of nuclear material, the processing of this data and the transmission of the notifications to the competent authorities (figure 4).



Figure 4 : GENIE PIMENT CENTIME inputs/outputs

Before the development of these three tools, each notification of import/export was made on paper forms and was “manually” and integrally verified by an agent. With regulation changes in 2005, there was a huge increase in the number of notifications and it became urgent to develop these softwares. For instance, in 2020, IRSN sent 1500 notifications to safeguards organizations and French authorities. The setting up of these tools reduced writing work to allow operators and IRSN agents to focus on assessment of the content. Therefore, it is also an important advantage for safeguards. Furthermore, it complies with all the complex regulation obligations, enables an immediate transmission of required elements and unifies the design of the notifications to improve their process in the safeguards organizations.

6. Conclusion

The SNPC department of IRSN has developed several IT tools over the years to help enhancing efficiency in its four main activities which consist in advising the CTE and assisting the operators, managing declarations, escorting international inspections and assessing documentation.

The tools presented in this paper (GAUSS, PASTEL, OSEILLE, GENIE, PIMENT, CENTIME) contributed to improve the quality of the declarations, allowed significant gain of time that could be saved for assessment and verifications of declarations. Standardized format for several output of these tools is also of key importance for safeguards organisations. Therefore IT tools contribute to improve the quality of safeguards in France. It is also a progress for operators as it is easier for them to provide the information required.

Continuous improvement is essential to sustain a quality level. Future challenges for the further development of these IT tools include compatibility of data formats especially for accounting declarations; support of cyber-security update to ensure exchanges through secure channel; development of new features to enhance the processes of data and information.