GrDF ASSET MANAGEMENT STRATEGY

NEW TOOLS FOR RISK, INVESTMENT AND MAINTENANCE MANAGEMENT

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1 Presentation of Gaz réseau Distribution France

a. GrDF – a subsidiary of the GDF SUEZ Group

The regulatory situation regarding gas distribution in Europe has evolved considerably since 2000.

France is one example of this: on 1 July 2007, the energy market was thrown wide open, meaning that – following industry, public authorities and professionals – more than 11 million private consumers could choose their natural gas supplier.

Established on 31 December 2007, GrDF (Gaz réseau Distribution France) is now an independent subsidiary of the GDF SUEZ Group. It inherited natural gas network distribution activities from Gaz de France. GrDF is a single entity which is responsible for its own economic stability and whose business activities mainly revolve around gas transmission.

GrDF has the following tasks:

- transmitting natural gas throughout France on behalf of all the suppliers, in a non-discriminatory manner and in complete independence;
- designing, building, operating and managing the natural gas distribution system by guaranteeing the safety of the real estate and people and the quality of coverage;
- connecting customer facilities to the network;
- providing services related to the supply of natural gas;
- developing the natural gas network in a sustainable and profitable way to provide access to natural gas to as many people as possible;
- taking care of the delegated management of the public gas distribution service, via concession contracts.

Unlike the gas transmission system operator in France, GrDF does not own the natural gas distribution systems. They belong to the local authorities ('licensing authorities' under the law), and GrDF operates the network on the basis of the concession contracts concluded with the licensing authorities.

In addition, GrDF is supervised by the French regulator: the French Energy Regulatory Commission (CRE). CRE is the market 'watchdog', guaranteeing transparent and fair operation of the energy market.

CRE ensures that any natural gas supplier (without discrimination) can access the network. It proposes tariffs for using the distribution systems to the competent ministry which makes its decision via a decree.

Meanwhile, GrDF is also under the aegis of the French State in terms of its obligation to observe the technical regulatory stipulations and requirements related to its activities as a natural gas distributor.

Therefore the distributor GrDF controls its development by:

- determining the regulated economic framework;
- building up assets (investment);
- capitalising on these assets by providing services;
- developing the market;
- ensuring the proper economic and industrial performance of the network.

Today, the GrDF project *Entreprendre pour réussir* (Success through enterprise) is based on growth, innovation and value creation for customers of the subsidiary, employees and shareholders. This projects reaffirms the ‘fundamentals’ of the gas distributor’s activities: safety, customer satisfaction (for suppliers, local authorities and consumers). It aims to:

- establish the identity and legitimacy of the new company;
- position GrDF as a unifying figure promoting sustainable and profitable growth of natural gas vis-à-vis stakeholders;
- put safety at the heart of industrial and economic performance;
- promote social and managerial development.

b. GrDF – a few figures

The key figures for GrDF are as follows:

- a natural gas network with a length of 188,700 km, making it the longest in Europe;
- 45,900 employees;
- serving 9,265 municipalities (77% of the French population);
- 11.1 million customers in France,
- 13 active suppliers on the French market, including four on the market for energy sold to private individuals;
- turnover of €3 billion in 2008;
- €650 million in investments;
- 310 billion kWh of natural gas transmissions;
- EBITDA (earnings before interest, taxes, depreciation and amortisation): €1.3 billion;
- regulated asset base: €13.2 billion.

It is worth pointing out that GrDF invests €1 million each day on improving network safety.

c. Industrial assets of GrDF

The natural gas distribution system is GrDF’s industrial tool. It covers all pipelines for transmission of natural gas to end customers.

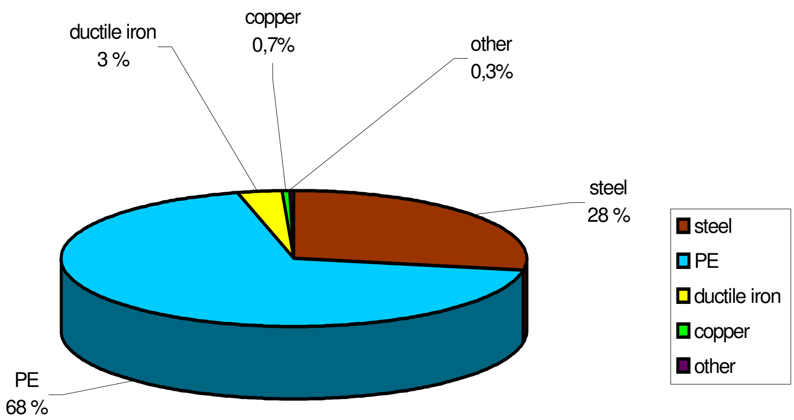
Concession assets are as follows:

- pipelines;
- customer and network pressure-reducing stations;
- individual and collective service lines;
- real-estate facilities.

The GrDF concession limit applies right through to the meter of the end customer.

A wide range of materials are used in the gas distribution system (see figure below).

Polyethylene (PE) is the material used for some 68% of the network (approximately 130,000 km). The average age of the network infrastructure is around 20 years but this average goes up and down depending on the material used in the network.



The medium-pressure network (from 4 bar to 25 bar) represents about 90% of the network. The low-pressure network (from 21 mbar to 300 mbar) has a length of about 11,000 km.

In addition, GrDF has a very extensive set of concession facilities (see data below).

Family of facilities (assets)	Facilities (in number of units)
Network pressure-reducing station	20,000
Customer supply station	120,000
Individual service line	6,500,000
Collective service line (real-estate facilities)	800,000
Network valve	270,000

Each family of facilities is highly heterogeneous in terms of age and technical properties, due to a series of decisions during the development of the French gas distribution system and of the regulations.

2 Asset management practices at GrDF

a. Principles

For 20 years, GrDF mainly focused its renewal investments on the programme to reduce grey iron pipelines.

When this programme ended in 2007 and facing an increasingly regulated environment GrDF had to deal with a new challenge: defining methods for making choices between the various renewal and maintenance investment programme options for its concession assets.

Faced with a lot of investment options to prioritise and approve, it is absolutely essential that GrDF finds ways of optimising the following:

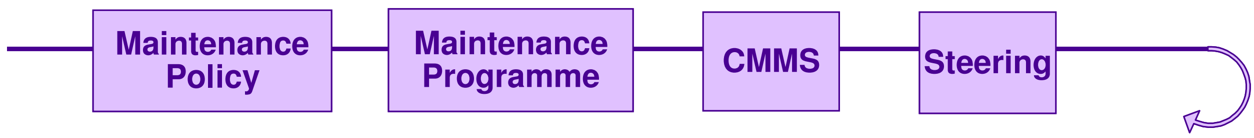
- its annual renewal investments budget;
- its annual preventive maintenance budget.

Therefore, in 2005 GrDF embarked on developing a proper procedure for managing its assets.

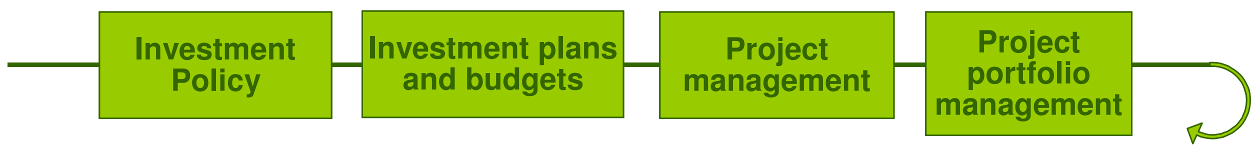
The management of physical assets can be defined as "all practices and activities that enable an organisation to optimally manage costs, risks and the performance of its physical assets throughout their life cycle".

For GrDF, the main elements that need to be in place for industrial asset management are as follows:

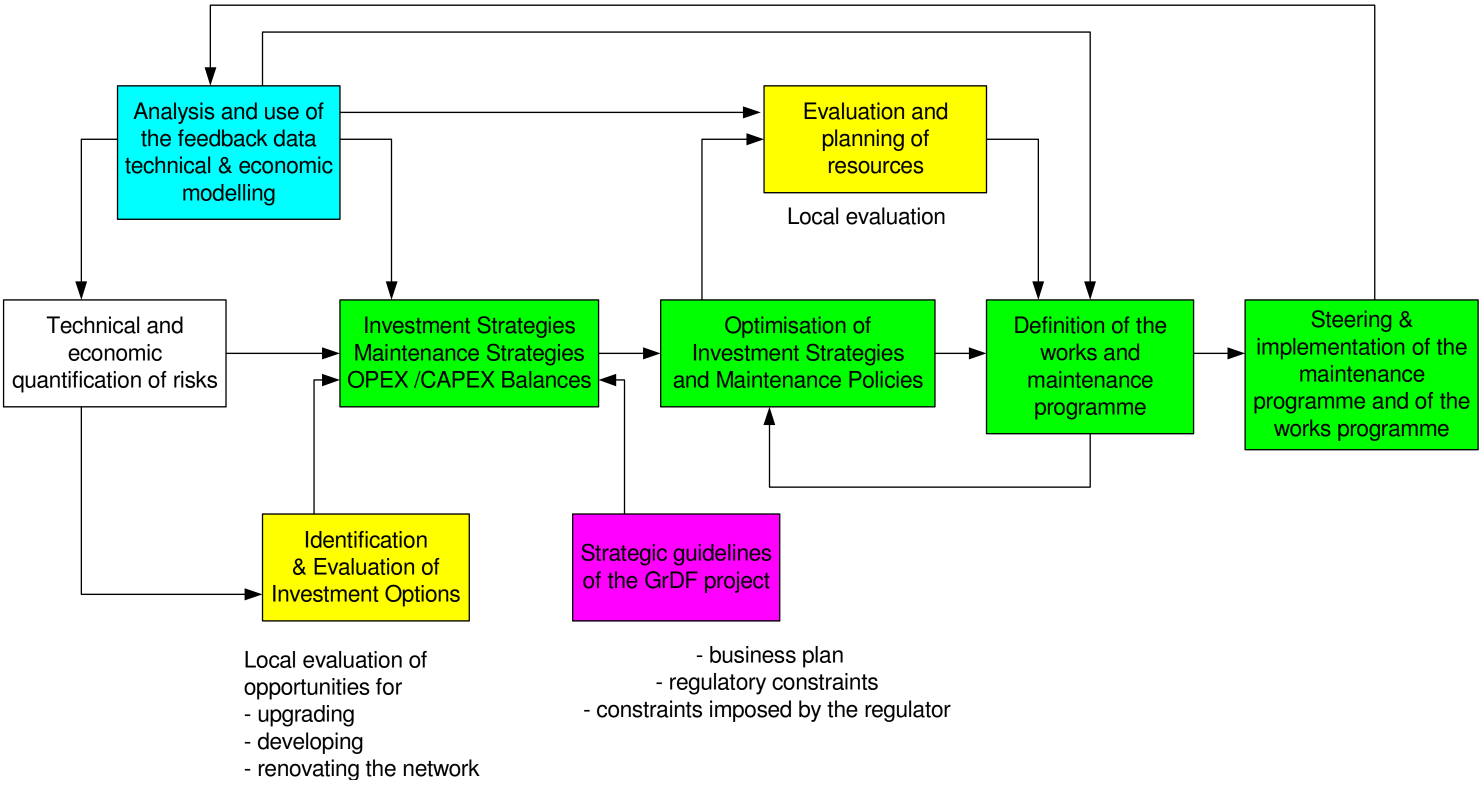
- effective maintenance of its assets:



- management of its investments:



More specifically, the figure below summarises the asset management process:



b. Establishment of the asset management process at GrDF

Consolidation of the fundamentals of asset management

Initially, GrDF strived to consolidate its knowledge of the technical condition of its network and the corresponding performance.

In this context, from 2005 GrDF took the following measures:

- Listing assets

  A good knowledge of the technical assets addresses two challenges:

  - The first is the cornerstone of network safety. A good knowledge of technical assets makes GrDF able to manage industrial risks and guarantee the safety of its facilities.
  - The second is of a financial nature. The value of GrDF assets is a significant basic component of the distributor's revenue and the accounts of the GDF SUEZ Group.

  An excellent knowledge of the assets must guarantee the exhaustiveness, coherence and accuracy of the respective descriptive data, in particular in the essential phases of data collection and entry.

  From 2005, GrDF drew up a national technical reference framework, based on identification of the activity data needed for a knowledge of the distribution facilities assets and applied to all facilities families (except network pipelines which have traditionally been carefully listed). This listing is still in progress.

  In 2006, GrDF also decided to add a data quality control tool (which is based on continuous improvement and is integrated with the management) to the tools for steering its inventory.

- Enhancing the geographical information system (GIS)

  GrDF is enhancing its geographical information and localisation system. This modern and effective system has a key role in the technical information system because it provides a representation of gas networks and branch lines by positioning them spatially.

- Developing an effective feedback procedure

  The feedback (REX) procedure is a key factor in the industrial safety procedure of the distributor GrDF. The incidents databases are now an essential part of evaluating the operational safety of the distribution infrastructures, i.e. of quantifying:

  - the impact of the facilities on the safety of the real estate and people (gas leak, hazardous situations, accidents);
  - the quality of the gas supply provided to customers (impact of the incident).

  GrDF has put in place an organisation, processes and tools which mean that:

  - incidents can be traced on its network and event feedback (REX) can be used by elaborating methods for analysing and interpreting the results;
  - the quality of data collection and the methods for processing such data can be made more watertight so that we can have a certain level of confidence in the results.

- Establishing a CMMS (Computerized Maintenance Management System)

  Based on the identified technical assets and the existing old local maintenance management applications, GrDF built a proper national CMMS.

  This tool includes a description of the data from the technical reference document listing facilities and meets the need for information about the costs involved in operating and maintaining concession gas facilities (see section 4.3).

<u>Improving the management and relevance of maintenance and investment programmes for concession gas facilities</u>

The measures implemented previously enabled GrDF to elaborate decision-making tools and methods, with a view to enhancing the management and relevance of maintenance and investment programmes for these assets.

These tools and methods, which were developed by GrDF and the Gas and New Energies Research Centre of the GDF SUEZ Research and Innovation Division (CRIGEN-DRI), are now used mainly in the regional design offices (local structure) and by the national GrDF management.

These tools aim to:

- evaluate the relevance of investment projects and establish a hierarchy of these projects, based on quantitative risk analyses (CAPEX/CAPEX issue);
- optimise the maintenance budgets and related maintenance strategies (deciding between corrective or preventive maintenance);
- improve the choices made between maintenance and investment (OPEX/CAPEX).

Therefore GrDF took the following measures, which are described in more detail in subsequent sections:

- It implemented a preventive maintenance policy optimised using the RCM (Reliability-Centred Maintenance) approach with an economic evaluation of the preventive maintenance plans.
- It optimised network upgrading and renewal investment programmes by using a tool to support decision-making, integrating:
  - a risk-based approach;
  - a cost-benefit analysis, including an economic valuation of the direct, indirect and induced costs involved in operating assets throughout their service lives.
- It made a comparative estimate of costs and performance and optimised the preventive maintenance policy which had been defined for all the families of assets:
  - searching for the best possible balance between the preventive management budget and the corrective maintenance budget;
  - searching for the best possible frequency for carrying out preventive maintenance tasks.

3 Methods and tools developed for asset management

a. Implementation of an optimised maintenance policy

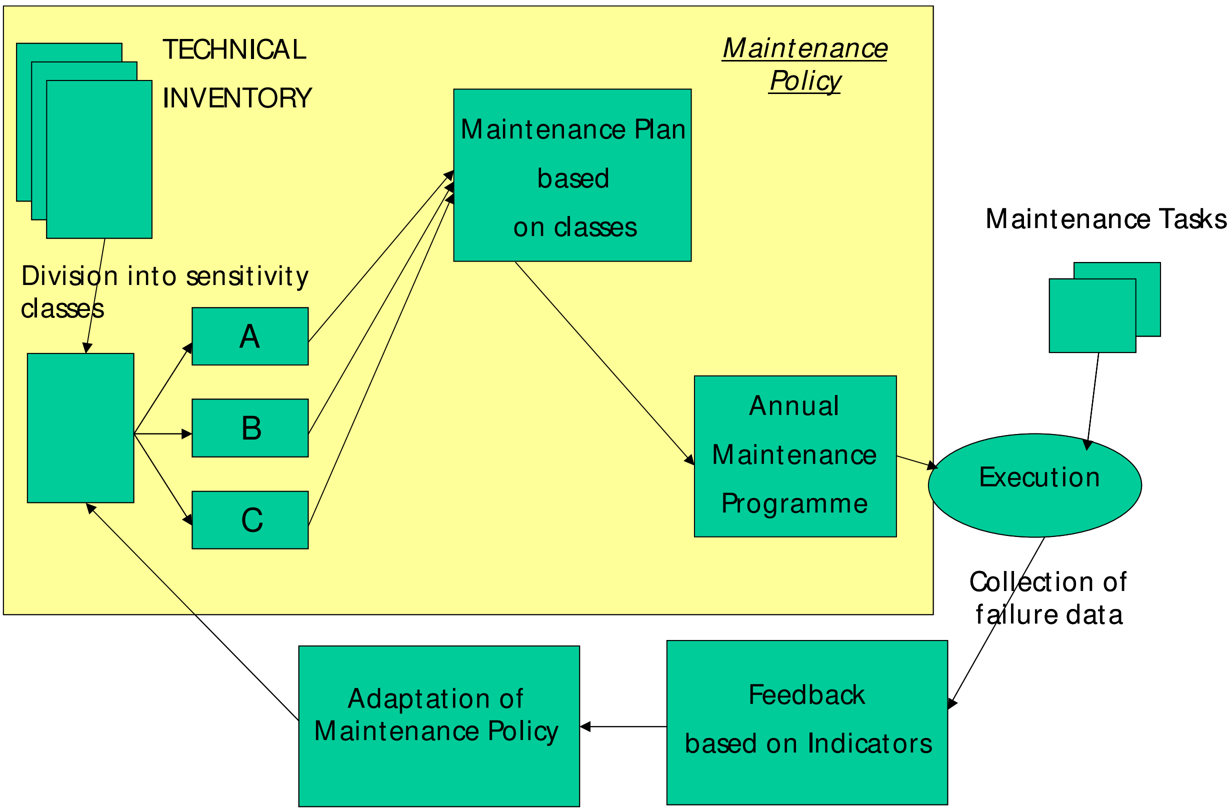
The procedure that is used aims to optimise maintenance periods on the basis of feedback (REX). The main measures taken to meet this objective are:

- definition of a methodological framework;
- use of the RCM approach;
- annual 'maintenance decisions';
- a tool for capitalising on feedback (CMMS of the distributor).

A methodological framework

GrDF has a methodological framework for drawing up an optimised preventive maintenance policy. This framework defines:

- guidelines to implement optimised and evolving annual preventive maintenance, avoiding excessive quality but maintaining the required characteristics for gas supplies (safety, availability, etc.);
- the prerequisites for organising effective feedback, enabling the maintenance policy and therefore the annual preventive maintenance programmes to be adapted periodically on the basis of failures that are noted.



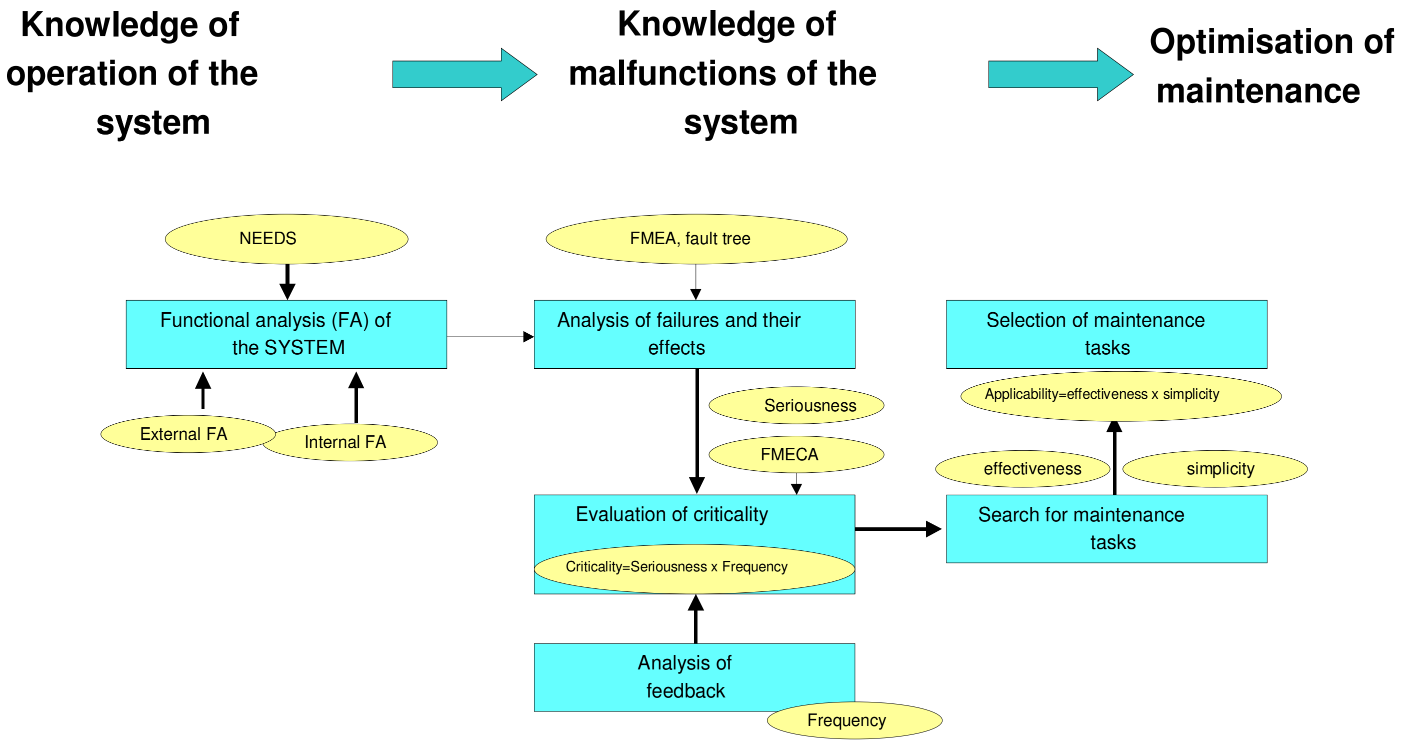
The RCM approach

The RCM (reliability-centred maintenance) approach was used to elaborate optimised maintenance tasks. This is a pragmatic approach which is based on an in-depth analysis of the functioning and potential malfunctions of the equipment to determine the most efficient maintenance measures.

The approach involves determining which equipment has to be subjected to this type of maintenance and how often this maintenance needs to be carried out.

Accordingly, it entails three main stages:

- the Functional Analysis which enables the function of each item of equipment in the system to be defined;
- the Failure Modes, Effects and Criticality Analysis (FMECA) which enables the failures which may occur in any equipment to be analysed and a list of critical equipment to be deduced on this basis by analysing the impact of the failure on safety and operating costs;
- a systematic search for the most efficient maintenance tasks to remedy the most critical failures (effectiveness, simplicity and cost of implementation) and grouping by frequency.



Maintenance decisions

These studies result in a catalogue of maintenance tasks being drawn up. These maintenance tasks have to be applied in the assets and are related to maintenance intervals. They serve as a basis for the national maintenance policy and are implemented each year in the various regions in the form of 'maintenance decisions'.

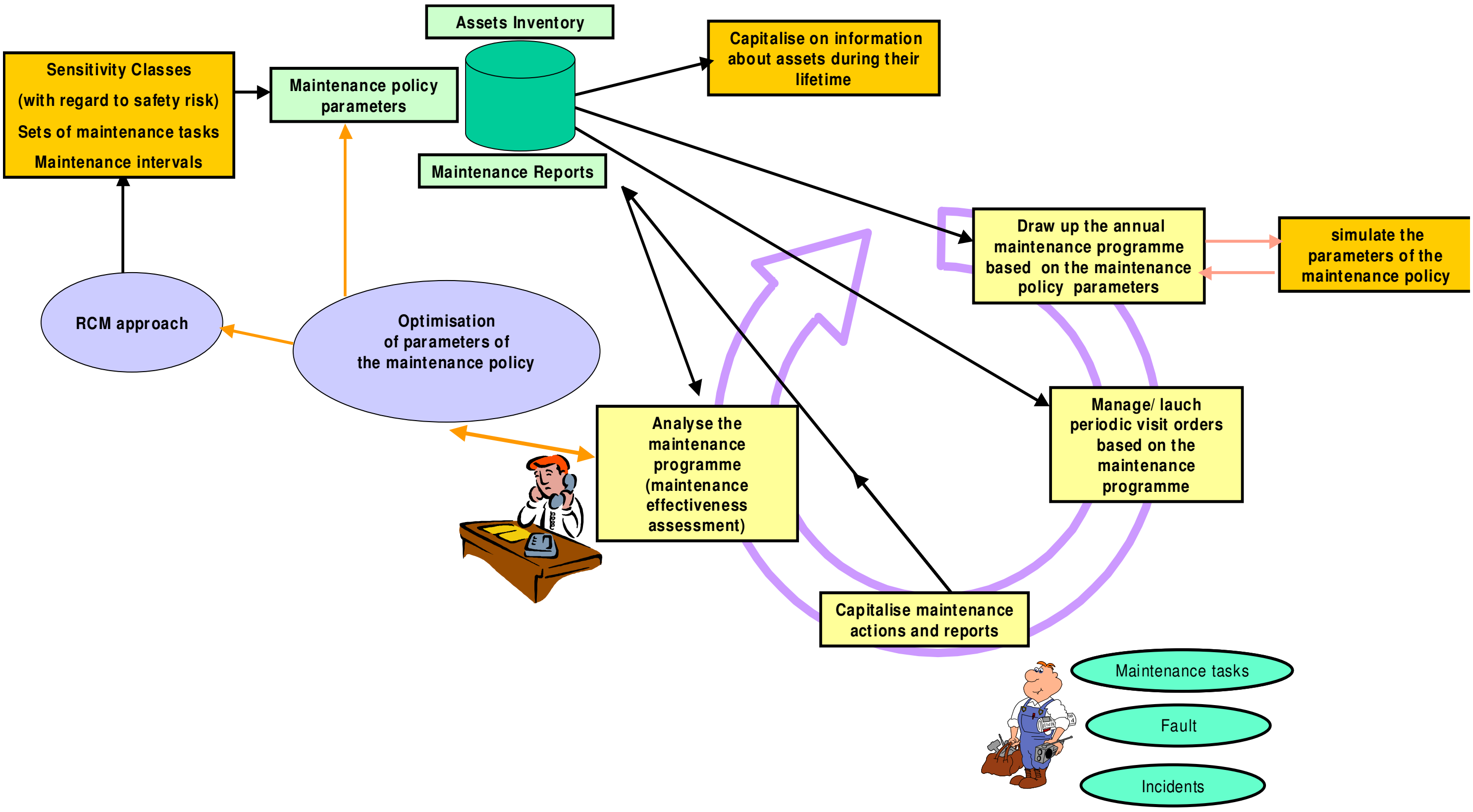
These maintenance decisions define a budget and a number of visits for the implementation of maintenance tasks based on the family of assets. This budget is valued economically using a simulator.

The Computerized Maintenance Management System (CMMS)

To manage and trace the whole procedure, a new CMMS using SAP was deployed. The results of RCM studies were used to set the parameters of the tool: technical structure of the gas assets, types of maintenance operations, failure mode, causes and solutions.

The CMMS functionalities– management of the maintenance programme, and capitalisation of the maintenance orders and the resulting reports – provide material for analyses regarding the optimisation of maintenance intervals.

All the information which is used in this way will enable the maintenance policy to be optimised over time.



b. Method for optimising risk management

GrDF's main concern is to ensure the safety of people and real estate.

Until 2007, GrDF resources focused on reducing grey- cast iron pipelines. This programme has now finished but a few risk facilities ('lower risk' than grey cast iron) still need to be addressed.

In this context, GrDF drew up a multiannual plan to reduce these risks.

In the first place, GrDF drafted an overview of these risks.

To this end, the initial approach involves evaluating for each type of assets (pipelines, service lines, real-estate facilities) related to its activity:

- the frequency of incidents (calculated on the basis of feedback);
- the proven (and potential) seriousness of the effects of incidents on these facilities;
- this means that the initial risk (IR) can be calculated for each 'facility/activity' pair – this is the product of the frequency of incidents (FI) and the seriousness of incidents (SI).

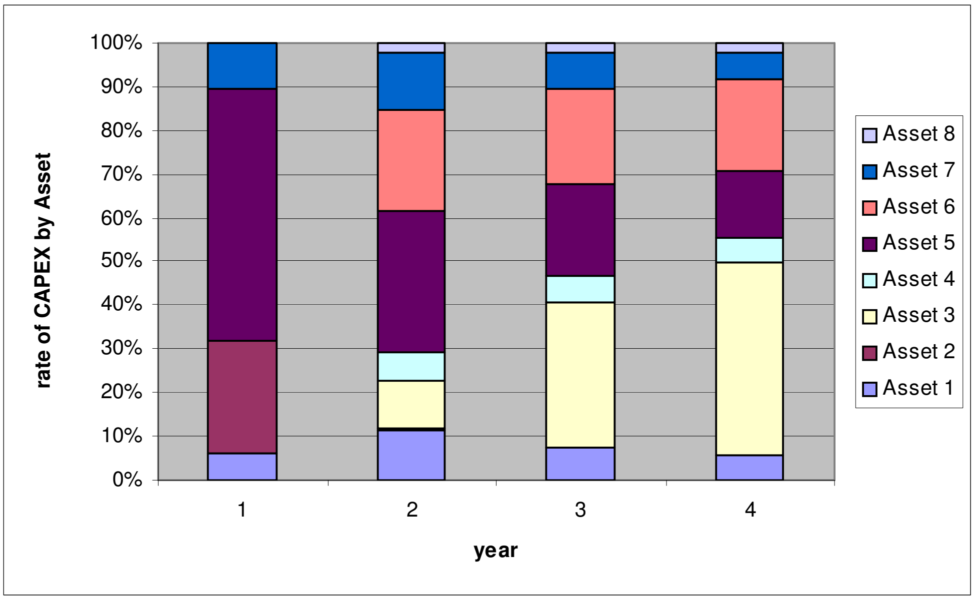
Other features of each facility/activity pair are:

- its total size (number of km of the network or number of units);
- the unit cost for dealing with the risk related to the facility.

The challenge for GrDF is to distribute its annual overall budget for expenditure on investments so that it can reduce these risks.

Based on all these data, a number of scenarios can be simulated to work out the volume of investments and resources needed to minimise risk (target figure to process on an annual basis) and optimise the allocated budgets (multiannual timetable for reducing this risk).

Therefore the national assets manager uses an Operational Risk Management (ORM) tool to carry out these budget allocation studies.



c. Aid to establishing a hierarchy of investments: GSI tool

At this stage, the ORM method which was presented previously means that for each type of assets that are classified as 'risk' assets, the regional GrDF system operators have the multiannual processing timetable and the associated budget.

This means that the regions can draw up investment programmes. Now it is a matter of prioritising these requests at regional level, using a national homogeneous method shared by everyone.

This is the objective of the GSI (Industrial Safety Gains) tool.

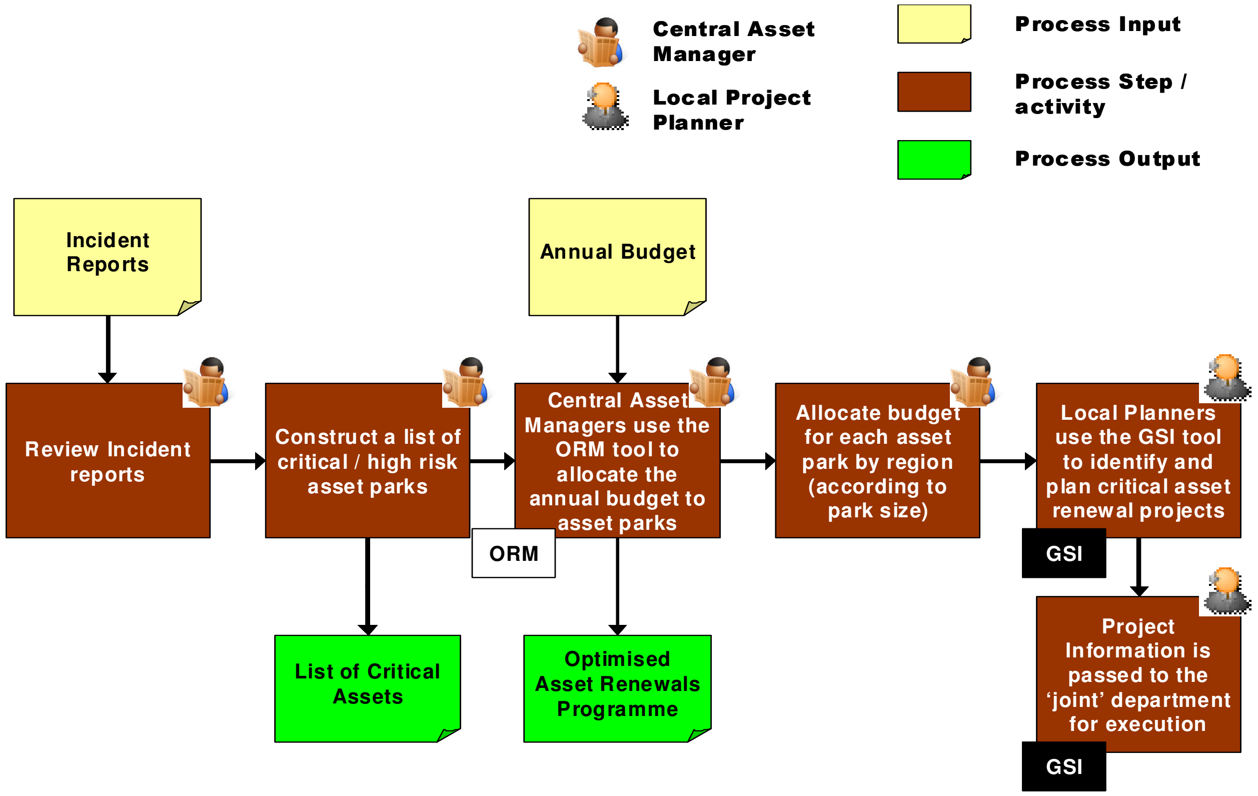
The GSI tool is a major tool for managing the distributor's assets. This tool quantifies a decision-making indicator that is needed to establish a hierarchy of facility renewal and distribution capacity enhancement

It aims to quantify, as comprehensively and objectively as possible, the capacity of an investment to reduce the risks of operating the natural gas distribution system.

By implementing a full-cost approach, this tool helps to guide the strategy for operating the distribution system with a few to meeting two major objectives:

- improving the reliability of the facilities making up the network, with a view to creating safety gains and gains in terms of keeping the facilities operational;
- improving the continuity and quality of service by upgrading the network to deal with the risks of interruption to the supply.

The figure below presents the relationships between the risk management tool (ORM) and the GSI tool in the process of drawing up investment programmes.



Principles of the GSI

The GSI is calculated using two basic principles:

- the principle of avoided costs over the service life of a facility;
- the full-cost approach for the valuation of these avoided costs; the GSI is calculated on the basis of a comparison between these avoided costs, due to the renewal or upgrading of existing distribution system facilities, and the investment needed for installation of new facilities:

$$GSI = \frac{\text{Avoided costs}}{\text{Investments}}$$

These avoided costs are quantified on the basis of the direct and indirect costs and induced costs entailed by network facilities.

In this evaluation of the full cost, three major criteria are taken into account when calculating the GSI:

- safety;
- continuity of service,
- maintenance in operational conditions (operating charges).

The calculations carried out by the GSI tool are based on a reference duration of 45 years which is consistent with the reference duration for the method of calculating the regulated asset base (RAB) which yields the transmission tariff.

The full-cost approach involves taking into account the financial effects of any event on the widest possible area.

In this connection, a distinction is made between three types of costs:

- direct costs: these include the operating and maintenance charges (equipment, workforce, subcontracting), which are directly recorded by the units, and the cost of accidents (compensation for damage to goods and injury to people, including the cost of insurance);
- indirect costs: these generally correspond to the structural and administration costs;
- induced costs: these are all the other costs related to other notions such as image, safety, development of the regulations, satisfaction of customers and local authorities, etc.

It is still relatively easy to work out the direct costs, using basic accounting principles but this remains dependent on the quality of data collection and the accuracy of the structure of our management applications.

A number of sometimes complex operations are needed to estimate the indirect costs.

The induced costs are the most difficult to quantify, in view in particular of their diversity: loss of image, tightening of the regulations, industrial nuisance, commercial and institutional impact, loss of production of industrial companies, etc.

The induced costs are of fundamental importance to the method because in many cases they are greater than the direct and indirect costs.

<u>Nature of the workstreams investigated</u>

The GSI tool means that two families of workstreams covering physical assets can be investigated:

- Network renewal workstreams: the purpose of these workstreams is to replace a set of existing facilities due to their state of deterioration and/or risks they pose to third parties, the distribution system and its material environment.
- Network upgrading workstreams intended to improve supplies for customers who face the risk of local interruptions to distribution due to incidents or cold weather.

<u>Quantification of gains (valuation of avoided costs)</u>

The avoided costs are quantified for each of these types of workstreams. The avoided costs reflect the economic benefit of the replacement or upgrading of part of the network.

This involves comparing the behaviour of existing facilities with the expected behaviour of a technical solution offered by the system operator.

Four categories of gains are evaluated:

- safety gains: economic value reflecting the effect of the investment on the occurrence of incidents that are potentially serious for the part of the network in question;
- continuity-of-distribution gains: economic value of the effect of the investment on the occurrence of interruptions to gas distribution and situations causing inconvenience to customers;
- operational gains: economic value representing the effect of the investment in terms of maintaining the operated part of the network in an operational state (OPEX);
- opportunity gains: economic value representing two classes of opportunity:
    - capitalising on roadworks to anticipate an investment decision;
    - other gains related to the local workstream situation.

- Calculation of safety gains

Safety gains are calculated if a renewal workstream is being investigated.

The facilities taken into account for calculating safety gains are as follows: pipelines, individual and collective service lines, internal pipes, risers, specific branch lines and pressure-reducing stations.

Accordingly, the computational model for safety gains uses the following as input data:

  - the annual frequency of occurrence of potentially serious incidents, which is quantified on the basis of analysis of the feedback about incidents;
  - parameters describing the nature of the population near to facilities:

    these parameters are obtained on the basis of external reference databases which give the population density and the type of home, with these data being taken from the French census;
  - the average full cost incurred by the occurrence of a potentially serious incident.

- Calculation of continuity-of-supply gains:

The computational model for supply gains involves estimating five key elements:

  - the annual frequency of interruptions in distribution for the various types of families of assets, based on feedback;
  - the number and type of customers who are connected to the part of the network being investigated;
  - the length of the interruption to service continuity that has been suffered by these customers;
  - estimate of the quantity of energy not distributed during this period;
  - economic valuation of a deterioration in the gas supply.

The economic valuation includes costs related to:

  - loss of transmission revenue;
  - once an incident has been resolved, the labour costs for restoring gas to customers who were cut off;
  - valuation of the inconvenience to customers.

- Calculation of operational gains

The computational model for operational gains mainly uses the following data:

  - the annual frequency of incidents by families of facilities (incident generating corrective maintenance costs);
  - the average full cost of corrective maintenance work defined on the basis of the nature of the family of facilities.

- Calculation of opportunity gains

In the first place, opportunity gains mean that work that has been brought forward is taken into account. This may have a number of causes, such as roadworks being carried out by a local authority or another operator which also runs an underground network.

Other factors can also be taken into account when calculating opportunity gains, e.g. effects related to the impact of a given investment programme on the local organisation of the distributor.

- Calculation of the investment

The GSI tool provides two ways of quantifying the investments involved in laying a new facility:

- an estimate based on unit costs, which are indicated by default:
- an estimate based on investment amounts provided by the user.

<u>An operational cartographic tool</u>

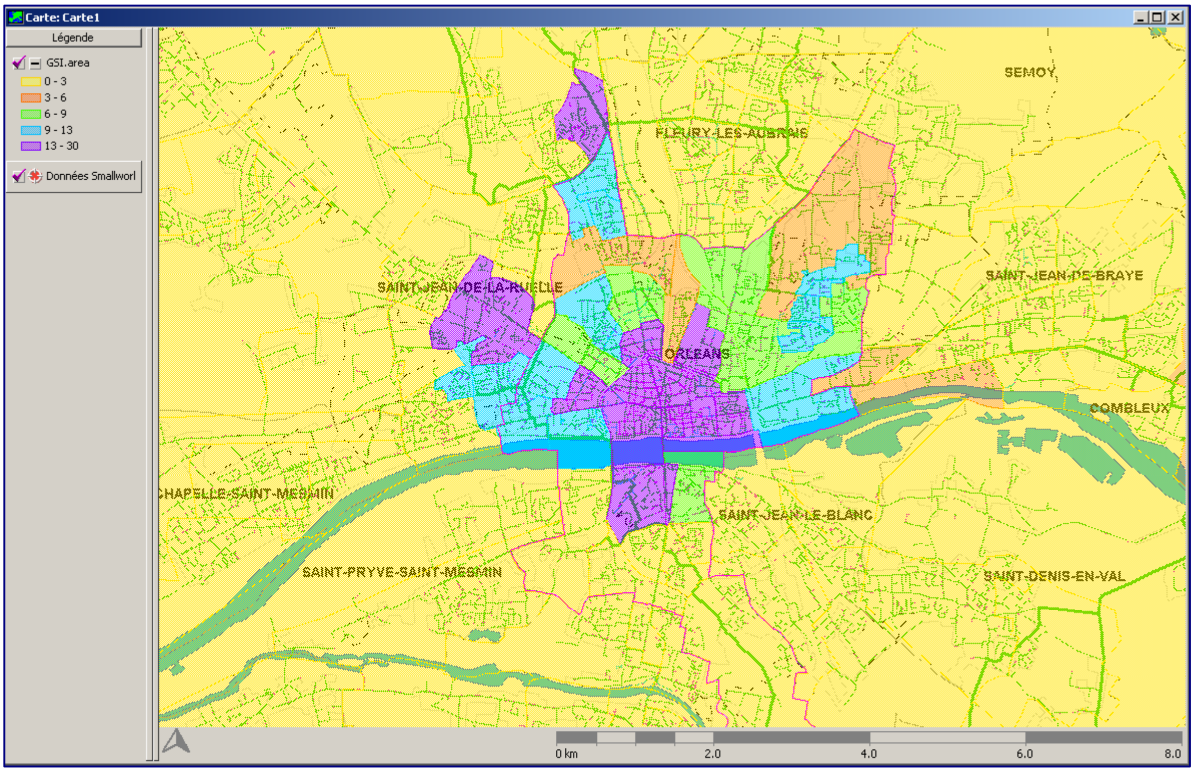
The first version of the GSI tool was an Excel spreadsheet and was used from September 2005 by all the GrDF regional operators responsible for drawing up investment studies.

Since 2008, the GSI tool has been integrated into a cartographic application using Smallworld GIS.

This cartographic application is an aid to implementing investment studies of the GrDF network.

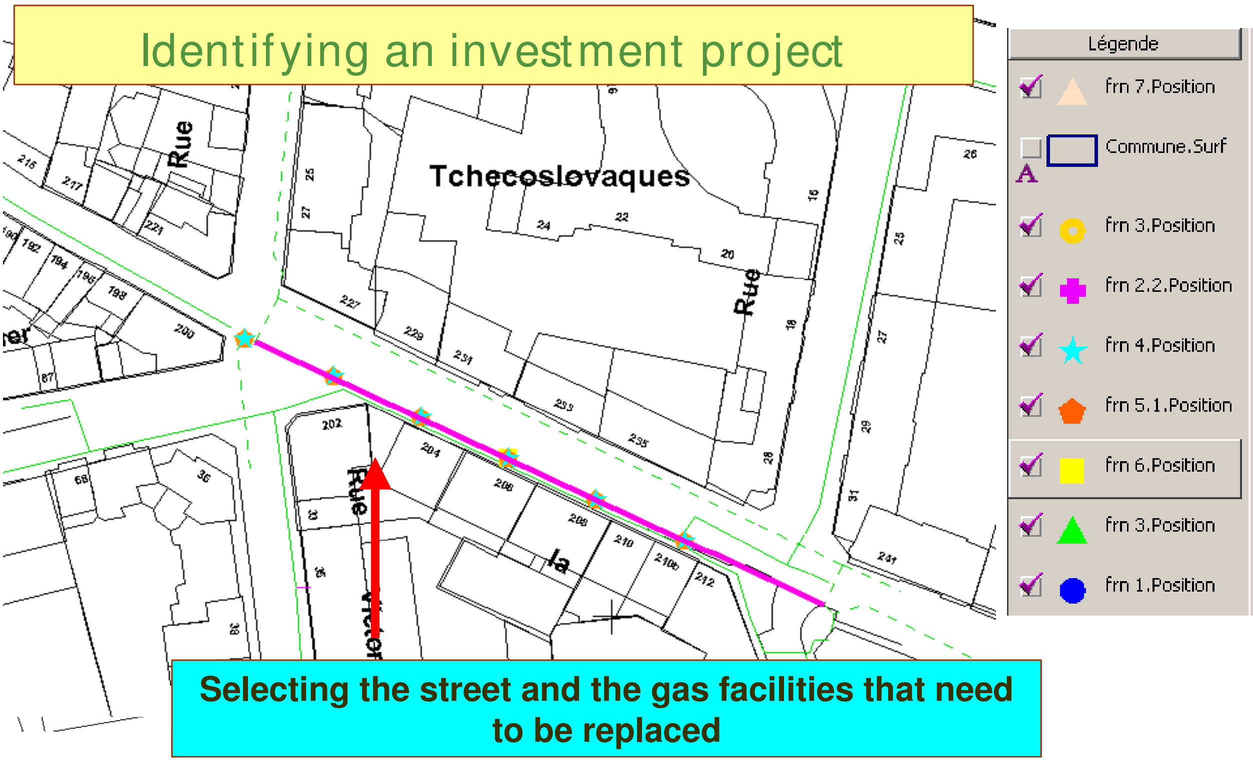
The new cartographic solution has the following benefits:

- an immediate visual representation of the data regarding assets and incidents available in the various GrDF databases (CMMS, feedback database, customer data, etc.);
- a representation of zones with a high investment value for safety, in descending order of GSI which is calculated automatically;



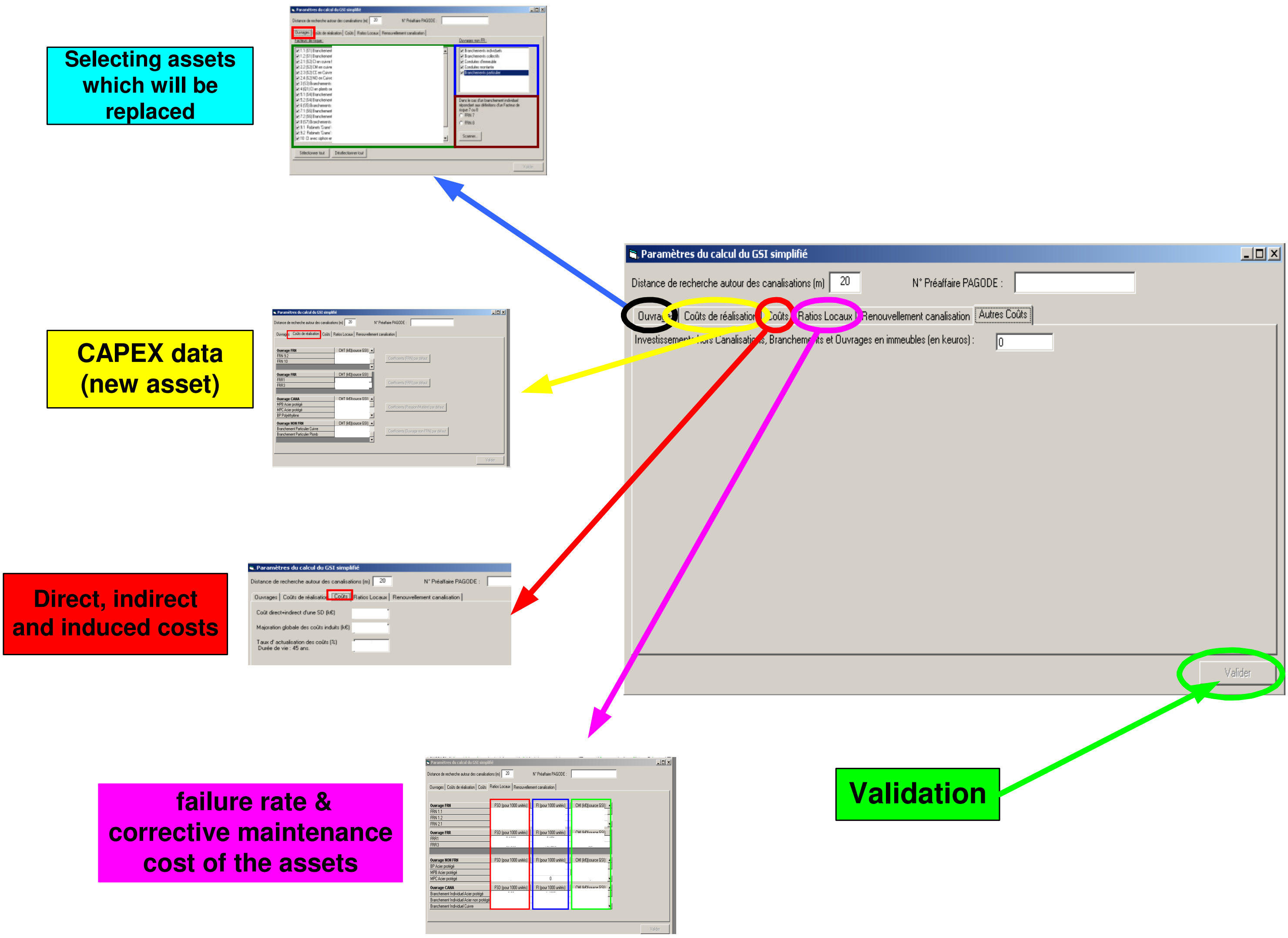
- provision of a computational module for the GSI indicator for the workstream in question where it meets a road or a set of roads for regional users.

Users can thus study the profitability of an investment project by using this application. Having identified a zone with a high investment value, they select a road or set of roads they consider to be relevant for an investment project.



Having selected the pipelines in question, the application automatically identifies all the facilities that can be included in the study project, via map pointing around pipelines.

Therefore users select the facilities they want to be included in their investment project and validate the technical and economic input data that are useful for calculating the GSI of the project (see figure on the next page).



In this way, users obtain the value of the GSI indicator in the selected workstream almost immediately.

This cartographic solution produces an Excel file containing the following:

- the GSI worksheet for the workstream in question (see below);
- the addresses of the facilities to be renewed;
- a cartographic representation of the selected item;
- data related to renewal of the pipeline;
- a physical document presenting the data for following up on the actual implementation of the work by the engineering department;
- an export file containing all the important elements for calculating the GSI with a view to the national consolidation of GSI studies.

GrDF
GAZ RESEAU DISTRIBUTION FRANCE

Outil GSI - GEOGAZ v1.0

Synthèse

Description du chantier

Nom du Chantier	
Région	CENTRE
Portefeuille	CENTRE SUD
Centre	CLERMONT FERRAND
Commune	CLERMONT FERRAND
Code INSEE	63113
IRIS	631130401 - JAUDE
Rue	NUE DES ETATS UNIS
Date de saisie	11/06/2009 08:53
N° PAGODE lié au GSI	
Code finalité	P5
Type du chantier	RSV

Ratios utilisés

Ouvrages FRN	FSD*	CMT**	FI*	CMI**
FRN 1.1				
FRN 1.2				
FRN 2.1				
FRN 2.2				
FRN 2.3				
FRN 2.4				
FRN 3				
FRN 4				
FRN 5.1				
FRN 5.2				
FRN 6				
FRN 7.1				
FRN 7.2				
FRN 8				
FRN 9.1				
FRN 9.2				
FRN 10				

Ouvrages FRR	FSD*	CMT**	FI*	CMI**
FRR1	0,1309	1,3	3,1510	0,5
FRR3	0,1535	1,073	10,4208	0,8
Canalisations				
MPC Acier protégé	0,0000	0,3	0,0000	4,4
MPB Acier protégé	0,0006	0,3	0,0243	4,4
MPB Acier non protégé	0,0078	0,0	0,3395	4,4
MPB Cuivre	0,0081	0,0	0,1840	4,4
MPB Polyéthylène	0,0004	0,1	0,0148	4,4
BP Acier protégé	0,0029	0,0	0,0796	4,4
BP Acier non protégé	0,0209	0,0	0,3546	4,4
BP Autre fontes	0,0035	0,0	0,0669	4,4
BP Fonte grise	0,0542	0,0	0,6239	4,4
BP Polyéthylène	0,0032	0,1	0,0998	4,4
BP Tôle bitumée	0,0127	0,0	0,4118	4,4

Ouvrages Non-FR Hors canalsiations		FSD*	CMT**	FI*	CMI**
Brt ind	Acier protégé				
Brt ind	Acier non protégé				
Brt ind	Cuivre				
Brt ind	Plomb				
Brt ind	Polyéthylène				
Brt coll	Acier protégé				
Brt coll	Acier non protégé				
Brt coll	Cuivre				
Brt coll	Plomb				
Brt coll	Polyéthylène				
CI	Acier non protégé				
CI	Cuivre				
CI	Plomb				
CM	Acier non protégé				
CM	Cuivre				
CM	Plomb				
Brt part	Acier non protégé				
Brt part	Cuivre				
Brt part	Plomb				

* : pour 1000 unités ** : en keuros

Chantier Ouvrages FR Hors canalisations

Description du Chantier

Description IRIS		
Nombre de km du réseau sél	0.28000	km
Densité de population de jour	13526.79883	hab/km2
Superficie de l'iris	0.28602	km2
Nombre de situation dangere	1	

Données économiques		
coût direct+indirect d'une SD	CSD =	6
Majoration globale coûts ind	MGDCI =	4
taux d' actualisation des coût	a =	8

Description de la population		
Coefficient de majoration de (	GDH =	########
Coefficient de majoration de (	GIMH =	########
Nombre moyen des niveaux (	NNI =	

Clients SAM	
Nbe	0
Consommation totale annuell	0

	Total	FRN	FRR	Non FRN
Branchements collectifs	2	1	0	1
Conduites d'immeuble	4	0	0	4
Conduites montantes	3	0	3	0
Branchements particuliers	18	0	0	18
Nourrices	2	0	0	2
Tiges cuisines	0	0	0	0
Conduites de coursives	2	0	0	2
Branchements individuels	0	0	0	0
Total	31	1	3	27

Ouvrages FR Hors canalisations

	Quantité	Inv. Total	Population IRIS	% traité
FRN 1.1	0	0,0	0	0%
FRN 1.2	0	0,0	0	0%
FRN 2.1	0	0,0	0	0%
FRN 2.2	0	0,0	0	0%
FRN 2.3	0	0,0	0	0%
FRN 2.4	0	0,0	0	0%
FRN 3	0	0,0	18	0%
FRN 4	0	0,0	5	0%
FRN 5.1	0	0,0	2	0%
FRN 5.2	0	0,0	0	0%
FRN 6	0	0,0	117	0%
FRN 7.1	1	1,5	109	1%
FRN 7.2	0	0,0	0	0%
FRN 8	0	0,0	0	0%
FRN 9.1	0	0,0	0	0%
FRN 9.2	0	0,0	0	0%
FRN 10	0	0,0	0	0%
Total	**1**	**1,5**	**251**	**0,4%**

	Quantité	Inv. Total	Population IRIS	% traité
FRR1	3	3,9	73	4%
FRR3	0	0	0	0%
Total	**3**	**4**	**73**	**4,1%**

GSI FR Hors canalisations

GS_FR	GE_FR	INV_FR	VAN_FR	GSI_FR
50,49	0,84	**5,40**	51,33	9,50

Chantiers Ouvrages Non-FR Hors canalisations

Description du Chantier

Ouvrages NonFR à renouveler (hors canalisations)

sur réseau MPB	BR Ind.	BR Coll.	CI	CM	Part.
Acier protégé	0	0	0	0	0
Acier non proté	0	0	0	0	0
Cuivre	0	0	0	0	0
Plomb	0	0	0	0	0
Polyéthylène	0	1	0	0	0
sur réseau BP					
Acier protégé	0	0	0	0	0
Acier non proté	0	0	3	0	9
Cuivre	0	0	1	0	0
Plomb	0	0	0	0	9
Polyéthylène	0	0	0	0	0

* Attention. la matière de certains brchts a été renseignée par l'utilisateur

Total - Ouvrages NonFR à renouveler (hors canalisations)

Total MPB + BP	BR Ind.	BR Coll.	CI	CM	Part.
Acier protégé	0	0	0	0	0
Acier non protég	0	0	3	0	9
Cuivre	0	0	1	0	0
Plomb	0	0	0	0	9
Polyéthylène	0	1	0	0	0

GSI Non-FR Hors canalisations

GS_NonFR	GE_NonFR	INV_NonFR	VAN_NonFR	GSI_NonFR
62,36	0,45	12,10	62,81	5,19

Chantier Canalisations

Description du Chantier

	Canal. AR*	Canal. à poser *			
		MPC	MPB	MPB	BP
Nature	**Total**	Acier	Acier	PE	PE
MPC	0,00	0,00	0,00	0,00	0,00
MPB	100,00	0,00	0,00	100,00	0,00
BP	0,00	0,00	0,00	0,00	0,00
MPC+MPB+BI	100,00				

* : en mètres

GSI Canalisations

GS_CANA	GE_CANA	INV_CANA	VAN_CANA	GSI_CANA
0,96	0,08	10,00	1,04	0,10

Autres investissements

	INV_AUTRES
Investissements hors Canalisations, Branchements et Ouvrages en immeubles	**200,0**

GSI Global

GS_Global	GE_Global	INV_Global	VAN 1	GSI 1	VAN_Global	GSI_Global
113,82	1,37	227,51			115,18	0,51

4 Gains related to the asset management procedure

By developing these methods and tools, GrDF is improving the relevance and objectivity of its maintenance programmes and facility renewal investment programmes.

Specifically, the GSI tool is the most mature decision-making tool that has been developed to date.

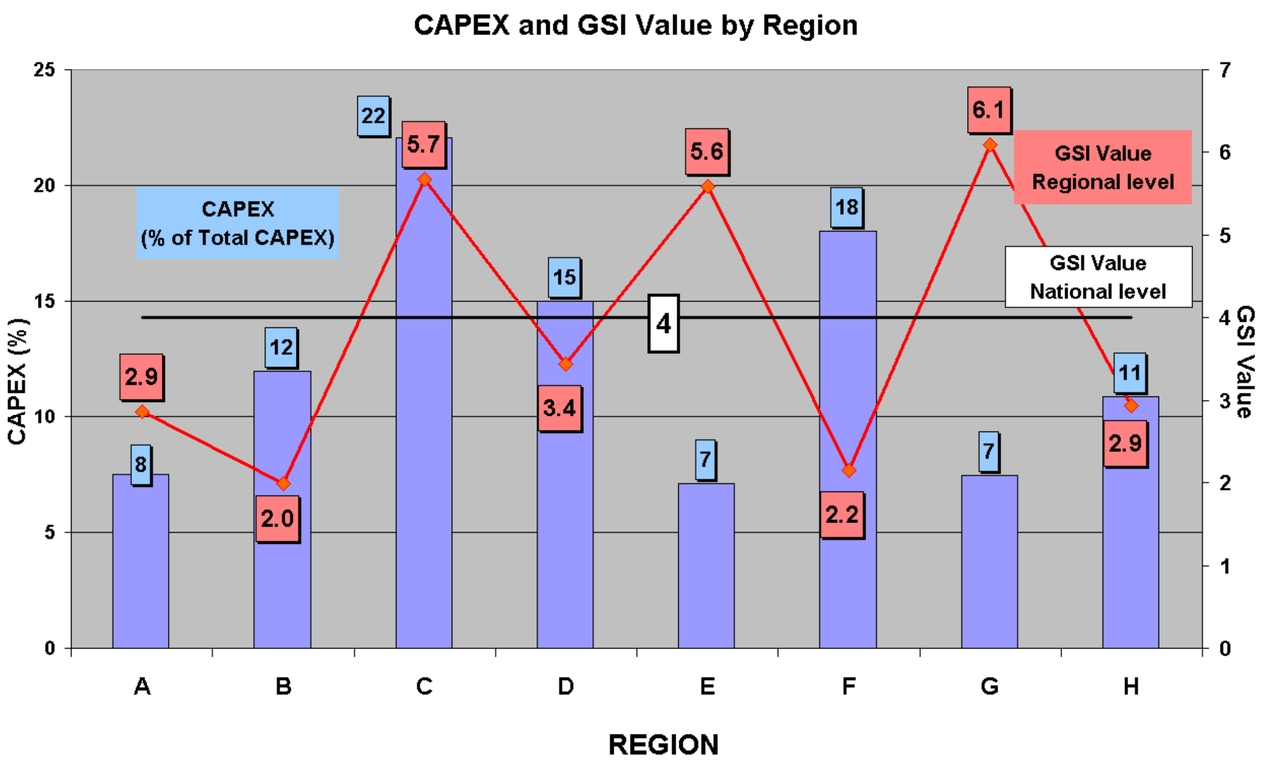
GrDF identified a number of gains related to the implementation of this tool:

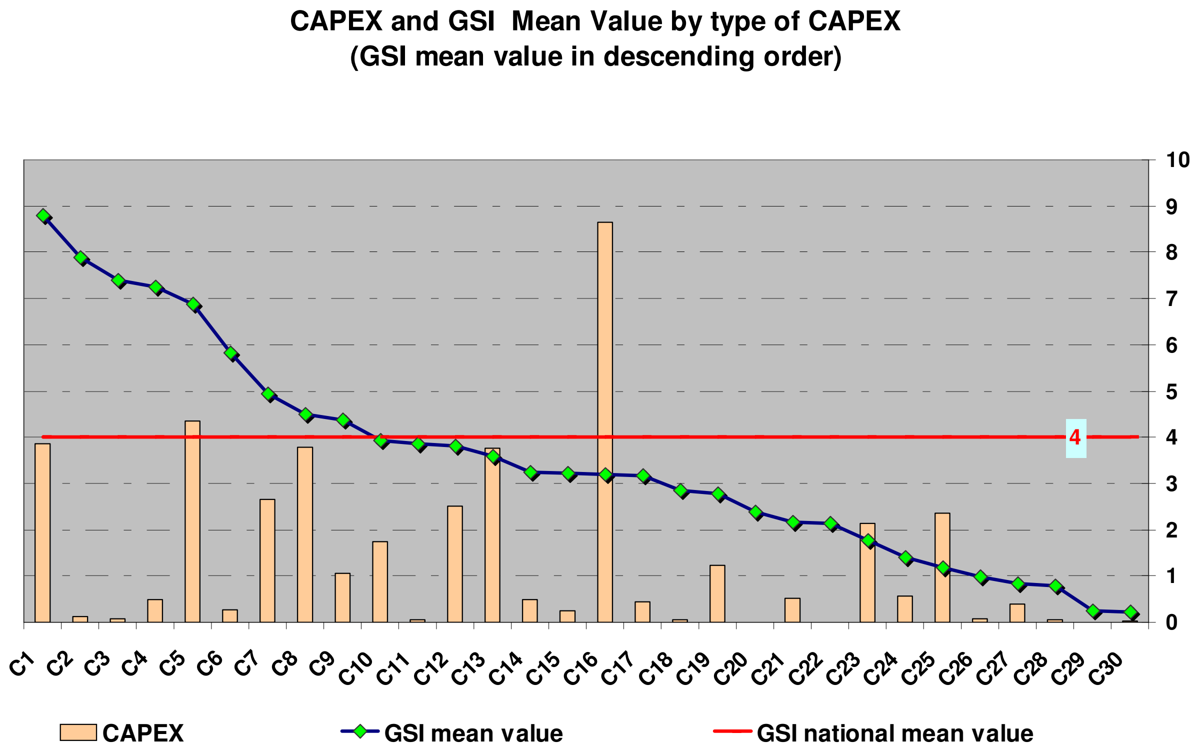
- major progress in terms of the general factoring-in of the full cost;
- improved visibility of the structure of these investments in terms of their nature and their geographical region.

The in-depth analysis of investment requests presented by the GrDF regions enables the factors determining the performance in each annual investment programme to be identified and their special features to be understood.

Currently, some 4,000 annual investment requests are subjected to a GSI study.

The utilisation of these data, through analyses comparing the values of the GSI indicators for the regions with each other, illustrates differences between regions in terms of the nature of investments.





- A tool to help to manage the necessary developments.

- An expected gain in terms of risk management by identifying zones with high value with regard to industrial safety.

In addition, the use of the cartographic solution yielded time savings for those in charge of investment studies because they were given a unique solution bringing together the main GrDF technical and economic data needed to carry out investment study projects.

5 Conclusions and future prospects

a. Future developments of GrDF tools

Future developments of the GSI tool will focus on the following aspects:

- improving the modelling of forecasts of failures of the gas facilities (quantitative estimate of the probability of a failure) – these developments should enable us to improve our investment planning by making use of a dynamic model;
- regionalising the input parameters and tailoring the operating charges and maintenance costs so that they match the situation in the field as closely as possible;
- optimising and quantifying intangibles.

In addition, GrDF intends to implement the principles of the GSI for deciding between the preventive and corrective maintenance budget.

The aim is to work out the best possible compromise between general preventive and corrective maintenance expenses, while taking into account the risks involved in operating gas facilities.

Thus, to optimally define its maintenance budget, GrDF intends to use reliability models which make it possible to work out the scope of maintenance and the risks related to each sensitivity class of the various families of facilities.

To this end, GrDF uses the feedback from the CMMS database, incident databases and accounting databases. They provide data on the scale of the asset parks, the unit costs for corrective and preventive maintenance, and preventive maintenance decisions.

In addition, GrDF is continuing its work in the following areas:

- analysing and evaluating the risks related to failures of facilities and their location (corrective maintenance costs, impact on safety, cost of a lack of quality of service, etc.);
- drawing up a general model that makes it possible to quantify the impact of preventive maintenance on risks involving the network;
- working on a decision-making tool which makes it possible to study various maintenance strategies to, for example, maximise the reduction in the safety risk while ensuring that the cost of maintenance remains constant.

The optimisation of OPEX expenses must not be dissociated from the optimisation of CAPEX expenses because the issues of maintenance and are closely intertwined.
In the long term, the aim is therefore to achieve a general decision-making solution integrating applications to make OPEX/OPEX, OPEX/CAPEX and CAPEX/CAPEX decisions at local and national levels.

b. Conclusion

The GrDF approach tries above all to provide all the asset management players – from the asset owner through to the operational players – with the same tools with a view to optimising the efficiency of our investment and maintenance policies at all levels.

The wide range of operational facilities, regions and their immediate environment mean that the management has to provide different allocations of resources in an objective manner to facilitate acceptance.

The asset management tools have been developed on the basis of this very operational and pragmatic rationale.

Obviously, this asset management strategy mainly aims not only to guarantee the industrial and economic performance of the network, but also to ensure that GrDF, due to its approach, demonstrates to CRE and to the French government its ability to be a legitimate player on the French gas market and to use regulated revenues as efficiently as possible.