The IMPLEMENTATION of an INTEGRAL

PIPELINE (integrity) MANAGEMENT SYSTEM

means more than Integrity alone

by

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SUMMARY

This paper will give an overview of the history of PiMS and the new developments within Gastransport Services regarding the implementation of an integral Pipeline (integrity) Management System. The authors will discuss the history, objectives, processes and the way how to reach the goal in more detail in this paper. The design of the pipeline network in the Netherlands was based on the ASME B31G guidelines, as a sound engineering practise. The construction started early 1960 in a very rapid tempo. The control and maintenance in those years was executed on a paper based system with steady state frequencies of measurements uniformly distributed all over the network.

With the nowadays databases and computer systems all kind of analyses beyond the capacity of a pipeline engineer can be carried out. These analyses have been made possible by outstanding Research of different companies, Joint Industry Programs and international investigations executed by a variety of different well known groups. However an integration of all the data and stand-alone models into one single (PiMS-)system with one or more linked databases and controlled by one process control system was not a major option due to a lack of IT-possibilities and management objectives.

Due to very fast developments in IT, recent incidents in the industry all over the world, the change in management objectives to have a faster and a better control over the pipeline safety, reliability and associating costs a strong desire for a PiMS-process control system was born.

RESUMÉ

Ce rapport donnera un aperçu général de l'histoire de PiMS integrity) Management System et les nouveaux développements dans Gastransport Services en l'implémentation d'un Pipeline (intégrité) Management Système. Les auteurs discuteront l'histoire, les objectifs, les procédés et la façon comment atteindre le but dans ce rapport. La design de pipeline dans l'Hollande a été basée sur le ASME B31G guidances, comme un practice d'ingénieur. La construction a commencé des début de l'année 1960 dans un tempo très rapide. Le contrôle et l'entretien dans ces années ont été exécutés sur un système papier basé avec mesures de régulier uniformément distribué partout le gaz grid système.

Avec les bases de données présent et les systèmes informatiques tout genre d'analyse au dessus de la capacité d'un pipeline ingénieur peut être exécuté. Ceux-ci analysent ont été faits possible par la Recherche remarquable d'entreprise différentes, de 'Joint Industrie Programmes' et d'investigations exécutées par une assortiment de groupes internationales renommés. Cependant une intégration de toutes les données et le modèles autonome dans ún Pims Système avec les bases de données plus reliées et contrôlé par un système de procès n'était pas une option majeure grâce à un manque d'objectifs d'il possibilités et direction.

Grâce aux développements très rapides dans IL, les incidents récents dans l'industrie partout le monde, le changement dans objectives de direction pour avoir un plus rapide et un meilleur contrôle par-dessus la sûreté de pipeline, reliabilty et associer coûtent un désir fort pour un système de contrôle de Pims Procédé était né.

1 INTRODUCTION

Gastransport Services operates about 11,500 km of pipeline network in the Netherlands, a highly populated country with about 4600 km of railways and 2750 km of motorways. The pipeline network consists of pipelines with diameters of 2" up to 48" at an average depth of cover of 1.60 m. The buried pipelines are protected among others with 2,000 ha of coating and are running through the country side where we do have contracts with about 120,000 landowners. A lot of measurements are taken in order to **maintain the safety and integrity of the pipelines** at its excellent quality in the way as earlier described in ref. [1]. Distributed over the Netherlands there are about 25,000 CP-test-posts, where at frequent intervals potential measurements are taken to control the Cathodic Protection of the pipeline at the required level. Many resources of different departments are daily involved to maintain the pipeline and its designed safety status. Researchers are working continuously to understand all the physical processes in order to improve the knowledge of design, maintenance and controllability of the pipelines and as a result thereof maintain the very good safety records of the pipelines in the Netherlands with the aim to improve it even furthermore.

If one compares the safety records of other means of transportation with (gas) pipelines in the Netherlands, the conclusion is justified that pipelines do have an outstanding safety record. In the Netherlands during an average year there have been 12,000 people injured and even about 1,200 people killed by accidents on the motorways, the gas industry on the other hand did not have over more than 30 years of operation had any major accident resulting in an injury or fatality ! Of course this does not mean that we can relax and enjoy the good safety records. Due to recent incidents in the gas industry all over the world and also calamities in other industries in our own country management and workers within the company are very much aware of the risks of gastransportation. This already has resulted in good quality assurance procedures and internal safety regulations in the company. It is moreover unavoidable that the good safety records as well as the threats and associated measures taken, have to be demonstrated to the competent authorities.

Due to the fact that nowadays a lot of data is and becomes available in digital format, the computer systems of today do have the capability to handle all that amount of data and moreover to run the developed models to correlate the data to support the pipeline asset owner in the decisions he has to take the time is just about right (earlier indicated by Phil Hopkins, see ref [2]), for a great change in the industry. The industry is ready to integrate all the available data and models into one large computer system later on mentioned as the PiMS process control system. This paper will give an overview of the history of PiMS, the basic concept and functionality of a PiMS process control system and the project consideration and results. At last in the conclusions the pit falls and lessons learned will be discussed as well as the thought for future expansion.

2 HISTORY

Gastransport Services as part of Gasunie has a long history in designing and operating a relatively long and complex pipeline network in a high densely populated country like the Netherlands. The design was based, as everywhere in the world, on the ASME B31.8 guidelines, as they were established in the 1950's on sound engineering practice. In the first 30 years of their existence the maintenance of the former Gasunie pipeline network was based on

- a design and construction policy taking into account all thinkable and foreseeable threats;
- a maintenance regime aimed at damage prevention and verification of all measures taken;
- drawings, inspection results and measurement were a paper based system. A correlation of different results of data was not possible;
- in spite of legal permits the company is defending the position and location of the gas grid within the land use planning of local and national authorities;

After these 30 years the industry and authorities in the Netherlands moved toward a more probabilistic approach, the risk assessment programme with real criteria for individual risk was born. Almost a decade later the Societal Risk was added and a comprehensive risk management program had been put in place based upon practical construction guidelines such as the CPR-18E.

Up to now the company has among others a very good safety record. As we noticed from recent incidents all over the world, the time has come for changes (see ref. [2]) and awareness of major catastrophic incidents, which we certainly do not want to happen in our industry (see ref. [4]). Therefore the GtS company is spending much effort in improving the control of the pipeline management system on the one hand. On the other hand the company is working hard to make the PiMS-process more transparent and completely auditable by demonstrating every single detail

including key performance indicators (see ref. [3]), to the authorities by means of a reliable process control system.

Last decennia, a lot of out of pocket money and a great deal of resource time have been invested to understand the (PiMS)-processes. These processes include sub-tasks like the study on effectiveness of various design measures, the actual and potential threats that pipelines are exposed to, improving the inspections methodologies, developing new measurement techniques and investigating the effectiveness of the full range of different corrective measures that companies take frequently. These task have been executed to guarantee that pipelines are safe and reliable at reasonable costs.

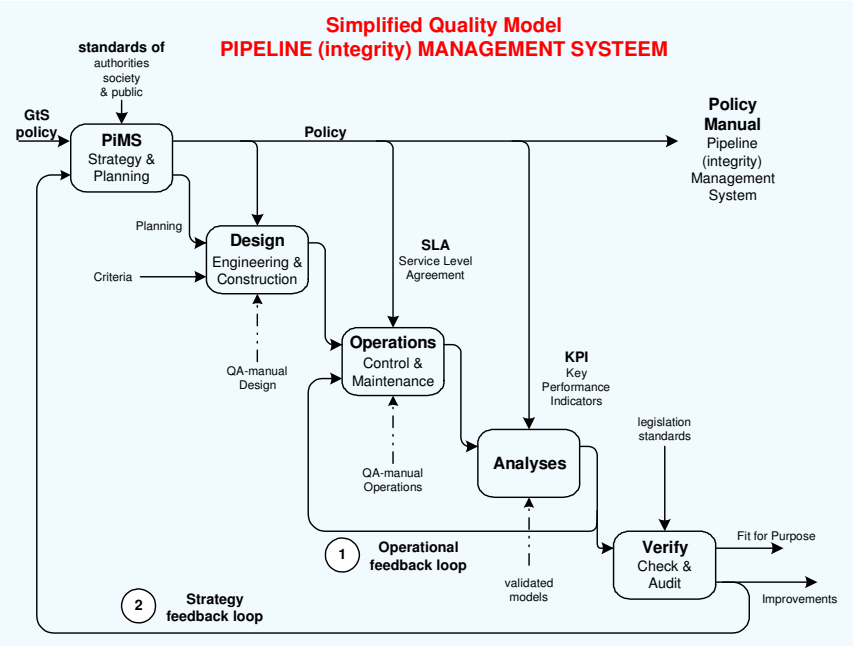

Figure 1

Last decennia all these efforts have been put into a Quality Assurance system as can be seen in figure 1, where a simplified version of the QA-model is visualized. Remarkable items in this figure are for sure the two feed back loops, one for the day to day operational control and maintenance and the other for strategic feedback of mid- and long term policies of the Pipeline Management System. Another remarkable item in this respect is the Verify process, which is executed within Gastransport Services by the Safety department, which is continuously accredited by an external accreditation company. The idea is now that all relevant items such as policy criteria, inspection results, all kinds of measurements including the fit for purpose documents from the safety department will be integrated into one Pipeline (Integrity) Management System. For further information about fit for purpose, repair and rehabilitation policies references are made to ref [7] and [8], where the fit for purpose policy itself will be explained in more detail. At the safety department within Gastransport Services an identical system is in place at the safety department. However the basic concept and PiMS as a process control system will be explained in the next paragraphs.

3 PiMS BASIC CONCEPT

The objectives of Gastransport Services to implement an integral Pipeline (integrity) Management System is to preserve and maintain the License to Operate of a Safe and reliable pipeline system at the lowest possible costs. This means as indicated in the adjacent figure 2 that the PiMS concept is based upon three pillars, namely Safety, Reliability and Costs.

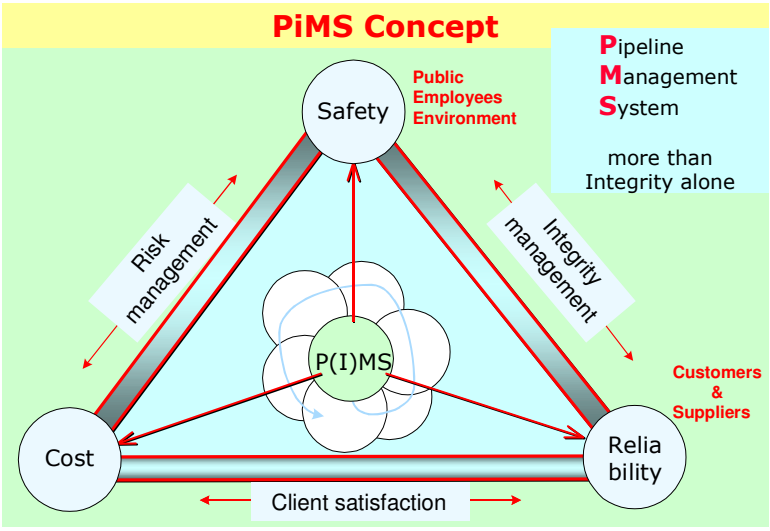

Figure 2

The PiMS in this respect can be seen as a process control system, which is continuously controlling the outputs such that the system fulfils all desired criteria. This is not an easy task to execute or to understand. One can understand for sure that in this concept many parameters are involved in a number of distinguished processes, tasks or functions.

3.1 PiMS objectives

The objectives of Gastransport Services to implement an integral Pipeline (integrity) Management System is to preserve and maintain the License to Operate of a Safe and reliable pipeline system at the lowest possible costs.

Within former IGU Study Groups it has already been stated (see ref. [1]), that the system has to demonstrate to competent authorities that adequate **managerial and organisational measures** have been put into place to prevent and control incidents, to limit their consequences for man and environment and that appropriate emergency planning is in place. Additionally it has to demonstrate **that technical safety and integrity** of the whole system has been achieved by way of appropriate design, construction, operation, maintenance and inspection based on agreed high technical standards and codes. All these kinds of paper based strategies are nowadays ready to be implemented in a real process control system. The objectives for this PiMS-process control system is given in the following list and in more detail in Appendix A:

- Proof every year the License to operate to authorities, the remaining threats and measures taken in a specific year;
- Proof and demonstration of actual integrity compared to previous periods of time;
- Generate information in auditable processes for both the safety department as part of an internal verification process and externally for the competent authorities;
- To improve the quality and confidentiality limits of the data used because it can be controlled by the unique source and distributed throughout the system where ever it is needed. The processes and workflow will be transparent for every user resulting in improved maintainability and data consistency;
- The possibility to be able to differentiate applicable measurements and measures over the gas grid system, where they are needed most according the criteria and key performance indicators;

The challenges that companies especially in the Netherlands have to meet in the near future they are among others:

- More stringent and new legislation (environmental as well as safety) coming up soon in new industrial standards (NEN 1059 / 3650);
- More direct governmental control as a result of recent incidents (Seveso II, firework disaster, Enschede, Volendam, Toulouse, etc.) shall mean more reports to generate and more to demonstrate;
- The gas grid system is ageing and we ought to take appropriate mitigation measures;

- As a result of better and easier communication means actual information is coming more frequently and in larger numbers resulting in expanding databases and the need for adequate filtering techniques;

3.2 PiMS a balance mechanism

The PIMS-process, as indicated in figure 3, can be seen as a balance mechanism between the design- and operational measures on the one side and all kind of threats at the other side. As said before, a lot of knowledge has been gained about the effectiveness of the measures and threats, so that the level of balance can be determined. External circumstances and ageing causing internal and external defects are also considered as threats too. It is clear that extra measures are necessary to maintain the balance at the desired level.

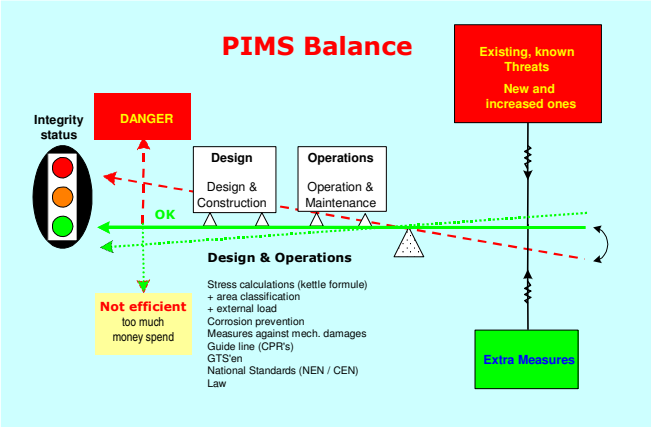

Figure 3

Of course a company only wants to take the most effective extra measures at the lowest costs. In this respect the pipeline owner is frequently interested in the level of the balance. As a result thereof using the extra measures as a kind of corrective action in the sense of tuning the process in order to achieve a “green” traffic light status for every separate pipeline section. It might be clear that a pipeline network consist of many (over a thousand) pipeline sections and that this balance, including the effectiveness of measures and threats, must be calculated for every section. Having this information it is obvious that the balance is more than integrity alone, because it is in fact an Integral Pipeline Management System. This PMS is the overall balance between safety, reliability and costs in a way that it is acceptable for all stakeholders including authorities and the public.

It may be clear that these balances are indeed very complex processes and therefore we feel lucky that with today’s technology and instruments we can solve the equations and visualize the balances in a very pleasant way by a sort of (PiMS)-process control system. As a result thereof one of the advantages is that the pipeline owner is in this manner capable to differentiate the operational measures over the pipeline sections and spend the maintenance budget there were it is most needed.

3.3 PiMS process control system

As said before the PiMS-project can be seen as a the implementation of a process control system. To automate a process one needs to have a comprehensive knowledge about the process itself , the possible disturbances of the process, the necessary measurements and the corresponding measurement frequencies. The measurements must be analysed, subsequently filtered and archived to allow historical trending, alarming and controlling against the desired process values. This implies that in order to control the process not only the controlling criteria as well as the algorithms and the effectiveness of corrective measures must be crystal clear, otherwise it is out of the question to automate such a process. The reason for such an approach can be found in the fact that a lot of data have been stored separately such that overall correlations were hardly impossible. With the nowadays computer systems and databases these correlations have become possible to assist the pipeline owner in the quantitative decisions he has to take more frequently in less time.

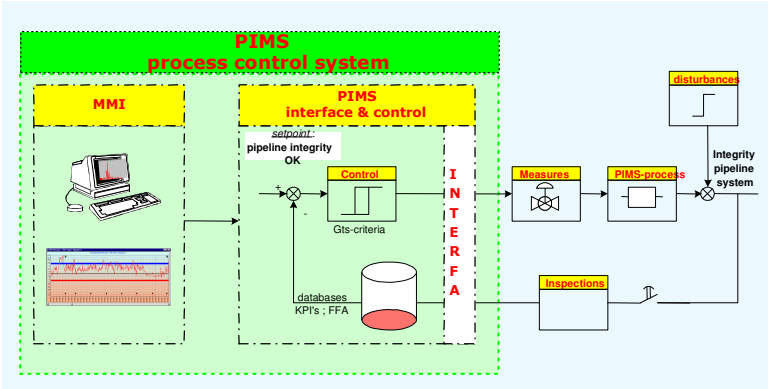

Figure 4

As indicated in figure 4 the PiMS process control system consists of interfaces, databases, control algorithms and criteria and a MMI to operate the system. But as discussed previously this is not enough, knowledge about the processes itself is as much important as knowledge about the way how to automate the process. This implies that such a project is very complex and cannot only be executed by the IT-department. In the case of Gastransport Services many people from departments such as the Asset Management, Operations, Research, IT and Purchasing are involved in the PiMS project, even a special project board team, consisting of managers high in the hierarchy and the project management, has been formalised to handle several problem areas, which go beyond the responsibilities of the PiMS project management.

3.4 PiMS system hierarchy

In order to automate a process one needs to know how the process is working, the sensitivity and reliability of all its components and so forth. Much effort has been put into these aspects in the past. The PIMS-process is a very complex one and relatively young. This means that due to the very good safety records not too much data on incidents is available to make quantitative calculations possible. Moreover the external disturbances to the process are also varying. This makes it even more difficult for analysts to quantify the integrity of a pipeline. As a very large disadvantage all the necessary information for all kind of analyses have been spread all over the companies databases.
An insight view on the future investments, such as survey, pigruns, repair and even replacements of pipeline sections is hard to estimate for the entire network, because of the lack of integral technical data and cost information.

The possibilities of process control systems nowadays are numerous. With current techniques like for instance Geographic Information Systems and standard applications like CP, Risk Assessment, inline pipe analysing tools and dedicated programs as there are integrity assessment, economic decision tools it will become not only possible to answer all kind of queries but also get answers related to the PIMS-balance on safety, reliability and cost.

The consequences of events potentially resulting in corrective actions, such as pressure reduction or even putting a specific pipeline section in a strategic transport route out of operation, are the worst nightmares of any network operator. If these consequences could have been prevented by an adequate corrective actions just in time, then the balance between safety, reliability and costs is working to the full satisfaction of the pipeline owner and operator.

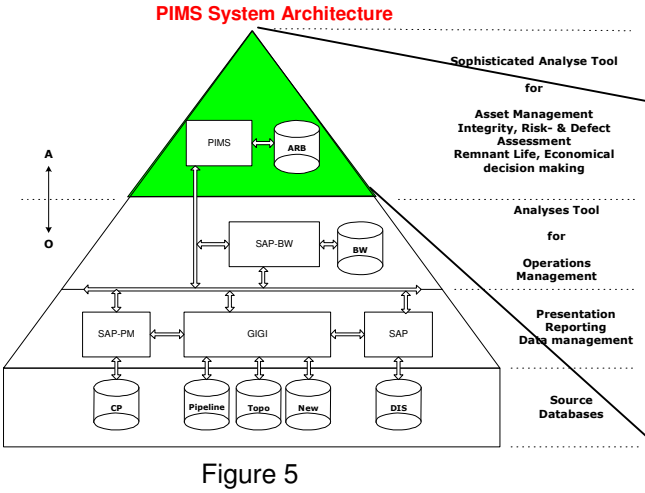

Figure 5

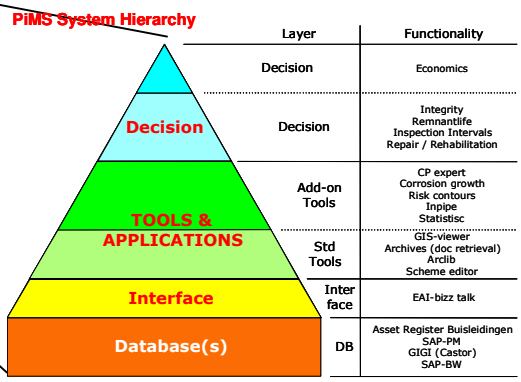

Figure 6

3.5 PiMS functionality

The functionality that is needed in the GtS company is written down in a comprehensive functional specification. A global overview of the functionality, which currently will be implemented in the GtS PiMS-system is :

- Geographical and topological information about the pipeline network, surroundings and environment;
- Inline inspections (flaw list as well as binary data, analysing and comparing programs)
- Excavations, repairs, fit for purpose declarations
- CP data measurement presentation and analyses of protection in time and in place

- Coating surveys measurements and interpretations
- Risk assessment contours (according standards as NEN 3650, CPR-18E of IR & SR)
- Incident monitoring (GDLI & EGIG)

The advantage of having all these kind of data, correlation functionality, add-on tools, simulation models in one integrated system is obvious. The analysis are more efficient for the experts, there is no necessity to search after and collect all actual information. With other words easy and time efficient analysis are become possible, rapid demonstration about the current and thus actual situation of each individual parameter, measured or calculated is one of the major feasibilities and last but certainly not least the compliance with laws, codes and regulations can be proved by this system. The department, which normally check and audit manually every contingency of the pipeline is also going to use the PiMS-system, because all the measurements and inspections carried out and mitigation measures taken are assessable within the system as well as their analysing tools in order to declare a pipeline fit for purpose. Even photographs of defects and environment are to their disposal to justify the fit for purpose declaration. Naturally these kind of documents generated by the department responsible for declaring a repaired defect or even a complete pipeline fit for purpose and at the end of the year the Certificate of Compliance will be archived in the PiMS-system.

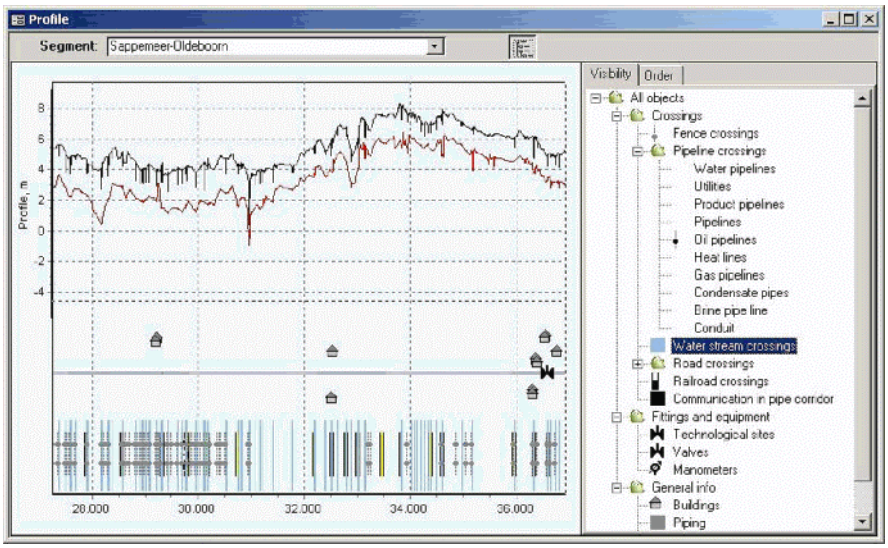

Figure 7

The system is developed such that not only all data can be retrieved at all times and at all kind of possibilities, but all the data has been geographically linked. Meaning that if an operator selects a pipeline or just a section of it, an automatic linking system will be at his disposal. The historical information of all kind of activities like inspections, CP-measurements, photographs, soil investigation report, CP-deposit chemical analyses etceteras are available just in a split second. Large reports massive photographs will as usual be stored in a Document Information System (DIS), but through the linking procedure and the interface with an EAI biztalk ring the system knows where the sources are stored. The PiMS-system will automatically activate the appropriate viewer for the type of source the operator wants to have a detailed look on. Furthermore all kind of analyses can be executed and results will be stored in the appropriate databases.

4 CURRENT PROJECT

The PiMS-project is divided into a number of phases. The project was started about two years ago with the inventory phase. A lot of desired functionality, existing models and database sources have been investigated and put into a Functional Design Specification. This rather global Functional description has served as the basis for an European Request For Quotation for different (international) bidders as explained before. In the meantime the criteria and the selection process has been elaborated in documents, where after the selection process of bidders began. The selection process has lasted about a year. After the selection process a scoping phase has been organised, which took about half a year. The following items have been executed:

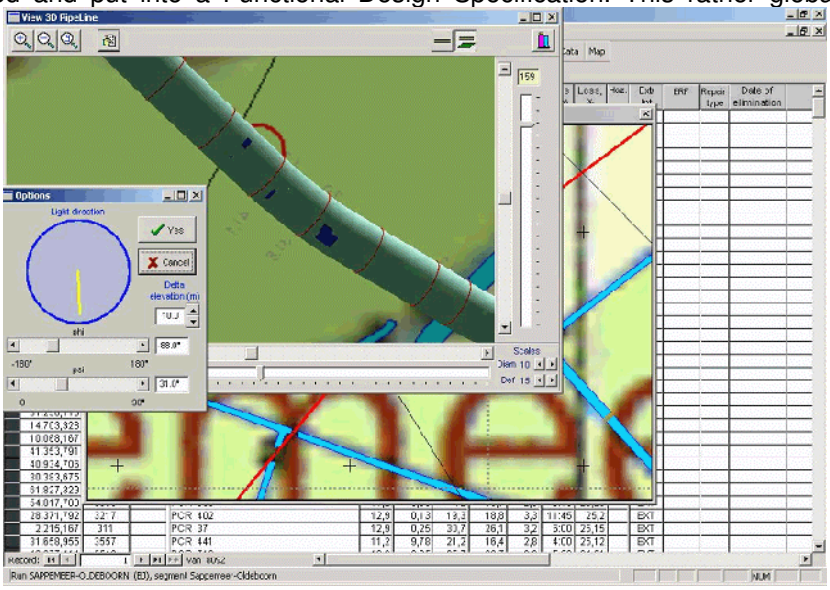

Figure 8

- the requirements of the system have been discussed in much more detail, it has served as a detail definition phase;
- a lot of the existing information of the pipeline network as well as current models have been exchanged and discussed between experts of both companies in other to gain a mutual understanding about the possibilities and the needs of the system;
- a prototype has been elaborated including the digitising of all kind of available data of one of the pipeline sections (A-540, 36" diameter, 70 km length);
- interactive work shops have been organised to clarify to a major selection of the project team the possibilities and the need of the PiMS-system;
- the contractor has visited the central command post and other IT-systems to have an understanding about the current status and quality of our operational IT-systems;
- the prototype has been demonstrated to the project team members, where after the project team could exercise with the prototype at their own PCs through client/ server programs in the test environment;
- feedback from the workshop and the test of the prototype in the test environment have been structured and discussed with the contractor;
- the above mentioned feedback as well as the experiences of the contractor has been taken into account in the project specification for the next phase;
- all gained information and the strategy within the company has lead to the scope of work and associated quotation and schedule for the next phase;

The risks for this project have been internally analysed by means of the keywords from the next table:

Lack of	**Results in**
• mission, objectives and perception	➢ confusion
• motivation, enthusiasm	➢ opposition, resistance
• skills, competence and attitude	➢ fear, hesitation
• strategy, structure and detailed plans	➢ chaos, no progress
• means and resources	➢ frustration, irritation

It may be clear that every project team member has his own responsibility and tasks to execute and therefore have an individual meaning about the above mentioned project risks. Because the situation from country to country and company to company differs a lot the consequences and potential measures which can be taken by the project manager are different and not discussed in this paper.

5 FUTURE

In the near future the following functionality can also expected to be implemented into the PiMS process control system.

- Analyses of effectiveness of the One call system (KLIC);
- Right of way patrolling (airborne, car patrol, walking over the pipeline);
- Monitoring land-use planning;
- Emergency planning and calamity control;
- NoPig inspections;
- Information and communication (management, authorities and public);
- The pressure safeguarding system, including pressure control, the HPSD and design specifications;
- Installations like blending, compressor, reduction, export stations from a safety and reliability point of view;
- Remnant life assessment of pipelines;
- Quantitative integrity assessment calculations;
- Economic decision modelling;

The key users of the system will first have to be acquainted with the functionality system, their feedbacks shall be analysed within the project team before new development will be initiated. Although GtS is a innovative company, great changes in the workflow and also respective organisational matters however have to go step by step. If the project moves too fast the rest of the organisation will not follow and resistance against the system is the remaining result. Therefore we can say that the future work on items mentioned above will start as soon as the key users are ready for it.

6 CONCLUSIONS

The PiMS-system offers a great added value for the Asset management and Operational department within the Gastransport Services company in the Netherlands. It will be indeed a great innovative step forwards compared to the developments from the last decennia. The system is very flexible and indeed anything you ever have dreamed of can be realized with this system. High profile of project management is crucial for these kind of complex projects in order to run a project with dedicated phases, deliverables, milestone and mutual understanding of the detailed functionality of the system.

One of the pit falls is that, due to the enthusiastic reaction on the demonstration of the prototype, one tries to implement too much at the same time and in the end the project is not delivering according to the principal expectations.

In this respect a view lessons learned will be stated underneath :

- High level management commitment and understanding is essential for the claim of all necessary resources and priority of the project, since so many people and departments have to work close together;.
- Time spent during a scoping phase will be paid back double or even more later on, because a lot of the potential problems and pitfalls are addressed during this phase;
- Do not underestimate the complexity of the system architecture, infrastructure and interfaces with other large systems like GIS (the geographical database and viewing system, SAP (database for objects, costs and workflows throughout the company), DIS (the archive system for documents, reports, photographs and what so ever), DDS (the digital drawing system) and so on;
- The project plan must be structured into phases with measurable deliverables, which act as milestones and the scope of work must be clear to everyone in the organisation including the contractors;
- It is crucial to have work flow diagrams for most of the crucial processes and to have a full understanding throughout the company of responsible owners and key users for each process;

- Investigate right from the start the data required, the data source(s) and availability in time for each application and source separately and try to match the outcome of these matrices in order to have a feeling of white spots and redundancy in data;
- The reliability of the data can be investigated parallel with the execution of the PiMS project, but is also vital for the confidence limits of calculated results;
- If all these lessons will be brought into practise throughout the company one will recognize that PiMS is indeed a very powerful tool, which had to be available yesterday instead of tomorrow.

It is obvious that an old dream can become true. All the data, previously collected in separate shoeboxes, is now available for the user with one mouse click. Even sophisticated tools such as calculation, simulation correlation and geographical linking routines are available to do his work more efficient and effective resulting in a better overview of threats to the pipeline system, differentiated measures to keep the system at its required high safety level and moreover all actions are auditable for company management, concern controllers and competent authorities.

ACKNOWLEDGEMENT

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The company ATP Neftegassystema from Gomel, Belarus will be acknowledged for their outstanding work carried out during the scoping study to demonstrate the value and capabilities of their system.

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KEYWORDS

Pipeline Management, Integrity, Process control system, Risk, Risk assessment, Remnant life, Economic decisions, Cathodic Protection

Appendix A

PiMS SUPPORT and ASSISTANCE

In the table underneath an overview is given of all the objectives that can be used to initiate the implementation of a PiMS project in your own company. Gastransport Services can help you through the Gasunie Engineering Department with support and assistance for advices, the project control, project execution and implementation and even act as overall supplier of a PiMS system in your company.

Of course it is not possible to demonstrate all objectives, functionality and results in this paper. If you need any further information feel free to mail a.pijnacker.hordijk@gasunie.nl or check the internet site www.gasunieengineering.nl

	Motivation PIMS-project		
	Item	***Differences between the past and nowadays***	***Consequences***
Overall	**Reliability**	The pipeline network suffers from ageing	These primairy motivators to start the PiMS-project are divided over External en Internal arguments, which are subdivided into different items as indicated below
	Safety	Significant increase of (public) awareness caused by recent incidents (Enschede, Volendam, Toulouse, etc.)	
	Costs	The tarifs of gastransportation are under pressure by the DTE	
Extern	**Demonstration**	Recent disasters, threats of an European Pipeline Directive (such as Seveso II) and national pipeline regulations	There is a need for elementary procedures, structure and comprehensive tools ur combined in an auditable process control systeem, which enables the operator with a "push at a button" output in de vorm van topografical output, graphics and tabels. Nowadays it is not possible anymore to correlate data and to execute respective (integrale) analyses without help of complex computer systems
	Verification	The authoritioes are more competent and willing to judge not only procedures, but also the content	
	Safety distances	In the past only the invidual design was approved, nowadays an complet overview of the entire network must be given. The problem areas need to be accentuated by GtS.	Lack of land use for built-up areas as a result of zoning contours of buried pipelines is nowadays a hot topic. The environment of the pipeline shal often and at higher frequencies change, the organisation must coop with these given changes. The consequences of new guidelines must be made transparent. Visualisation of problem areas in correlation with other transport modalities such as road,-, water- or railways wil become a prerequisite.
	Risk zoning	originated in the 80's. The consequences of new developed VROM risk contours procesdures are not transparent	
	Land use planning	open space development is approching the pipline, the company has to be able to anticipate quickly	
Intern	**Inspections**	availability of better apparatus(SCM, PCM), frequency of pigruns has been increased sigificantly (from 2 per 10yr upto 40 per 10yr.	The availability of much more (digital) data, which can be easily correlated, also means more work for analysists and a necissity for database management systems (storage and retrieval) as well as programming tools for defect assessment and defect comparison
	data bank	digital instead of analoge, more data & increased frequency of data, historical trends possibble	
	Correlation	scientific assessments possible through digital data, in the past only by eyecatch	
	Ageing	vroeger niet relevant , nu meer awareness	The companies are nowadays aware of the ageing threat. It is necassary to develop a model which analyses on the basis of of all available data the integrity styatus per pipeline section. As a result thereoff the ranking of the integrity of the entire netwqork can be obtained
	Intergrity status	Nu te berekenen door veel beschikbare gegevens te correleren	
	Optimalisation	behoort nu tot de mogelijkheden	Optimalisation and differentiation of measures and resources can no longer be manually acquirred, because of the number of possibilities and amount of data. Optimalisation of costs is necessary as a result of the DTE tarifs and the increased safety awareness. Therefore a PiMS process control system is unavoidable and absolutely essential.
	Differentiation	in the past fixed frequencies, nowadays different frequencies as a result of ranking of potential problems	
	Controlability	Controlability of the entire system can be improved by RBI and correlation of all neceassry data	Door een betere beheersing van alle verschillende corrective maatregelen over de verschillende leidingscties met potentiele problemen waarin de economische afwegingen worden meegnomen wordt zichtbaar gemaakt wanneer welke activiteiten dienen te worden uitgevoerd
	Investments	The pipeline owner knows now by means of ranking of potential problems and remnant life calculations when and how much he has to invest in his pipeline system	