The PROLIST concept:
integrating engineering with business workflow

Born in the German chemical industry, the PROLIST idea of transmitting technical data among plant owners, engineering contractors, instrument suppliers, and maintenance departments will save time, increase accuracy, and improve maintenance systems.

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The process of specifying, purchasing, delivering and maintaining highly complex instruments and automation equipment will be greatly simplified if all the companies involved agree to use PROLIST's concept called 'Lists of Properties,' or LOPs.

Purchasers and suppliers have, for some time, been using electronic formats such as e-mail and web sites to exchange data. However the data that are exchanged between departments and companies are in proprietary formats incompatible with each other's computer systems.

It is not much different from the situation that existed 30 years ago, when one company would send a paper 'request for quote' to another, and receive a reply on paper, and then generate a purchase order, also on paper.

Computers and the Internet have simplified the typing and sending documents back and forth, but until XML came along, it was pretty much the same tedious work. With the data exchange possibilities of XML, the data can be shared among computer systems without having to re-enter it from the keyboard.

And, for many years after the instrument is purchased, it is tracked in an asset management system. The same XML files can be sent to the maintenance department and the information transferred directly into an enterprise resource planning (ERP) system, such as SAP.

The idea is the outworking of PROLIST® INTERNATIONAL (www.prolist.org) organisation, which has 30 members, including plant owners, engineering contractors, device manufacturers, CAE (Computer Aided Engineering) system providers, software providers and universities.

DLOPs and OLOPs

Most of the work in PROLIST so far has been in defining the fundamental XML 'lists of properties' (LOPs) for a broad range of device types. The results of the working groups have been published in NAMUR recommendation NE 100 and are available in English and German.

The LOPs are structured lists which describe two types of parameters: the properties of the devices (DLOPs) and their operating environments (OLOPs).

For example, suppose the temperature range for which a device is specified for correct operation is -20ºC to 200ºC. In the DLOP the property 'temperature min' is assigned the value -20ºC and the property 'temperature max' 200ºC.

To describe the actual operating environment the same properties may be used, but with a different meaning and different values. If for example the temperature range at the operating location in the process plant is 100ºC … 150ºC then the OLOP would have recorded 'temperature min' 100ºC and the property 'temperature max' 150ºC.

PROLIST working groups have given much attention to the organisation of information in the LOPs. Properties are grouped into blocks and sub-blocks, which makes it easy to duplicate and create new lists of properties. For example, the electrical output block can be used as both a digital and an analogue output.

Also included in the files are the administrative lists of properties (ALOPs) which describe information needed for data exchange (file header, type of document, company details), and commercial lists of properties (CLOPs) that describe price, delivery times, and method of transport.

Workflow

The actual flow of the 'Lists of Properties' files between different computers may take a variety of paths. On the 'customer' side—that is, the chemical manufacturing plant such as Bayer or BASF—there is the engineering department which does its planning on CAE systems, the purchasing or materials managing department, and the maintenance department. On the 'supplier' side of the transaction—Krohne, Endress+Hauser, for example—there are the sales and distribution departments, which may be the first to receive an inquiry or an order and send an offer, and then there are the development departments which take care of maintaining their own product database.

These departments already have established their workflows, so the PROLIST files only serve to streamline the work. They do this in an important way: each individual piece of data is entered only once and into only one of the systems involved in the workflow and is then transferred from system to system with an XML file.

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The CAE system plays the key role in the workflow on the 'customer side'; it is typically the originator of the LOP file.

For companies without CAE systems, PROLIST provides software for creating and visualising LOPs in XML format. These two programs are PRO-SPEC for creating, viewing, and comparing LOPs in XML format, and PRO-VIEW for viewing the XML file.

Because certain people in the chain of users do not need to see all the data, PROLIST has implemented the concept of 'views' to reduce the number of items in the LOP that may be seen. This is considered important aspect of the scheme, so that certain people are not overwhelmed with data they don't understand and cannot use.

Into the Life Cycle

Following the engineering and purchase of a new instrument, it may remain in use with the company for many years. Computerised asset management systems keep track of maintenance on the devices, so the NE 100 files can be used to supply information for these maintenance systems.

The division of the NE 100 LOPs into DLOPs and OLOPs fits naturally into this purpose. The Plant Maintenance (PM) module in SAP illustrates the data management. The operating location of a device in the plant is described via the *functional location*. The devices themselves are represented as *equipment*, which can also be assigned properties in the form of structured DLOPs for device description. Each item of 'equipment' is assigned to a 'functional location' in SAP, similar to the procedure for assignment of individual process control devices to a particular control loop.

The properties for the functional location are listed in the control documentation in the operating parameter sheet. These properties correspond exactly with the data of the operating OLOP in accordance with NE 100. These data arise during the planning and engineering process before the actual use of the device. The OLOP contains planning data which are usually developed even before a device is procured.

NE 100	SAP PLANT MAINTENANCE	CONTROL DOCUMENTATION
Operating LOP (OLOP)	functional location	operating parameter sheet
Device LOP (DLOP)	specific piece of equipment	device specification

The data of the device LOP (DLOP) correspond with the data of the device specification from the control documentation and simultaneously with the data which are stored in SAP under a specific piece of equipment.

When SAP is used as the plant documentation system, these data can be transferred from the OLOPs and DLOPs directly to SAP through the import of XML files, thus avoiding manual input into SAP. Alternatively, links to the respective XML files can be stored in SAP at the functional locations and the XML files themselves can be stored at any location in the company's data landscape. The interlinking of the XML lists of properties is simple to implement without any investment.

The extent to which the NE 100 standard can contribute to plant maintenance is considerable. For example, in the daily maintenance analysis, which is managed in SAP, fault reports occurring within a process plant are logged in an electronic notification book. During analysis of the faults detected, which is normally conducted in the plant every morning, data on a control loop and the devices assigned to it can be gathered very quickly and simply, thanks to the data uploaded from the NE 100 LOP files.

In fact it is possible with only a few mouse clicks to establish, through checking of the electronic documents, how quickly a fault in the plant can be remedied. The contents of the XML files can be viewed and analysed with the PRO-VIEW program.

There is an additional benefit: the 'functional location' in the SAP Plant Maintenance module can be interlinked with another SAP object, known as the *material*. This represents data for a device held in the company's warehouse system that can be used as a replacement part. The XML file linked to the material can be also viewed with PRO-VIEW.

Organisation of the data exchange between the plant owner and the workshop, in which replacement devices are configured and assembled for the plant, serves as an example of this. This is already practised at one of the PROLIST member companies. The data of the device to be configured are input into the engineering system only once and then automatically transferred from one system to another by means of NE 100 interfaces.

We think NE 100 lists of properties are ideal for defining and implementing standardised interfaces between the various systems used for instrumentation and control in process plants. They offer opportunities for IT support in asset management and for optimisation of the workflows at plant owners, EPC contractors and device manufacturers. The result is plant documentation of a very high quality which cannot be achieved with conventional technology. ❖