

# Use of Lists of Properties in Process Control Engineering Workflows

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## Introduction

The exchange of product data between various technical disciplines and the corresponding process control systems (electrical, measuring and control technology) can only run smoothly when both the information to be exchanged and the use of it have been clearly defined.

In the past, the requirements on process control devices and systems were described in various ways by customers (users) when asking suppliers or manufacturers to propose equipment. The suppliers in their turn described the devices according to their own documentation and using different structures and media (paper, databases, CDs, e-catalogs, etc.). The situation was similar in the planning and development process, with device information frequently being duplicated in various IT systems.

Any method that is capable of recording all existing information once only during the planning and ordering process and making it available for all further processing gives everyone an opportunity to concentrate on the essentials. A precondition for this is to standardize both the descriptions of the objects and the exchange of information for all parties involved.

This NAMUR Recommendation proposes a method for standardization which will help both suppliers and users of process control equipment and systems to optimize workflows both within their own companies and in their exchanges with other companies. Depending on their role in the process, engineering firms may be considered here to be either users or suppliers.

Devices are specified using properties. These properties are compiled into lists of properties (LOPs), each of which describes a specific device type. The NE 100 covers both properties that may be used in an inquiry or a proposal and detailed properties required for integration of a process control device in systems for other tasks, such as planning (e.g. in CAE systems), maintenance and ERP systems.

## 1. NAMUR Recommendation 100 and Project Group "Lists of Properties"

**NAMUR** is an international user association of automation technology in process industries.

NAMUR is engaged in the following key activities:

- pooling experiences among its member companies,
- compiling aids and check lists for member companies,
- setting user requirements on new devices, systems and technologies,
- participating in national and international standardization bodies.

NAMUR is active in the fields of

- measurement systems
- process analytics
- process control systems
- communications systems
- operations management
- operational logistics systems
- electrical engineering over the entire life-cycle of systems.



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NAMUR represents approx. 15,000 PCS experts, of whom approx. 300 are active in the 46 working groups that cover the fields of measurement & control, automation, communication, process control and electrical engineering over the entire life-cycle of systems, including planning, procurement, installation, operation as well as maintenance and demolition.

The **Project Group "Lists of Properties" (PROLIST®)**, was founded in Germany on April 10, 2003. It is a nonprofit organization reporting to the NAMUR Executive Board. The registered companies, associations and universities can be found on the internet address [www.prolist.org](http://www.prolist.org) (see "Members").

## 2. Structure and Features of Lists of Properties

The use of lists of properties to specify devices and systems is now state of the art based on well-substantiated standards, norms and guidelines. The data model used herein is described in the IEC 61360 and ISO 13584 families of standards. The organization of the contents of Device LOPs in particular is as specified in the IEC 61987-1 standard [1-5].

A list of properties is a compilation of properties. Existing property-based specification tools used in practice are almost always provided in the form of "linear" lists of properties. They have no internal structuring. All of the properties are arranged on one level,

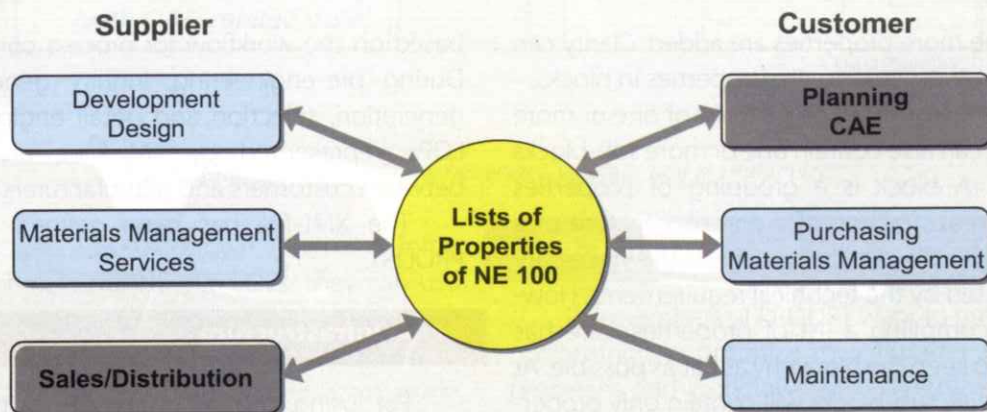


Fig. 1: Data exchange using the LOPs of the NE 100 as a neutral device exchange format

NAMUR Recommendation 100, Version 3, August 31, 2006, (abbreviated NE 100), has the title "Use of Lists of Properties in Process Control Engineering Workflows". For using the Lists of Properties (appreciated LOPs) access to the PROLIST-Server is necessary for selecting and downloading all or some specific LOPs (access code via PROLIST project office).

The aims of NE 100 are:

- To define a common language for customers and suppliers through the publication of LOPs.
- Through the application of NE 100, to optimize workflows between these partners and within their own organizations in processes such as engineering, development and purchasing.
- To reduce transaction costs.

possess equal importance, and can be sorted according to any desired of criteria.

### 2.1 Properties

Properties are specific features serving to describe objects, e.g. process control devices. These features include requirements and boundary conditions either imposed by the environment in which the device is to operate or which should be taken into consideration. They also include all technical details of the device.

The property itself is defined by its attributes assigned to it, such as identification (ID code), preferred name, definition, unit and format (see fig. 2)

### 2.2 Lists of Properties with Block Structure

When all properties are arranged with equal-importance on one single level, we call it a linear list of properties, the list will become more and more



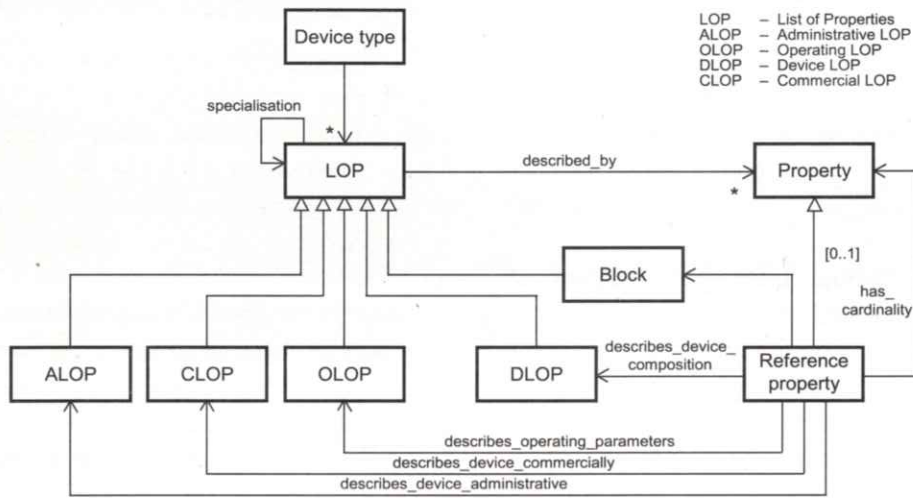


Fig. 2: Simplified UML Schema of a LOP

confusing the more properties are added. Clarity can be achieved by structuring the properties in blocks.

A block of properties can consist of one or more properties. It can also contain one or more sub-blocks (see Fig. 3). A block is a grouping of properties describing an abstraction of a complex feature of a device type. Blocks can be nested to the necessary level as dictated by the technical requirements. However, when compiling a list of properties, care has been taken to keep the hierarchy as flat as possible. At the lowest level, sub-blocks will contain only properties. For more details see NE 100.

### 2.3 Types of Lists of Properties

Most classification systems that use lists of properties concentrate exclusively on describing the technical features of a device type. NE 100, on the other hand, makes it possible to take account of other aspects for a device type.

In NE 100, these aspects are depicted using certain types of lists of properties.

- Device List of Properties (DLOP), describing the technical features of a device
- Operating List of Properties (OLOP), describing the operating aspects, i.e. ambient conditions,
- Administrative List of Properties (ALOP), describing all information needed for data exchange,
- Commercial List of Properties (CLOP), describing all valid commercial items.

The UML-schema is given in Fig.2.

### 3. Use of Lists of Properties in the Engineering Workflow

The use of LOPs in the engineering workflow is

based on the workflow for process control projects. During pre-engineering, inquiry generation, offer generation, selection and detail engineering some LOPs, represented by XML-Files, are exchanged between customers and manufacturers (Fig.3).

The XML-file has been defined by SAP and PROLIST.

### 4. Infrastructure

For using the NE 100 LOPs within business processes between companies system support is essential. Currently several CAE system suppliers have already implemented or are working on the implementation of the NE 100 LOPs into their systems. Furthermore PROLIST supports the use with the following systems.

#### 4.1 PROLIST database

The PROLIST database (server) is an Online Dictionary which is available to PROLIST members. It is accessible through a standard internet browser via the Web. No local installation is necessary. Companies may download NE 100 LOPs in different file format. The user has the selection of XML, XLS or PDF format. Also Development of new LOPs is processed online in the system. A workflow engine supports the common development of LOPs for new devices. The PROLIST database is based on the Online Reference Dictionary from Paradine, Vienna, Austria for PROLIST.

#### 4.2 PROLIST User-Package

PROLIST supports the creation of device inquiries to be sent to suppliers or offers sent to customer-based on the NE 100 LOPs. If the companies do



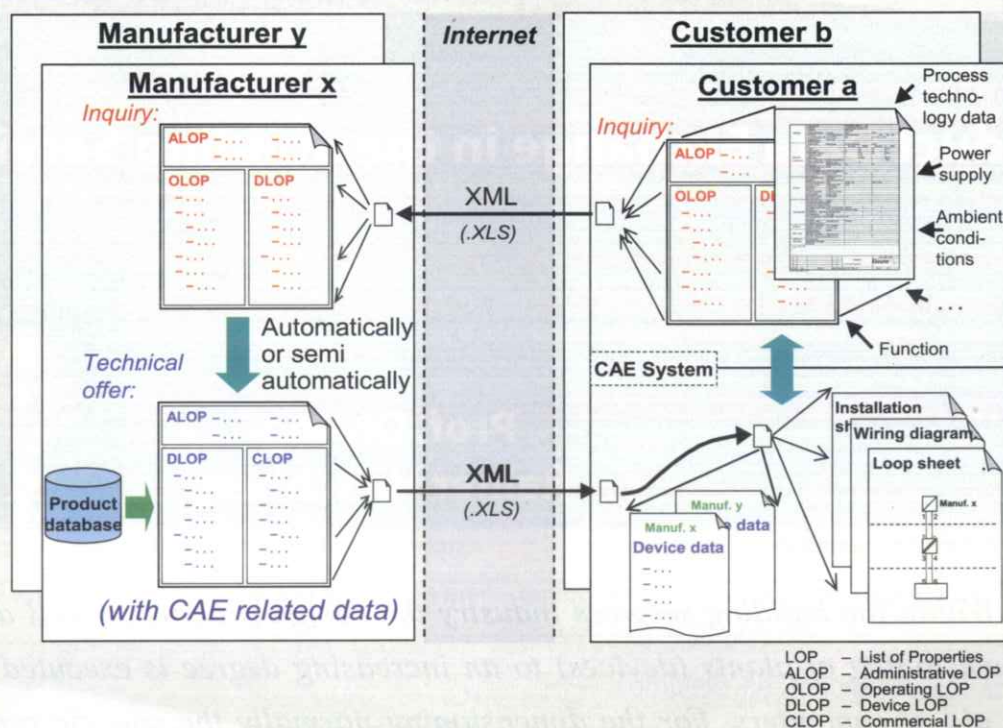


Fig. 3: Engineering workflow between Customer and manufacturer

not (or do not yet) have their own systems or infrastructure to process the NE 100 LOPs, they can use the PROLIST User-Package. This is a service based on the PROLIST database which allows the users to evaluate and store NE 100 LOPs in their own workspace on the server. These specifications can be downloaded in XML-, XLS and PDF format and used for the respective business processes.

#### 4.3 PRO-SPEC Offline Tool.

PROLIST also supports the users to process NE 100 LOPs on their own systems. PRO-SPEC is a Windows application running on XP-based systems. It was developed by PROLIST and realised by Paradine and supports the NE 100 LOP structure. Valuated NE 100 LOPs can be created, edited, compared and exported in XML and XLS Format. PROLIST members can receive and use PRO-SPEC free of charge. For non PROLIST members it can be purchased through PROLIST project office (e-mail: prolist@namur.de).

### 5. International standardization process

The standardization process with IEC is on the way. First, a cooperation between PROLIST and ISA was settled to take into consideration the ISA Spec-Sheet 20. Secondly, a IEC working group is installed to bring the PROLIST LOPs up to an international standard (IEC 61987-10 and -11).

### 6. Summary

The members of PROLIST want to use the unique opportunity to optimize their internal and external processes and workflows and to reduce transaction costs in engineering and procurement by making use of lists of properties. First experiences using LOPs in engineering workflows have been already made in pilot projects. Now, PROLIST companies have been preparing for the operational use of LOPs including the commercial aspects.

### 7. Literature

- [1] NE 100, Version 3.0: Use of Lists of Property in Process Control Engineering Workflows
- [2] IEC 61360 "Standard data element types with associated classification scheme for electric components"
- [3] ISO 13584 "Industrial automation systems and integration – Parts library"
- [4] IEC 61987-1 (FDIS): 2005-12 "Industrial process measurement and control: Data structures and elements in process equipment catalogues - Part 1: Measuring equipment with analogue and digital output"
- [5] CWA 15295: 2005-08 "Description of References and Data Models for Classification"