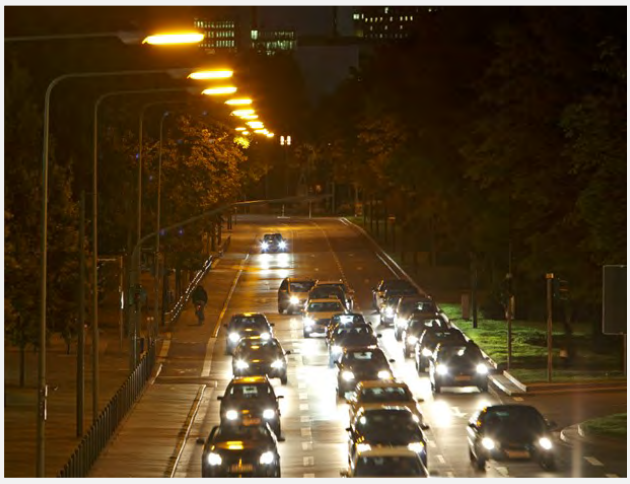
sixData

luxData

luxData.licht

The Management Information System for **street lighting** and professional **outdoor lighting**



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Tasks

Street lighting is a public service that municipalities are required to provide. The details are set out in DIN-EN 13201.

It is necessary for municipalities to reduce the

Objective

costs / performance ratios for maintaining street lighting or to keep them as low as possible over the long term.

It must therefore be possible to provide street lighting in a technically perfect condition without these services, however, causing the municipalities to lose sight of the strict economic demands that they are required to meet.

Rising energy costs along with the topic of CO2 emissions in particular have increasingly focused

Requirements

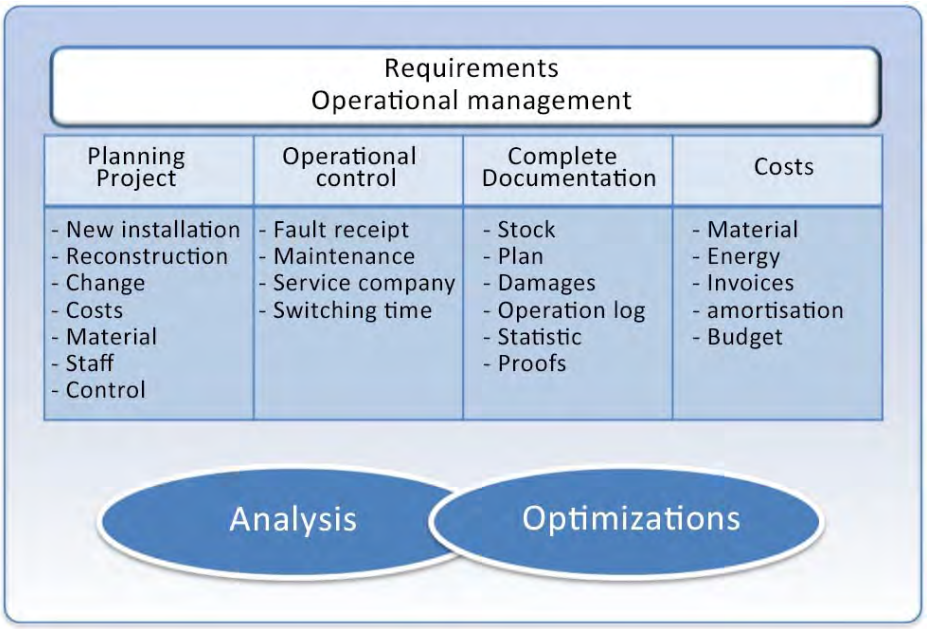
attention on street lighting.

So much so in fact that the demands on the management of street lighting have increased accordingly

and have made the business and technical requirements that need to be fulfilled more complex and significant.

That's why decisions have to be based on highest levels of reliable, meaningful and rapidly available information.

The graph below shows the essential tasks and challenges that face those concerned with the management of street lighting.



Our solution

luxData.licht is your key to making the management of **street lighting** and **professional outdoor lighting efficient!**

luxData.licht - is a modular system.

luxData.licht - has been successfully employed in the lighting industry for many years.

luxData.licht - meets all the demands facing those concerned with the management of street lighting and professional outdoor lighting.

luxData.licht - is being developed continuously.

Important functions at a plance

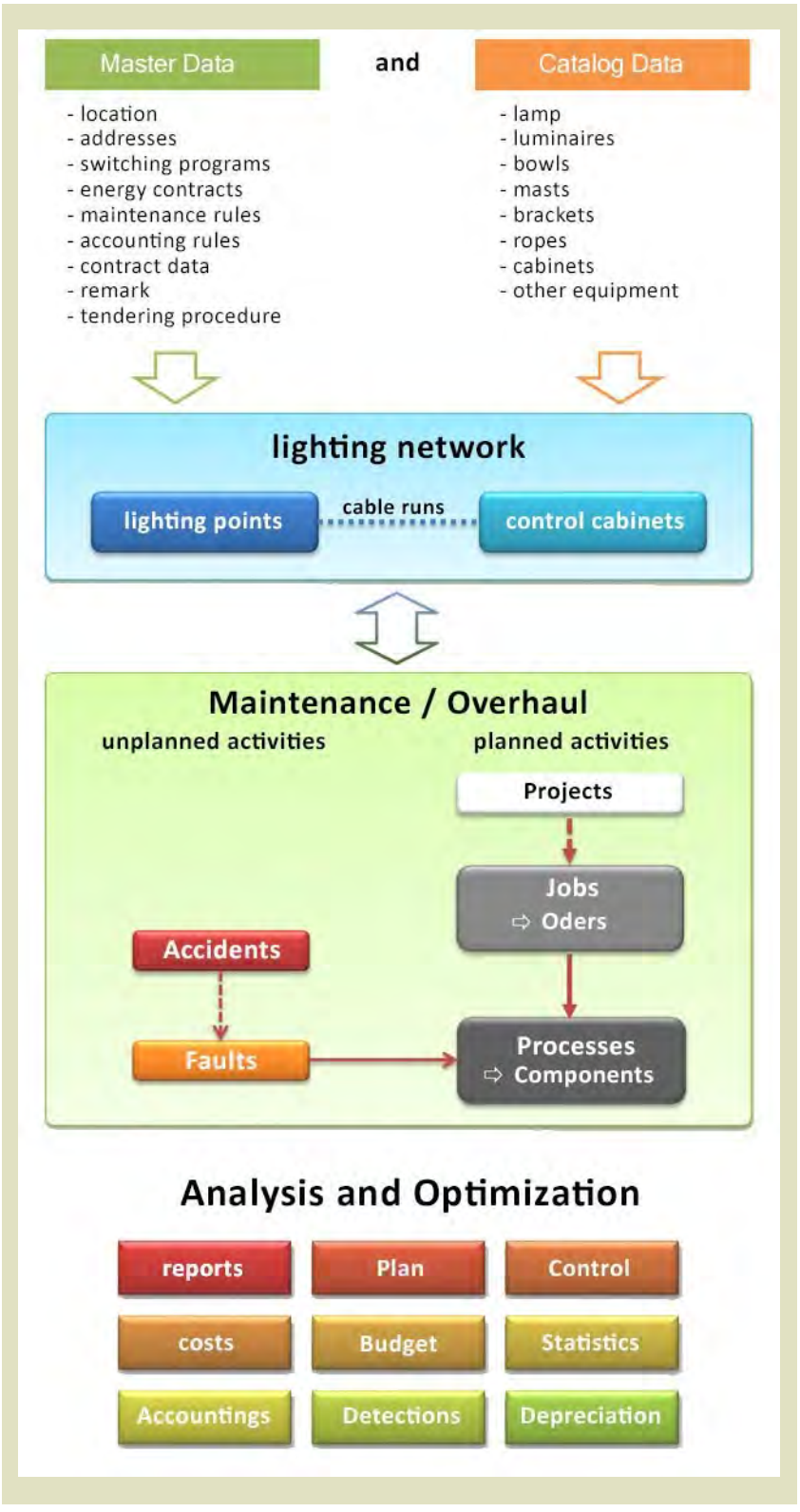
	O = Optional
Documentation of assets with full historiography	✓
Type catalog for all the necessary components	✓
Maintenance management Including malfunctions, maintenance, accidents, cost control	✓
Report pool with numerous templates and integrated report generator	✓
Statistical, evaluation, analysis tools	✓
Extensive filtering tools	✓
Queries using drag & drop	✓
Value lists	✓
Inventory control	✓
Consumption calculations Incl. switching programs, electricity contract data, accounting rules	✓
Twilight calendar	✓
Appointment management	✓
GIS with GIS statistics	✓
Hierarchical user management	✓
User filters	✓
External order processing	✓
stoerung24	✓
Interface to MS-Office (e.g. Excel)	✓
Database export	✓
SQL interface	✓
Script editor (VB.NET and C#)	O
Load curve	O
External processing of malfunctions	O
External processing of maintenance work	O
GIS interfaces	O
SAP interfaces	O

luxData.licht is divided into four main sections for dealing with the tasks associated with the management of street lighting.

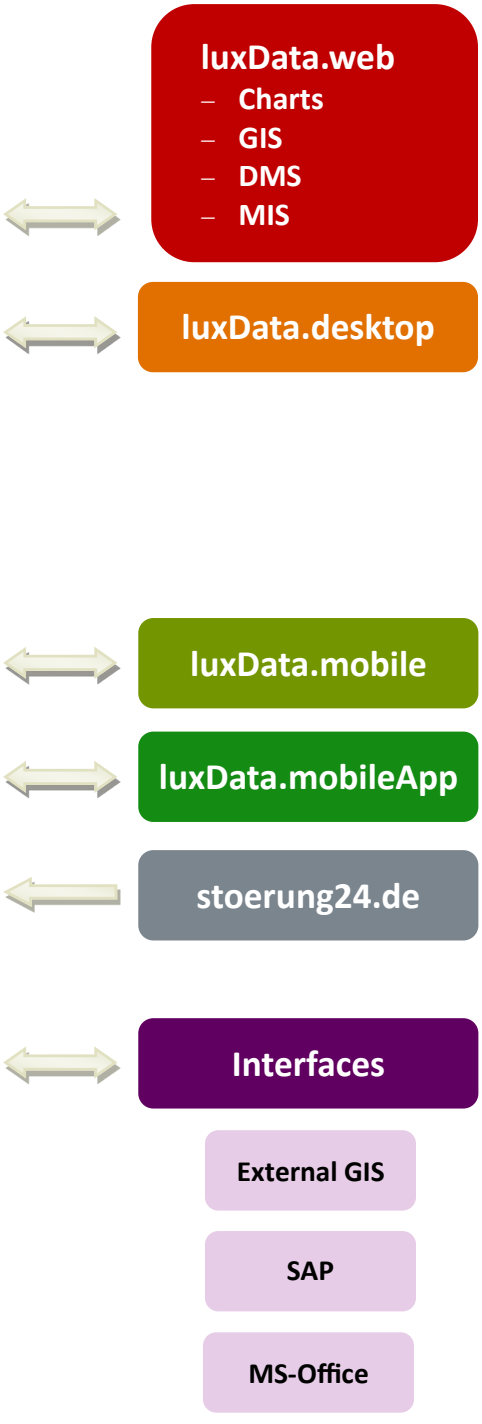
- **Master and catalog data**
- **Lighting network**
- **Maintenance / Overhaul**
- **Analysis / Optimization**

All of which may be extended with the aid of optional modules and different interfaces.

So that it's possible to easily satisfy even complex demands with the help of luxData.licht.



Optional modules

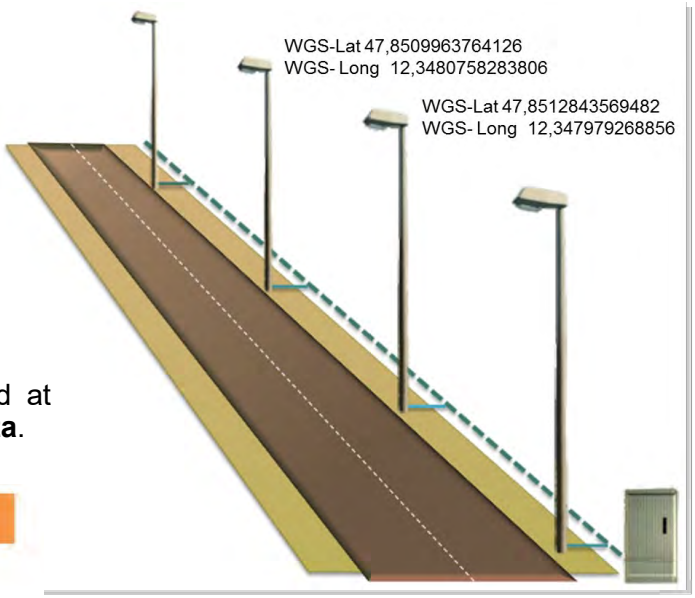


Your data is available in electric form?

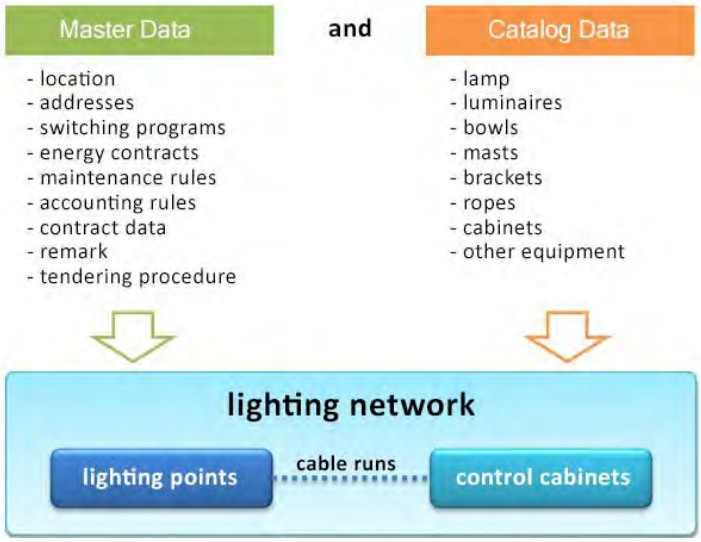
The data about your systems (lighting points, switching cabinets, cable runs, location details) is available electronically and in tables (e.g. Excel, Access, GIS or similar)?

Well, then it may, of course, be imported to **100%** into the luxData.licht system.

Map your entire lighting network with all the information that is relevant to you in *luxData.licht*. Utilizing all the options will create a comprehensive lighting network consisting of **lighting points**, **switch cabinets**, **cable runs** and **meters**.



All the necessary information will be placed at your disposal from the **basic** and **catalog data**.



The minimum requirement is to just save a few essential details about the lighting points in *luxData.licht*.

How much information you save for a lighting point depends solely on how much information you want to 'pull out of' *luxData.licht* to use in your decision-making processes.

The following rule applies:

It is only possible to extract information from a database if that information was previously entered into it. Conversely, this means that the more data is saved in a database, the more questions you'll be able to answer later.

The flexible **location structure** that *luxData.licht* makes possible also allows you to manage several locations at the same time. Here, localities (or also other parts of the location hierarchy) may be presented separately by users or user groups.

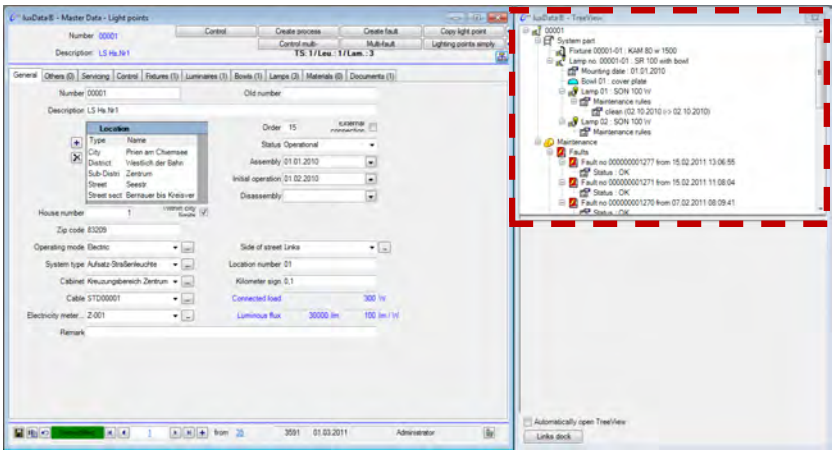
Lighting points

Special attention has been paid in *luxData.licht* to the **recording**, **documentation**, **historiography** and **processing** of lighting points.

To this end, all the lighting points from the basic and catalog data are brought together to create a single unit in *luxData.licht's* form for lighting points.

The form for lighting points is organized in tabs in order to improve the overview. This is where general information and the data for the respective component types are mapped in groups.

Such mapping simplifies the input and processing of the systems and their components.



A **tree view** may also be displayed when the form for lighting points has been opened. It provides and initial overview of the structure of the lighting point currently being displayed.

Creating lighting points

Lighting points may be recorded and created in different ways in *luxData.licht.* The three most common methods for creating lighting points in *luxData.licht* are shown below.

Hand-held devices and **ruggedized laptops with software are available to** hire **from us** to help you record, supplement or verify system data on site.

Data is available electronically

Once the existing data has been imported, it may then be supplemented or corrected on site with the help of **luxData.mobile and luxData.mobileApp** (hand-held device) or **luxData.desktop** (laptop or Tough-

Data is available on paper

Lighting points on the same streets are usually identical.

In this case, **one** lighting point only needs to be set up for the entire street. The details for this one lighting point then only need to be copied for all the other identical lighting points to be created in the system.

No data about the lighting points is available

This usually means that the data needs to be recorded on site.

luxData.mobile or luxData.mobileApp (hand-held device) or **luxData.desktop** (laptop or Toughbook) may be used to assist here.

Lighting point components

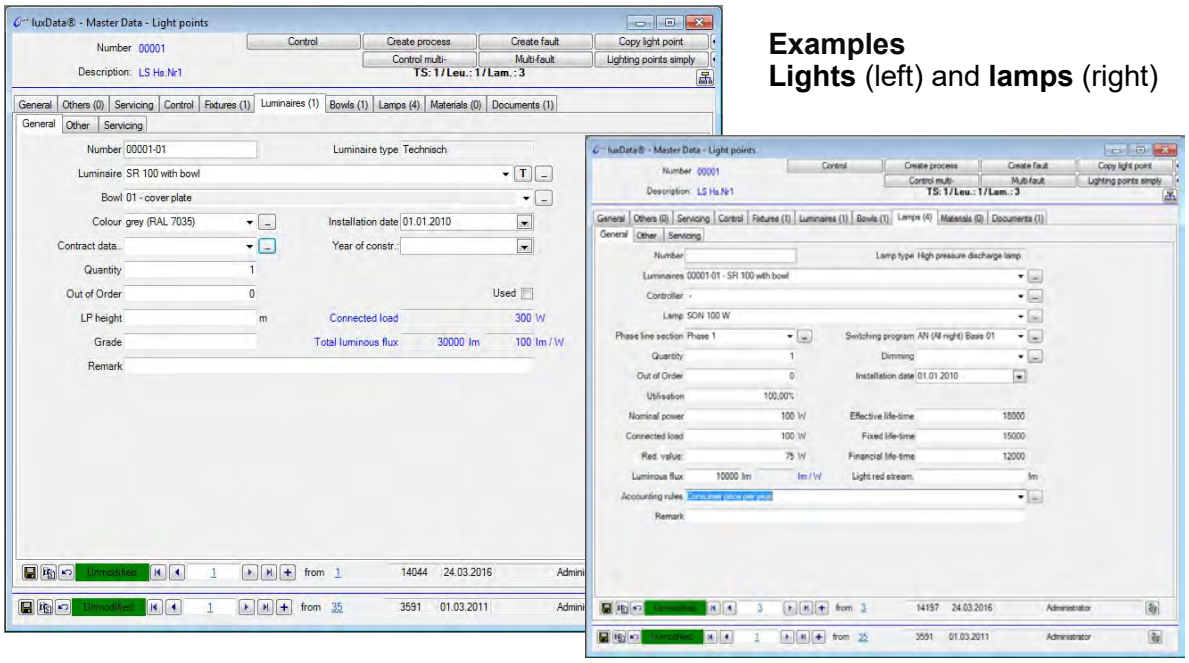
In practice, lighting points are often divided into different component types or groups.

- **Support systems**
- **Lights**
- **Shells**
- **Lamps**
- **Other materials**

A separate tab that is based on this structure is available for each component type in the form for lighting points.

Only individual fields in these tabs will vary with the component type. This makes familiarization with luxData.licht considerably easier.

Optimize view: Tabs that are not needed may be hidden from the outset.

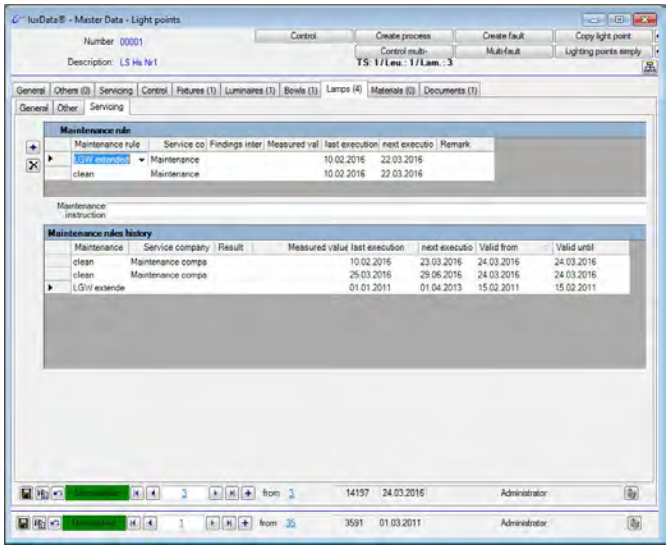


Examples
Lights (left) and **lamps** (right)

All the components used on a lighting point are initially allocated in the tabs for component types. In this way, every allocation associates a lighting point with all the relevant data that is required for subsequent analyses and work.

Separate maintenance regulations may be assigned to each individual component in order to make it possible to fulfil the maintenance requirements for the different components.

Each change to a component that affects the maintenance regulation will result in a new entry in the **maintenance regulation's history**.



Switch cabinets and **cable runs** represent the link between electricity supply and switching in street lighting.

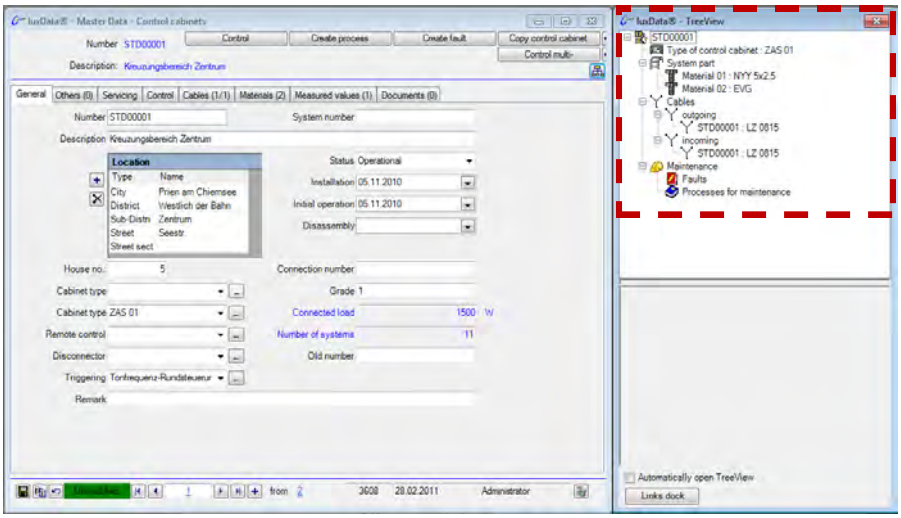
For instance, it might be necessary to know during maintenance work which cabinet and which cable runs are supplying the power to specific lighting units.

Separate forms are available for recording switch cabinets and cable runs.

It is not essential to save switch cabinets and cable runs in the system. But it is recommended.

Switch cabinets

The switch-cabinet form is divided into tabs. General information is visually separated in this way from information about the fitted components (meters, contactors, relays, etc.). **Measured values** for the switch cabinets may be entered in an additional tab.



The basic layout of the form for switch cabinets is broadly identical to that of the form for lighting points.

A **tree view** may also be displayed when the switch-cabinet form has been opened. It will provide an initial overview of the switch cabinet's layout.

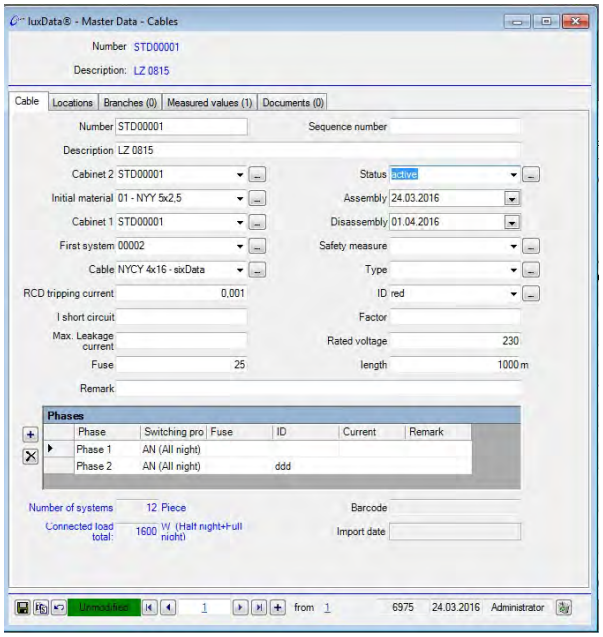
Cables

All the information that is important for cable runs may be entered here.

It is also possible to enter a cable run's data separately for each phase if necessary.

This includes among other things …

- Technical data
- Cabinet assignment
- Switching programs
- Different metrics



Design

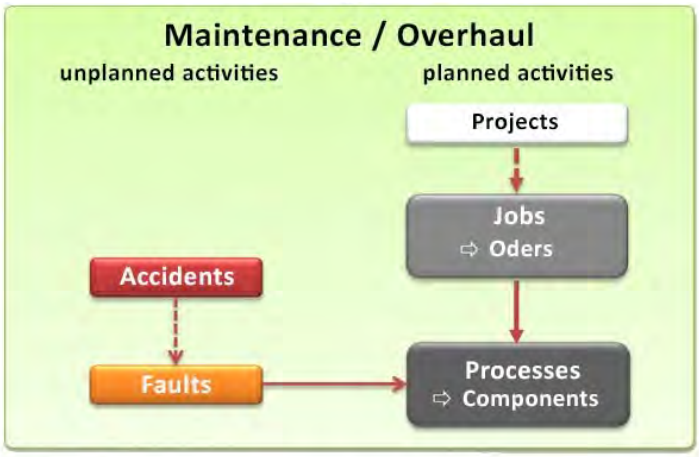
The following basic questions may be answered and processed in *luxData.licht's* maintenance section:

What?	... What needs to be done and what material and additional resources are needed?
Where?	... Where is the relevant lighting point located?
Who?	... Who is going to deal with the process?
When?	... When is the process going to be dealt with?
How much?	... How much will maintenance cost?

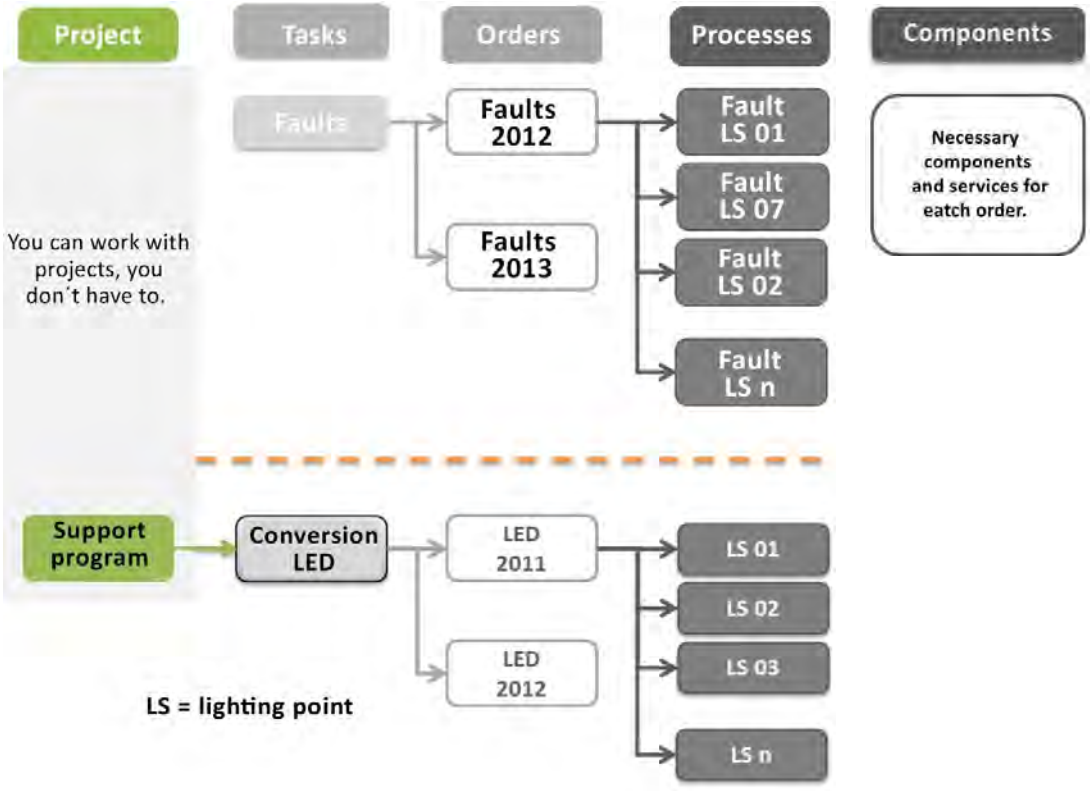
Maintenance in *luxData.licht* has been structured in such a way that all **predictable** as well as **unpredictable** activities may be efficiently organized and processed within the lighting network created.

Hierarchical layout and maintenance structure.

Projects may be assigned any number of tasks. Tasks may be assigned any number of jobs, etc.



The visual presentation displays all possible structures for projects, tasks and jobs, processes and components.



Projects / tasks / jobs

luxData.licht may be used to plan the details of all maintenance work that serve to maintain or improve street lighting.

Different maintenance hierarchies are available in the system to this end.

Projects may be used if necessary. (Please refer to the example with project)

Tasks and **jobs** must be created.

Example without project	
Task	Group change
Job	Group change 2014, Group change 2015.

Example with projects	
Project	LED retrofitting subsidized
Task	Section 1
Job	Bahnhofstr., Rathausstr.

Processes / components

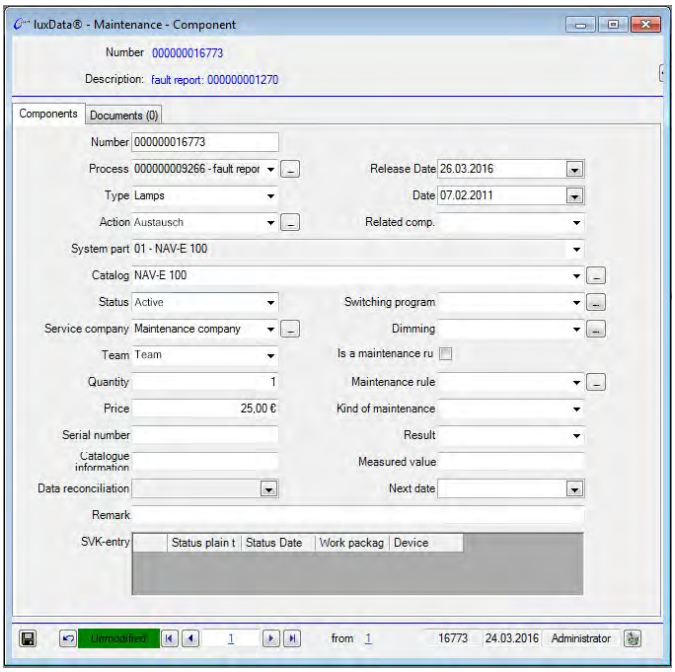
All the important basic information for the systems concerned (lighting point, switch cabinet) are saved for technicians or service providers in **Processes.**

- What system is affected and where is it located?
- What is the purpose of the process?
- By when must the work have been completed?
- Who should carry out the work?

And lots more.

The **components** are used to determine, among other things:

- What component in the system requires attention?
- What component needs to be newly installed / fitted?
- What action needs to be carried out?



It is possible in *luxData.licht* to create a task and job structure to deal with malfunctions for one or even several years in advance.

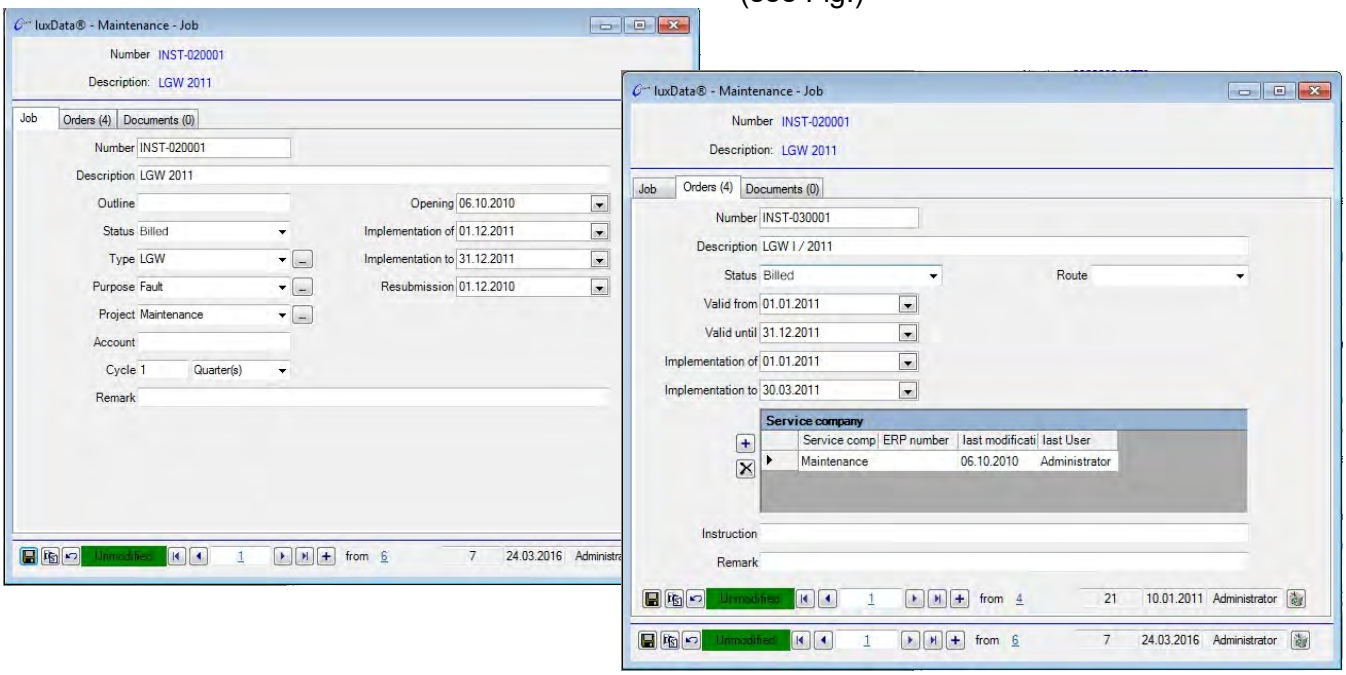
Such structuring makes it possible to create meaningful analyses for extended periods.

Example 1

Task – Malfunction 2013
Jobs – normal malfunction; vandalism, accidents

Example 2

Task – Malfunctions
Jobs – Malfunctions 2012; Malfunctions 2013 (see Fig.)



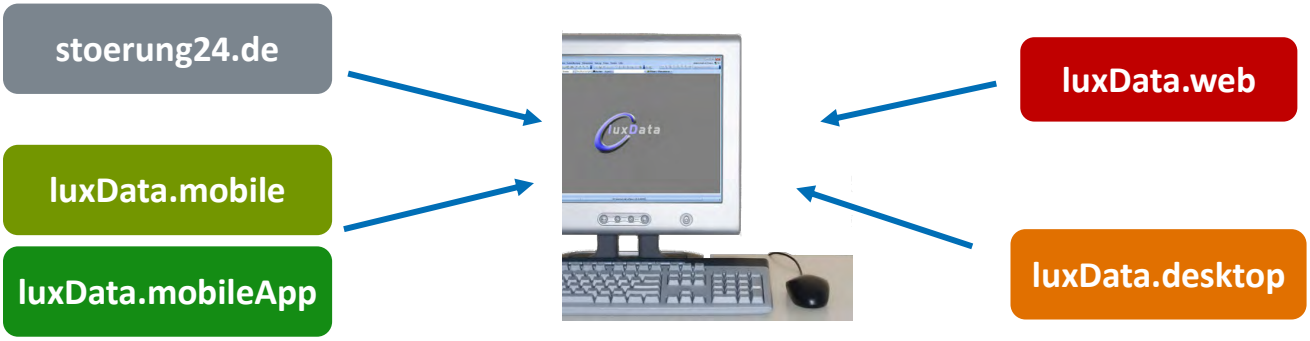
Recording malfunctions

It is possible to record malfunctions directly in luxData.licht but it is also possible to use external, optional applications.

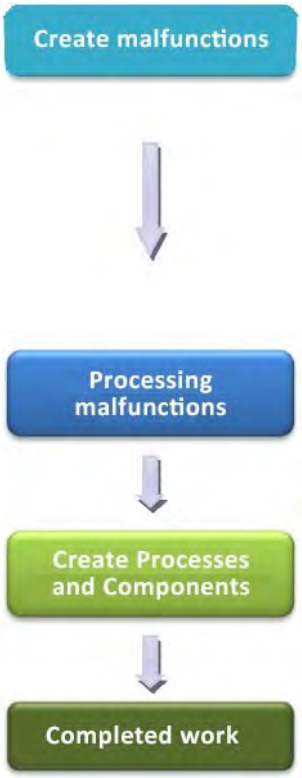
Optional applications for recording malfunctions

luxData.web is a web portal for external users with access to shared data where malfunctions may also be recorded. These messages will be automatically synchronized with *luxData.licht.* Please refer to the relevant description for further information about **luxData.web.**

www.stoerung24.de is a free Internet portal through which residents may report faults. These reports may also be imported into luxData.licht and synchronized there through an optional interface. Please refer to the relevant description for further information about **stoerung24.de.**



Cable runs for the sequence of dealing with malfunctions using luxData.licht



A malfunction is reported for a lighting point.
The lighting point concerned must be selected in the form for lighting points and the **Malfunction** then created.

Use **luxData.web** or **stoerung24.de** to make recording malfunctions more user-friendly. If geographical data has also been saved in the system, the lighting point will be automatically assigned and the malfunction will be automatically generated when it is imported from **www.stoerung24.de**.

Technicians on site may repair the malfunction using the information from the generated malfunction. They will thus be able to access information about the location, type of malfunction, necessary resources, required materials, priorities and so on.

The **Process** will then be generated from the malfunction on conclusion of the repair made using the information provided by the technician. The **Components** tab may then be used for allocating all the activities and materials required to repair the malfunction (work, material, etc.).

The master data for the system will be updated when the **data is synchronized** on conclusion of the work.

Increase the efficiency of maintenance with the help of **luxData.mobile or luxData.mobileApp.**
All the important information may in this way be made available on mobile devices to the technicians without the need for any paper documentation and may then be directly processed on site.
The data on the mobile devices may then be simply synchronized with luxData.licht on conclusion of the work.

Accidents

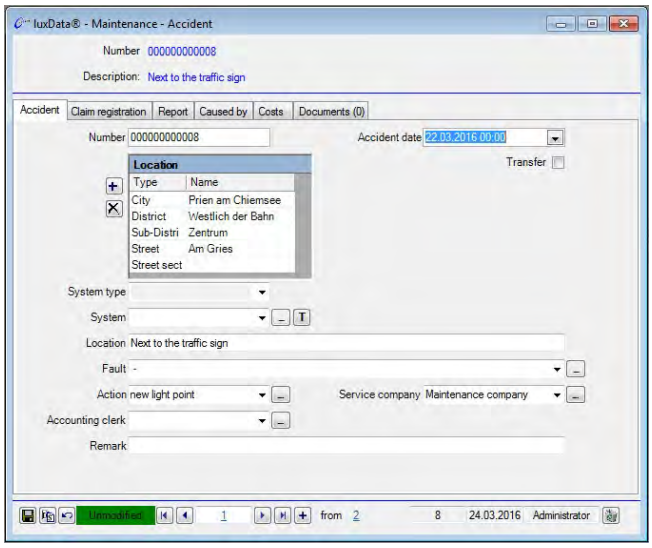
Malfunctions are often caused by accidents. Special measures are required when malfunctions caused by accidents need to be dealt with and costed accordingly.

luxData.licht provides a special form that may be called up from the malfunction form to handle the particular processing that this requires.

The data for the lighting points concerned will be automatically copied from the initial malfunction form.

This accident form makes it possible record all the relevant information about the accident. Including:

- Details reported to the police; damage records
- Details about the person who caused the damage
- Details about costs
- Insurance details



Catalog data is – after basic data – the second level for mapping lighting networks.

All components within a lighting network or that it may in future use are created in the type catalog.

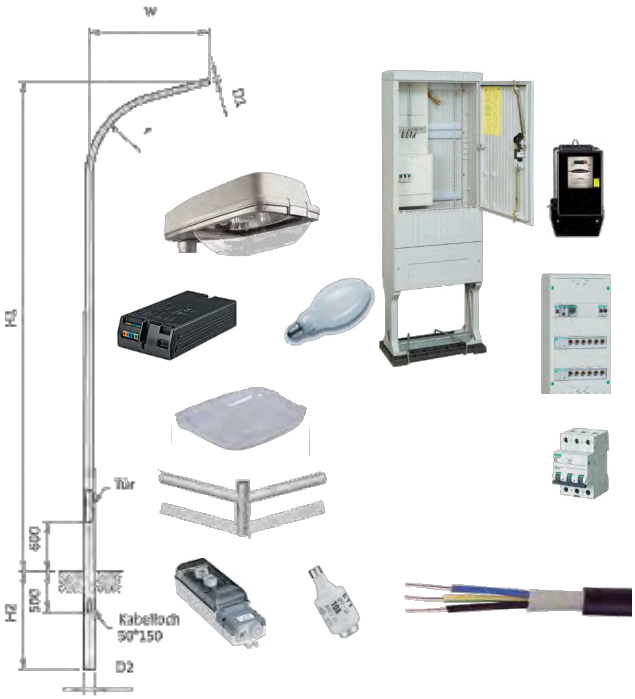
The different component types (lights, lamps, etc.) possess different characteristic details.

A separate catalog form has been created for each one of the component types to this end.

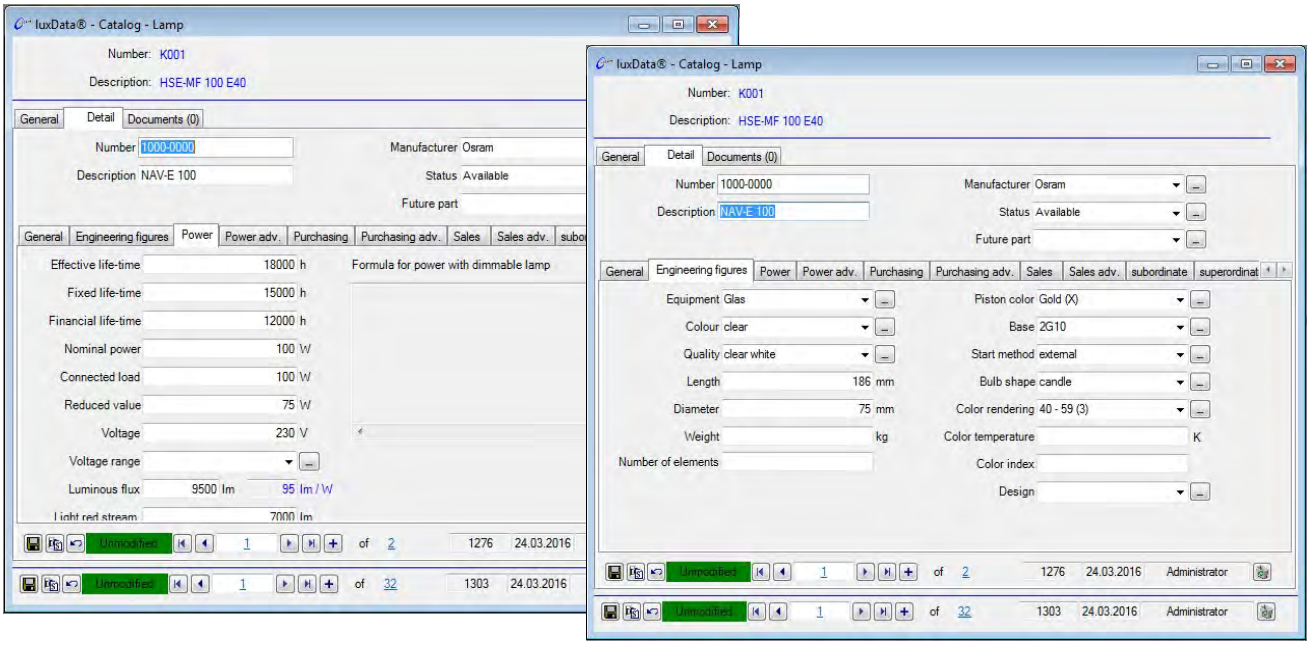
Each identical component therefore only needs to be created in the catalog **once**.

If the details provided by the manufacturer should change, e.g. description or the useful lifetime of a lamp, it will only be necessary to record the change in the catalog once.

Component types	Examples
Lamps	Sodium-vapour high-pressure lamp LED
Lights	Small case Large case
Masts	Lamppost Modular pole
Bracket	Wall bracket Double bracket
Cabinet	Meter cabinet Lighting unit cabinet
Shells	Cover glass Prismatic diffuser
Other materials	Fuses, ballasts, meters, cables, fastening materials



Beispiel: **Technical details** and **performances** for lamps.



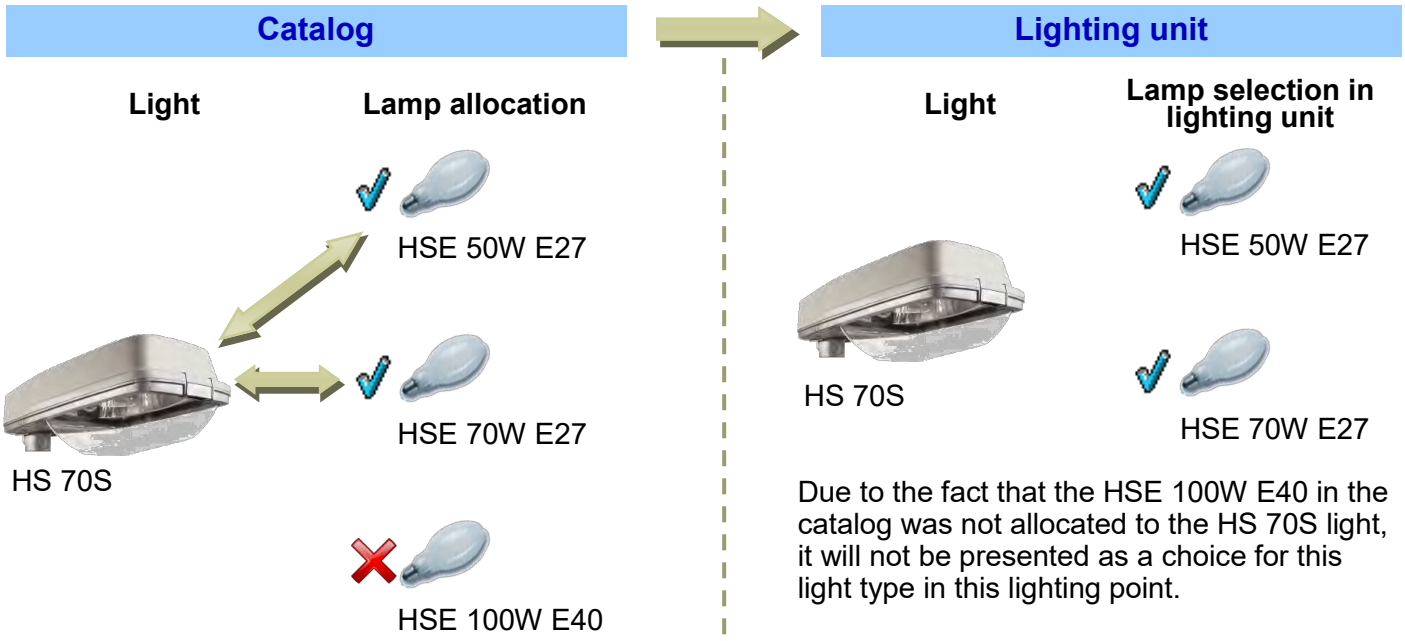
Assigning components to each other

It is possible to create allocations for each component in order to prevent incorrect materials from being assigned within systems.

This is where it is determined which components ultimately fit each other.

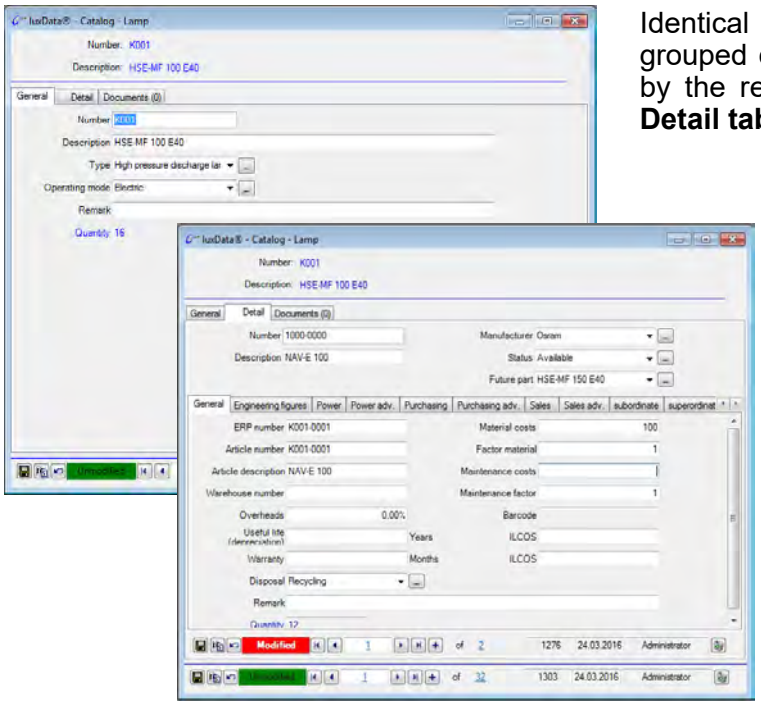
Such allocations, for instance, prevent lamps being made available within a light's lighting point that do not fit in the respective light.

Incorrect information about components and allocating them erroneously may have a serious effect on subsequent activities and calculations. That is why we recommend that these details only be saved in the system by qualified professionals.



Due to the fact that the HSE 100W E40 in the catalog was not allocated to the HS 70S light, it will not be presented as a choice for this light type in this lighting point.

Grouping of identical components



Identical components by different manufacturers may be grouped on the **Basic tab**. The comparable components by the respective manufacturers may be created in the **Detail tab**.

Example

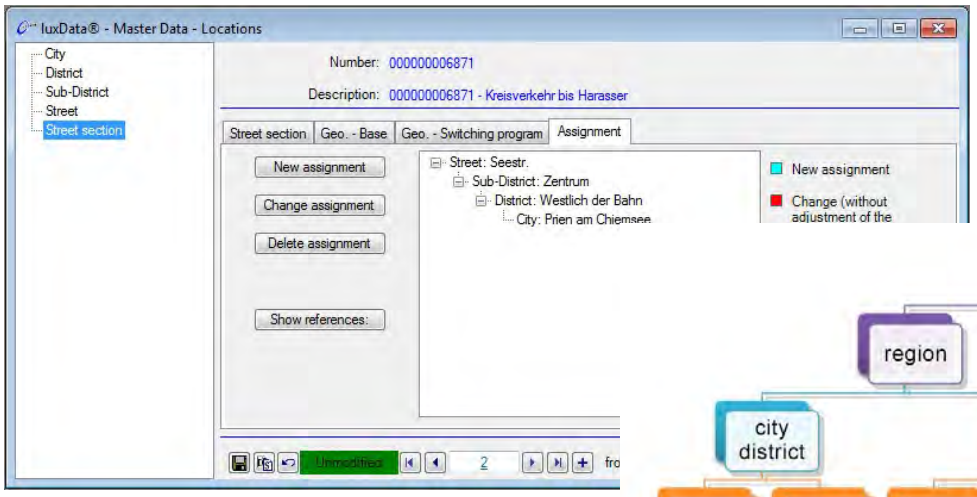
Location structure, **addresses**, **switching programs**, **regulations**, **contracts**, **assessment criteria** and **tendering procedures** constitute basic data and are part of the master data.

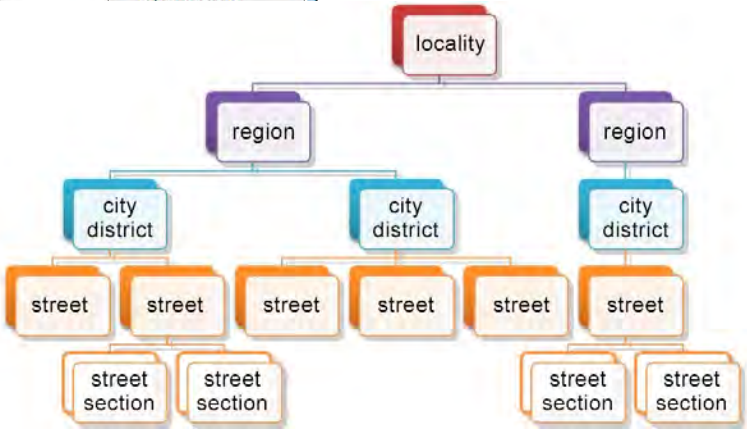
These are details that are created **before** the lighting network is created in the system.

Locations

luxData.licht offers a flexible location structure that may be adapted to local conditions.

- Several locations may be created and managed in the system at the same time.
- Several freely configurable hierarchical levels may be created. (For example: locality, region, city district, street and street section)
- Geographical data (longitude, latitude and altitude above sea level (in Germany: Normalhöhennull = 'standard elevation zero') that may be used in the twilight calendar may be saved for each data record in Locations.





Adresses

Create all the necessary addresses in *luxData.licht*.

Assigning address types means that the addresses will only be presented in the address fields where they are actually needed. For example, addresses assigned the address type of **Owner (Motor Vehicle)** will only be displayed in the **Accidents** form.

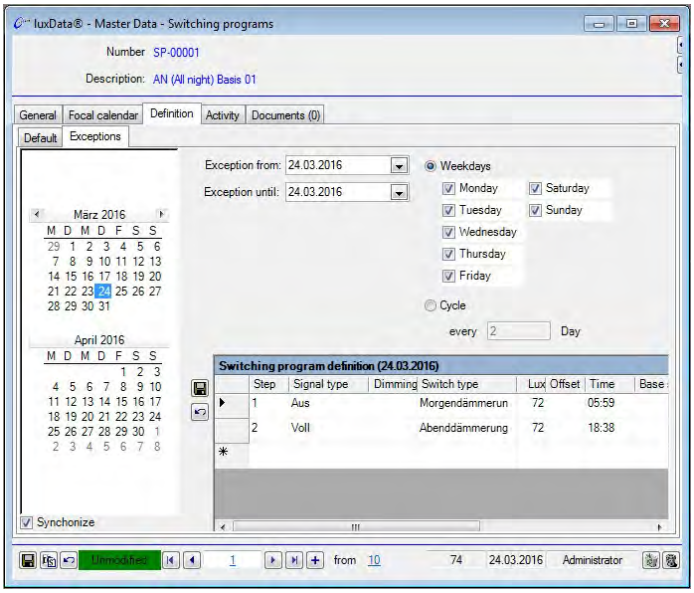
Address type examples

- Suppliers
- Customers
- Reporting person
- Service provider
- Owner
- Manufacturer
- Cost units
- Developers
- Public utilities
- Owner (motor vehicle)
- Network operator
- Police
- etc.

Switching programs

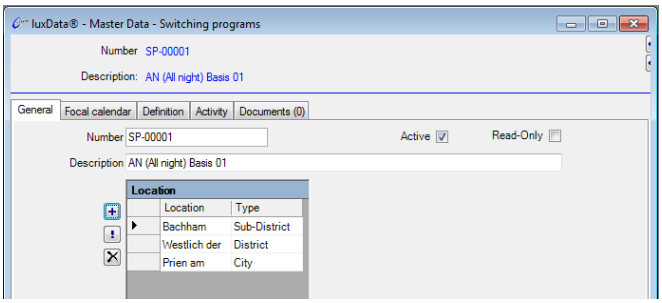
Switching programs along with the rated output and connection values constitute the basis for the **calculation of energy consumption.**

They can be combined with the prices agreed in the electricity contract to enable the energy costs to be calculated. The switching programs saved in the system may also be used to determine group changes.



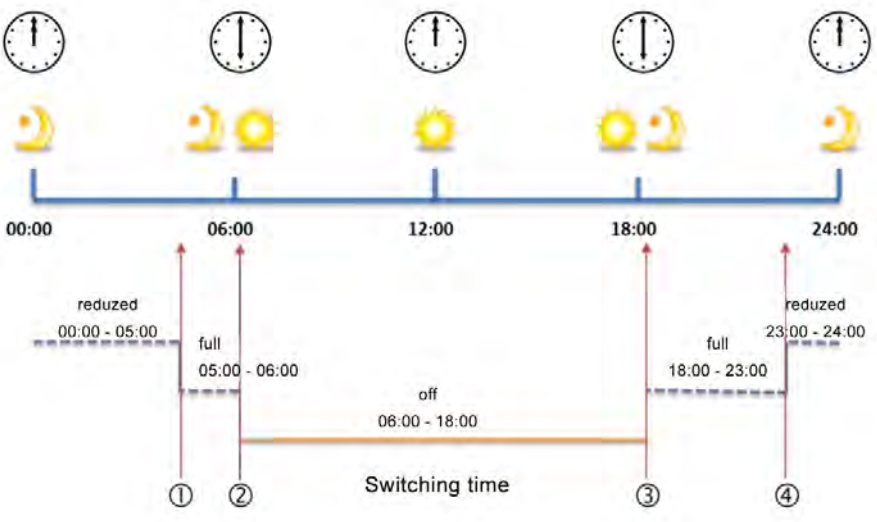
Map all the switching programs used in *luxData.licht*.

All switching programs in use along with special cases (e.g. Christmas lights, events, etc.) may be created in the system.



Each switching program may be allocated to one or several locations.

Example of a simple switching program



Externally controlled switching times (twilight switches, timers) may be easily imported.

The switching times are calculated every day on the basis of the switching definitions in *luxData.licht*. Sunrise and sunset (LUX values) may also be used here.

This means that switching times may be calculated for many years in advance and that these calculations may be used to make energy-consumption forecasts.

The switch from daylight savings time to winter time is, of course, handled automatically.

Maintenance instructions

All the necessary maintenance regulations in compliance with the requirements set out in the directives (e.g. EN 13201), manufacturer information (e.g. useful lifetime, measuring intervals) and other information that may be additionally necessary should be saved in the system.

Separate maintenance regulations with different methods may be created for each material type.

The next due date may be varied on the basis of the corresponding method.

Method examples

Material type	Activity	Method
Lamps	Group change	Dynamic
Lights	Clean	Interval
	BGV A3 Testing	Interval
Masts	Rust removal and painting	Fixed date
	Stability ispection	Findings

The maintenance regulations must be allocated to the units and / or unit components.

The maintenance regulations will in this way influence the due date for the system or system component depending on the method that has been allocated.

This means that the new due date will be calculated for a maintenance regulation.

Example:

The next due date for a group change is automatically determined from, among other things, the following data: Maintenance regulation, lifetime, switching program, last group change.

Methods and their effects on due dates

Method	Effects
Dynamic	The next maintenance date will be calculated on the basis of the specified useful lifetime, switching program and capacity utilization.
Fixed lifespan	The next date for maintenance will be calculated on the basis of the specified fixed lifespan.
Time intervall absolute	The next maintenance time will be calculated on the basis of fixed predetermined interval hours.
Findings	The next due date will be determined on the basis of the findings from the last inspection.
Fixed date	The next maintenance date must be saved in the system manually.
None	The next due date will not be automatically calculated.

Accounting rules

The accounting rules along with **consumption calculations** are used to calculate energy consumption and the resulting energy costs.

These costs may be distributed across cost units and accumulated there.

Electricity contracts

Save all the current electricity contracts with all the accounting-relevant information.

This primarily includes the prices for peak and off-peak rates, countervailing charges, discounts and the period of validity. Along with the performance information and the switching programs, this information flows into the **consumption calculation**.

Assessments

component inspections and checks. The assessment criteria may be freely defined (e.g. school marking system) and allocated to the respective component type.

Assessments may be allocated during system and

Tendering procedures

Store the possible tendering procedures in the system that may be applied before contracts are awarded.

The contract details may be stored in the system when tasks are awarded to external companies.

Contract details

Framework contracts and extending additional contracts / supplements may also be created in the system here.

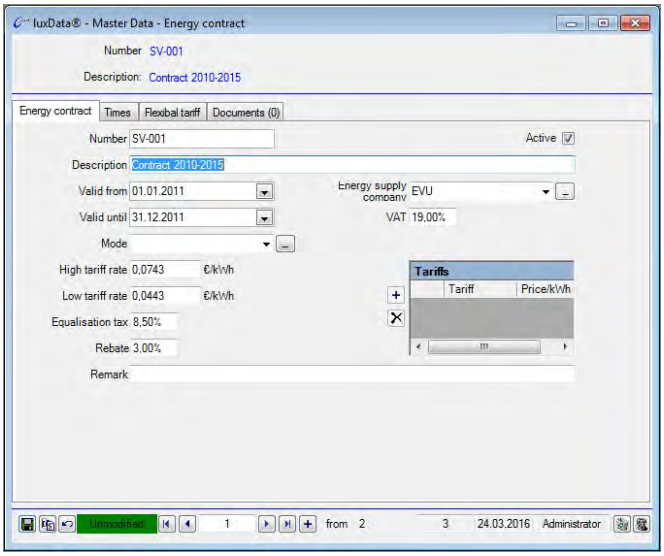
Example for contract details

Contract - construction of new road

Supplemental contract – crossing aid with island

Contract - group change

Additional job – cleaning of mirrors and shells



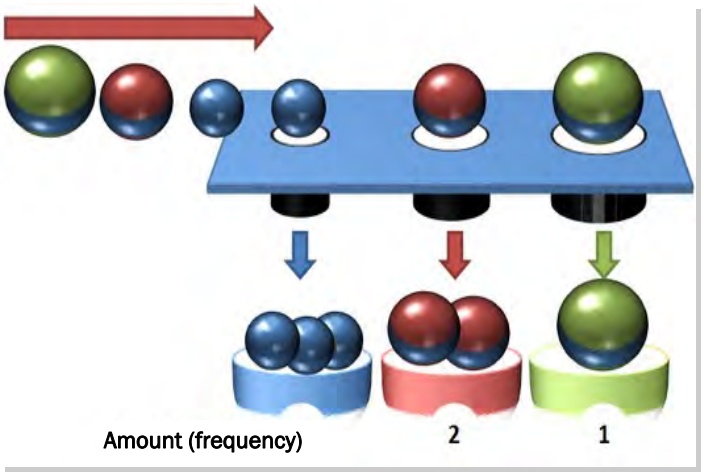
Statistics, assessments, analyses

Statistics constitute the basis for any analysis.

luxData.licht possesses integrated tools that will generate a wide range of different statistics.

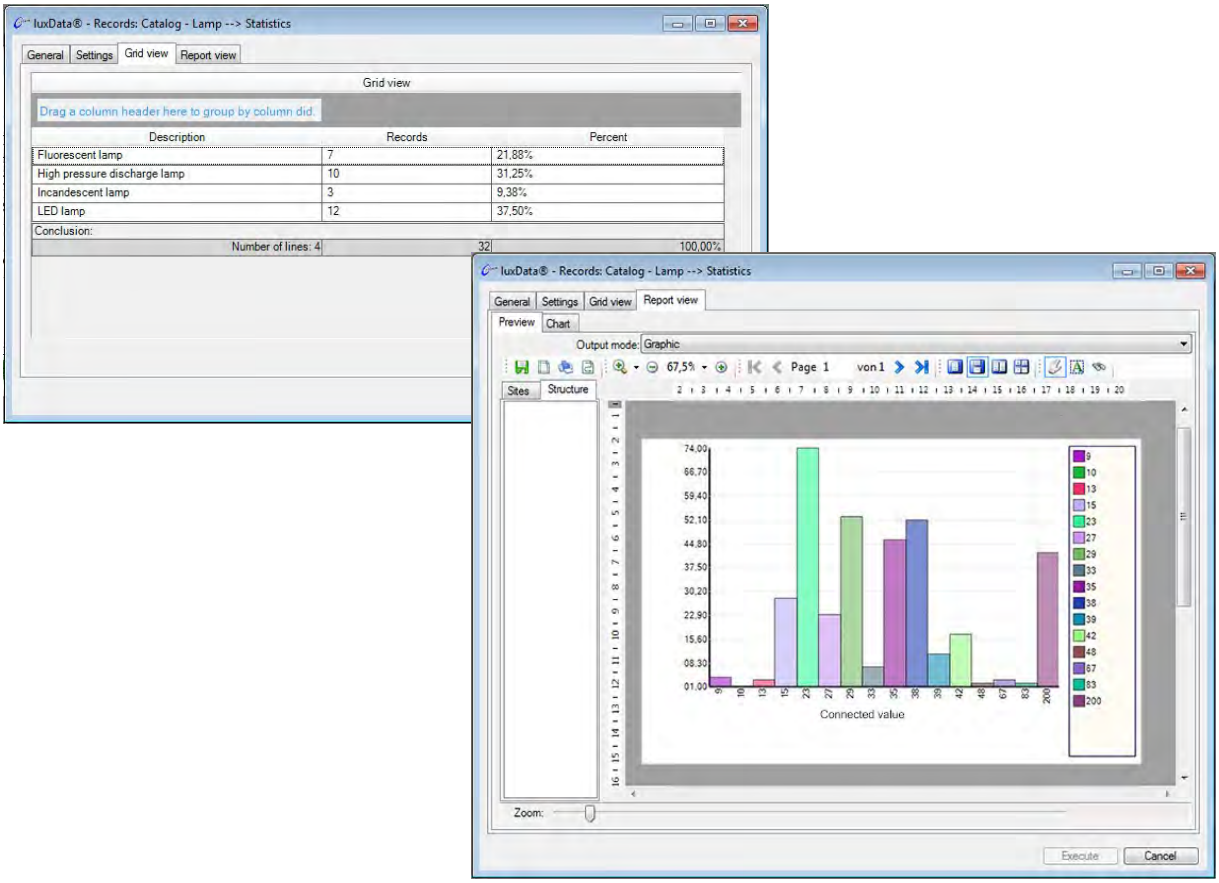
These are essentially:

- Minimum and maximum analyses
- Frequency statistics



All results - whether they´re in tables or graphs - may be saved and printed out as reports.

Statistics values may be exported to Excel. The data exported from luxData.licht may be individually edited and presented graphically using the diagram editor in Excel.



Filter options

The more data that a system is able to generate, the greater the demands on the filtering options will be. Various filter options are available in luxData.licht to this end. These may be combined with each other when necessary.

Filter commands

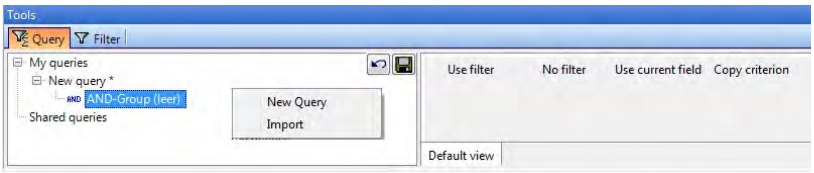
Filter commands allow deep-ranging selections to be made even across forms.

The filter from one form must be transferred to another reference form to do so. This form will then permit additional filter settings to be made.

Query generator

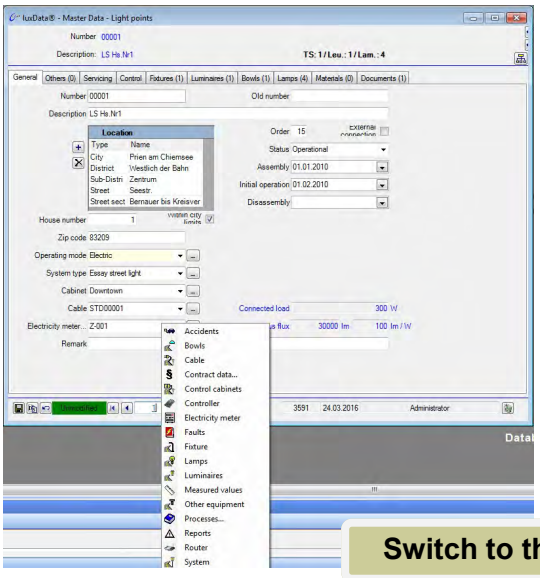
The query generator provides the option to create queries for active forms. No special database design or SQL database language skills are needed to generate queries.

- Queries may be generated from all forms and fields.
- Queries created with the query generator may be placed at the disposal of all users when necessary.
- A query created with the query generator may be set as the default query (this query will then always be executed).

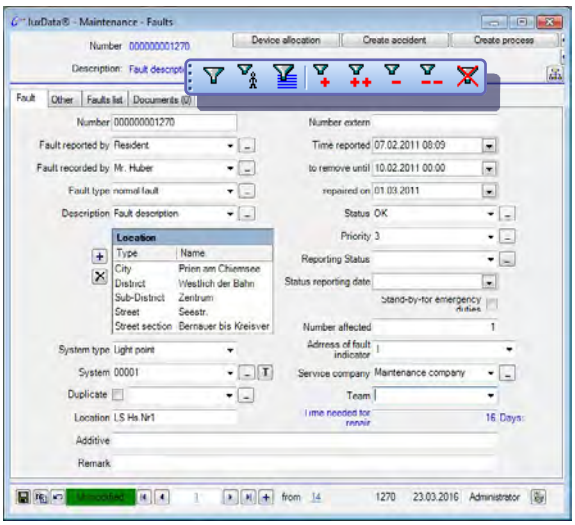


Example of possible combinations

Filtering using the query tool



Continuation of the filtering with filter commands



Switch to the reference form for malfunction

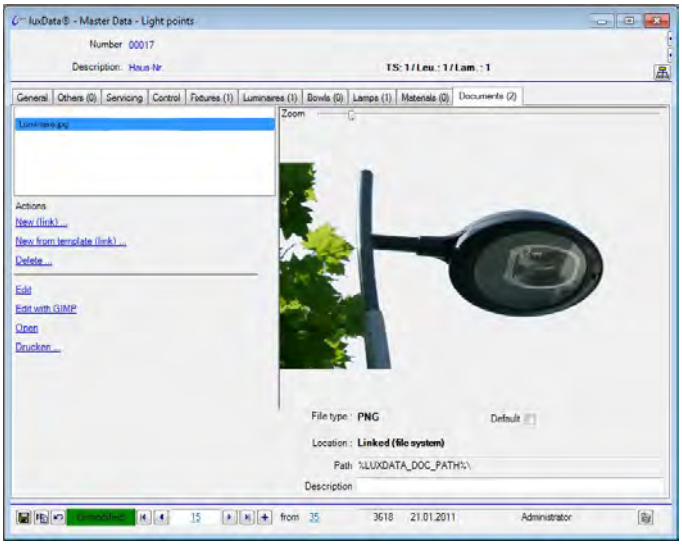
Image and documents archive

luxData.licht already provides a standard option for associating images, graphics, text documents (reports), tables and lists to data records. All the common formats may be used here.

The program that is able to open the corresponding format must be installed on the PC to open associated documents.

The associated documents will be saved depending on the settings within the database (recommended) or on a file server.

The CAD formats of DWG, DXF™, DWF and SKD may additionally be saved and associated as documentation.



Optional

Version 2.7.4 comes with an optional professional document management system (DMS) – **web.dms**. This system delivers all the benefits that modern document management systems have to offer. The system allows documents to be saved exclusively in the database.

When it has been activated, **web.dms** will replace the installed default image and document archive.

Switch to reference form – form references

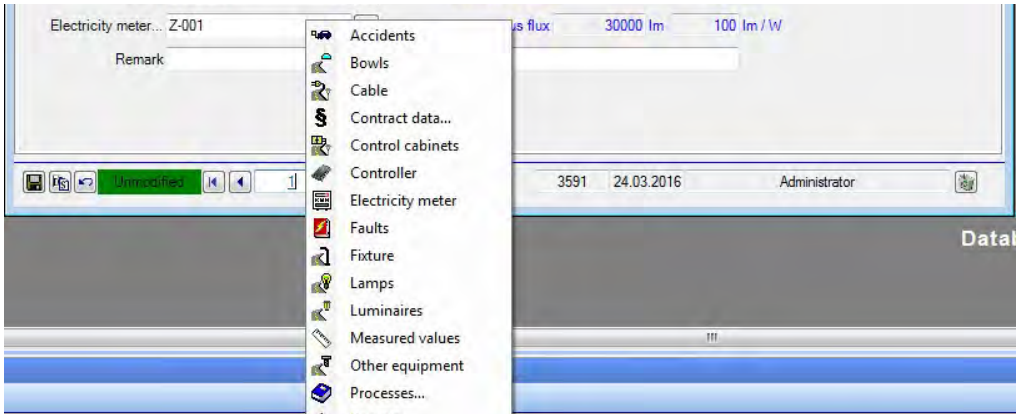
The various allocations, e.g. in combination fields, and resulting from different measures, will cause active forms to always be associated with other forms.

These cross references to other forms will be listed for the respectively active form and selected data records in **Form References** with an click on the right mouse button.

This will reveal any associations with specific forms for a number of selected light points. Clicking the respective reference entry will open the corresponding form.

The number of relevant data records from the previous selection will be taken into account in the opened reference form.

The reference list will display how many data records will be changed in the reference form beforehand.

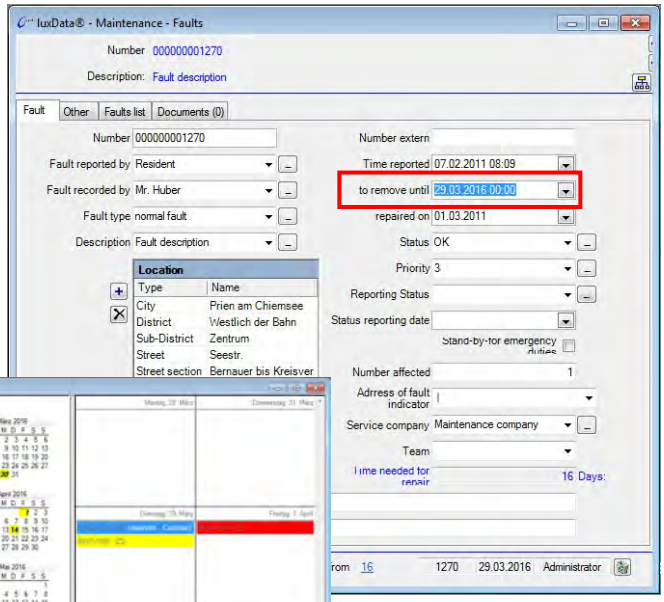


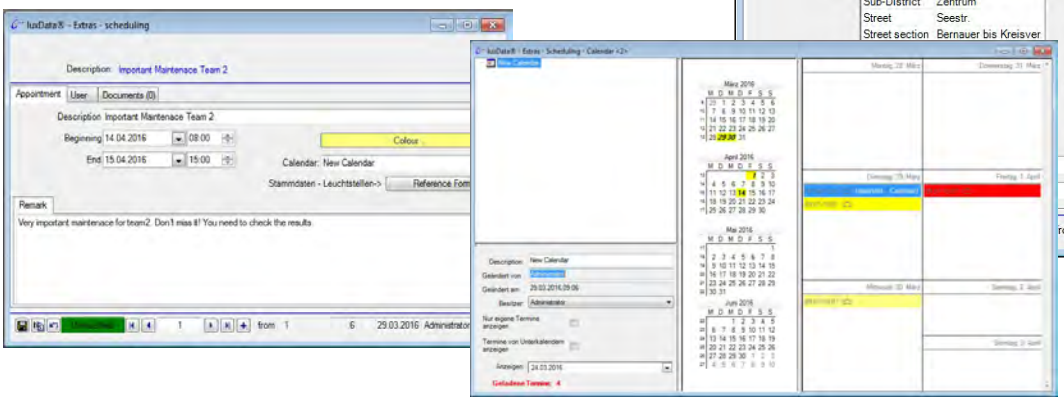
Scheduling with reminder function

Setting deadlines for processing tasks on time. Different calendars may be created to this end. This means that deadlines may be defined in group-specific calendars, for example.

A reminder function is also available for this purpose.

Deadlines may be associated with data records. The corresponding data record may thus be viewed from deadlines.

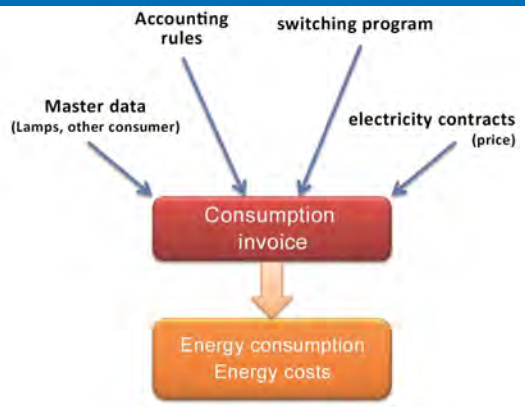




Consumption invoice

Energy consumption and energy costs may be calculated for all consumers and a freely definable period using a selected number of lighting points.

The performance data saved from the master data, switching times, accounting rules and electricity-contract details will be used in these calculations.

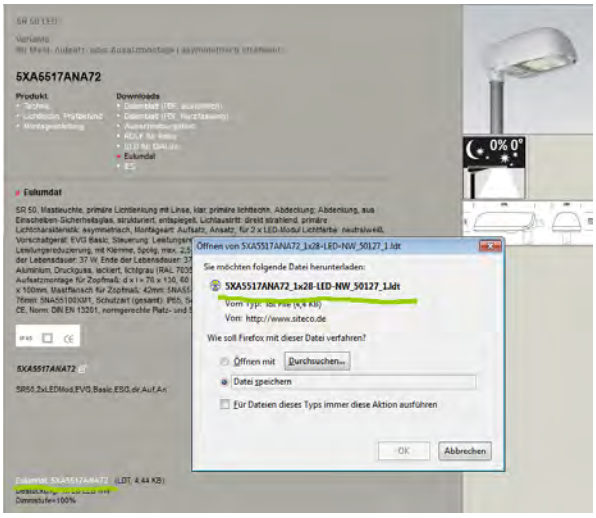


EULUMDAT

EULUMDAT permet d'importer les données des lanternes (.LDT) dans le catalogue de *luxData.licht*.

Ces données sont fournies par divers fabricants sur leurs sites Web ou CD de produit.

Si des lampes électriques sont affectées aux lanternes, elles sont reprises dans le catalogue de lampes.



Organizing maintenance regulations

If the maintenance regulations for a larger number of lighting points need to be adapted, it would be tedious if all the changes had to be made separately.

That's why luxData.licht allows maintenance regulations for a previously determined number of lighting points or system components to be organized at the same time.

Important customization options:

- Allocation of new maintenance regulations
- Change maintenance regulations that have already been allocated (e.g. execution date, service provider)
- Delete maintenance regulations that have already been allocated

This will ensure that the same maintenance regulations will apply within a previously filtered number of systems.

Subsequent maintenance work may therefore be controlled easier.

Inventory control

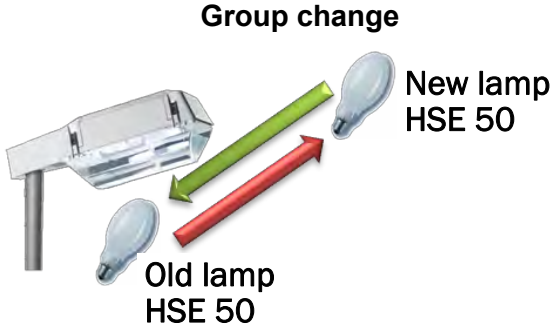
The following frequently applies to predictable maintenance work (e.g. lamp-group changes, stability):

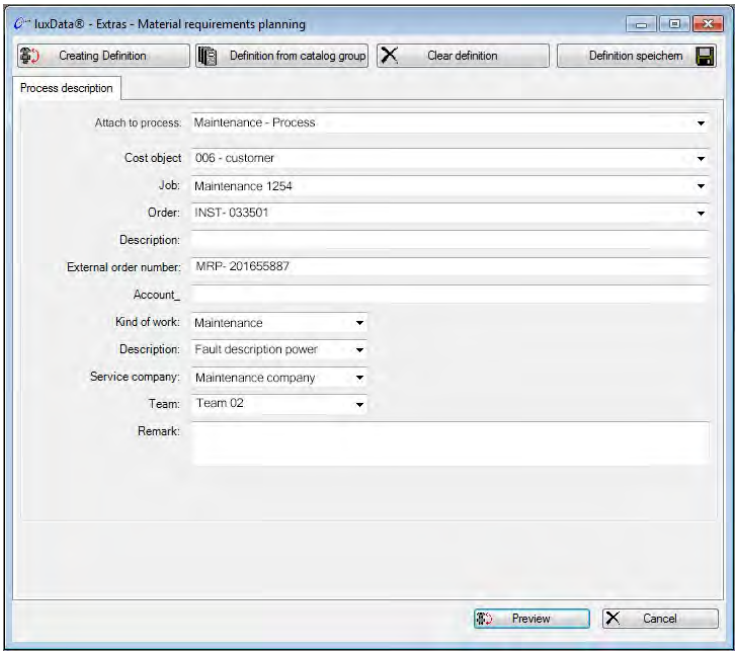
- Several lighting points need attention within the same period
- The same work needs to be carried out on different lighting points
- The work on different lighting points often affects identical materials
- Planning is carried out in advance

This means that several identical processes need to be created with the necessary components.

It is naturally not necessary to create these processes and their components individually in luxData.licht.

The Inventory Control function allows these processes along with their components to be created simultaneously in the system for a selected number of lighting points.





Views

luxData.licht possesses a multiple document interface (MDI=Multiple Document Interface).

This means that several forms may be opened simultaneously in the luxData.licht program window.

The tool-bar commands, the functions in Tools and various menu functions are available for the respectively active forms.

Two different views of each form are available to 'normal' users:

- **Form view (standard)**

  The data is displayed in tabs and fields. Data may also be directly entered or edited in the fields presented here.

- **Grid view (table view)**

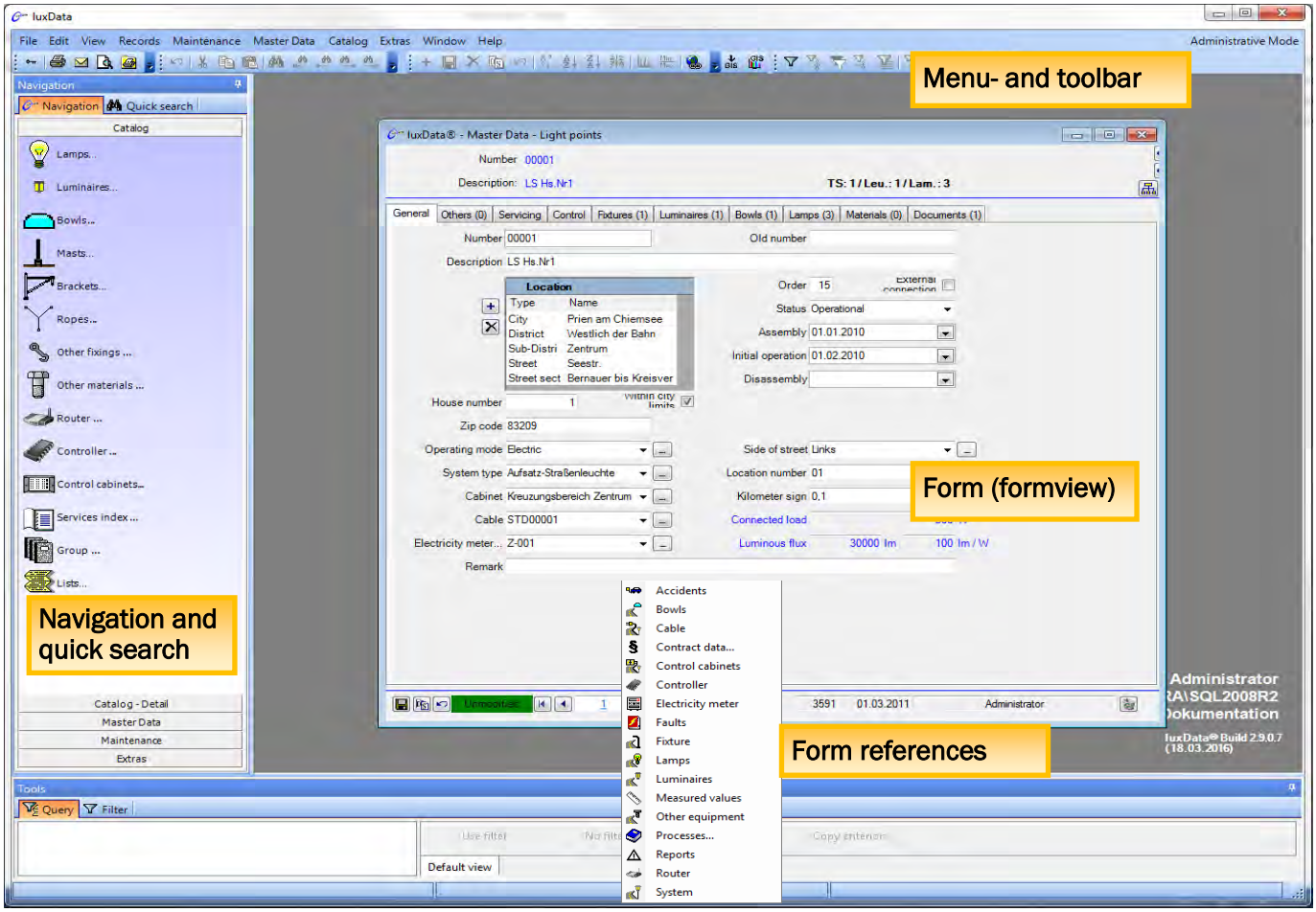
  The table view lists several data records simultaneously.

  This list may also be used for the targeted selection of several individual data records.

Administrators may also switch to the **Design view**. This view allows forms to be simply and quickly adapted for specific users or user groups.

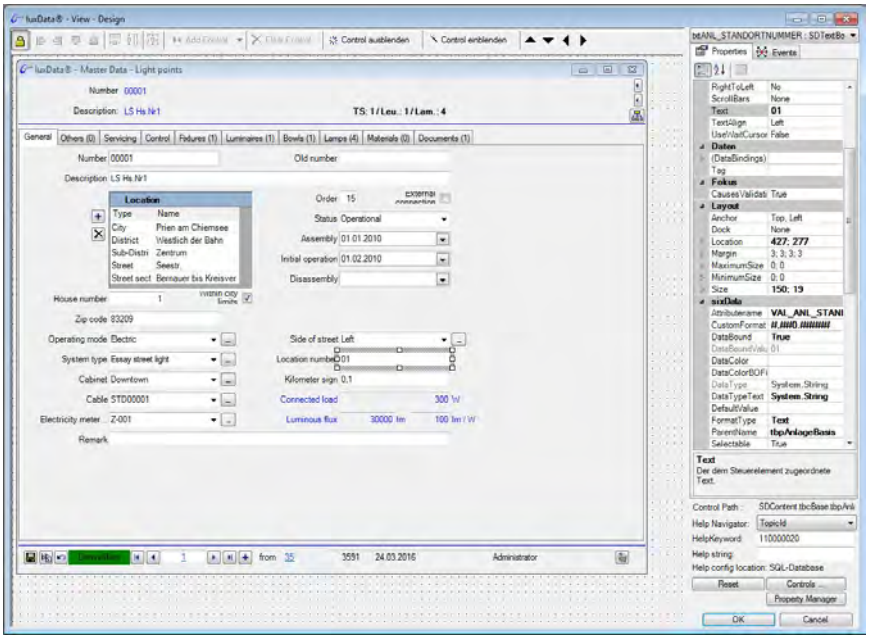
The sequence and structure of forms in *luxData.licht* may be individually adapted to requirements. These modifications will change the appearance of forms.

This product description depicts views of *luxData.licht* with its default settings. Here, all possible fields are always visible.



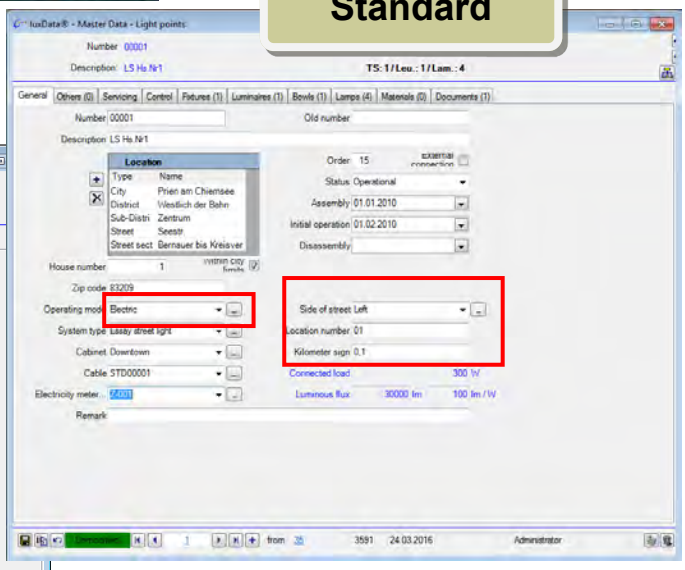
Individualizing forms

It's not always sensible and advisable to use the default standard fields and names. That's why almost any form may be individually adapted to ensure efficient processing.

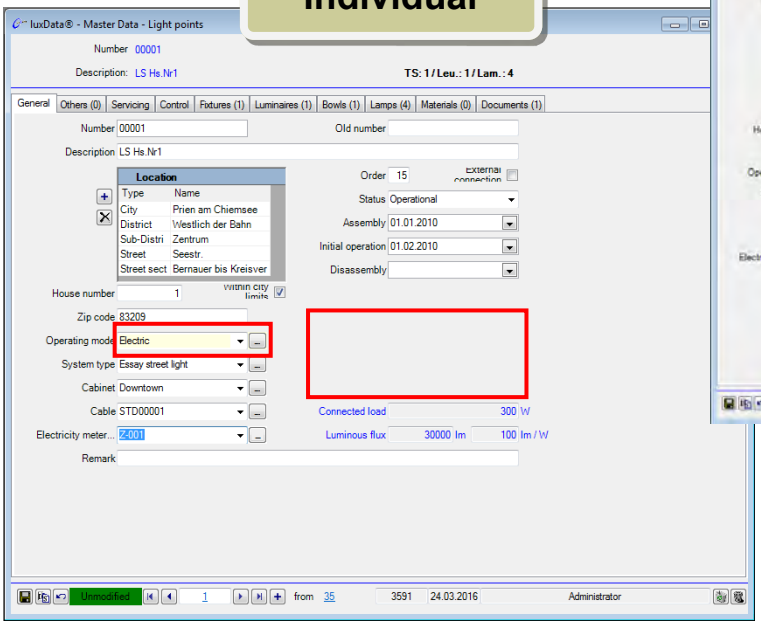


Users with the corresponding rights may switch to the **Design view** to make individual changes to the forms.

Standard



Individual



The field properties, e.g. colours, positions, data sources, spaces, font, font size, text colour, visibility and so on, may also be modified in luxData.licht.

- This allows important data fields to be identified by colour, for instance
- Data that specific users should not see (e.g. prices) may be hidden
- The form design may be used at group and user levels

User groups / users

User administration may be used to create any number of groups, sub-groups and users.

Groups and users may be mapped here in accordance with internal personnel structures and the respective requirements.

The rights may assigned to groups and / or individually to users.

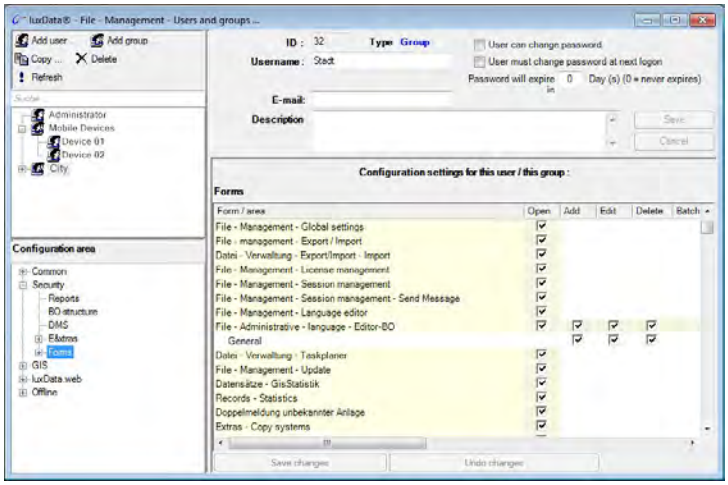
The user administration functions may therefore also be used to individualize *luxData.licht*.

Rights assignment

Each user group and each user may have rights assigned or removed for each form using simple settings.

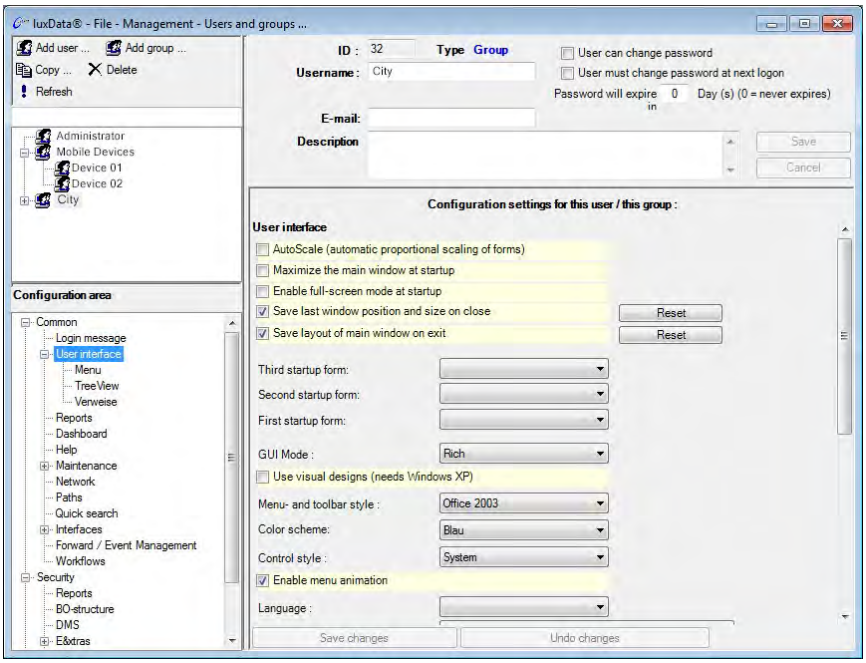
These rights include:

- Opening the form
- Appending new data records
- Editing data records
- Deleting data records
- Mass changes
- Recursive deleting
- Attaching/deleting/editing documents



The rights may be assigned or removed down to field level when necessary.

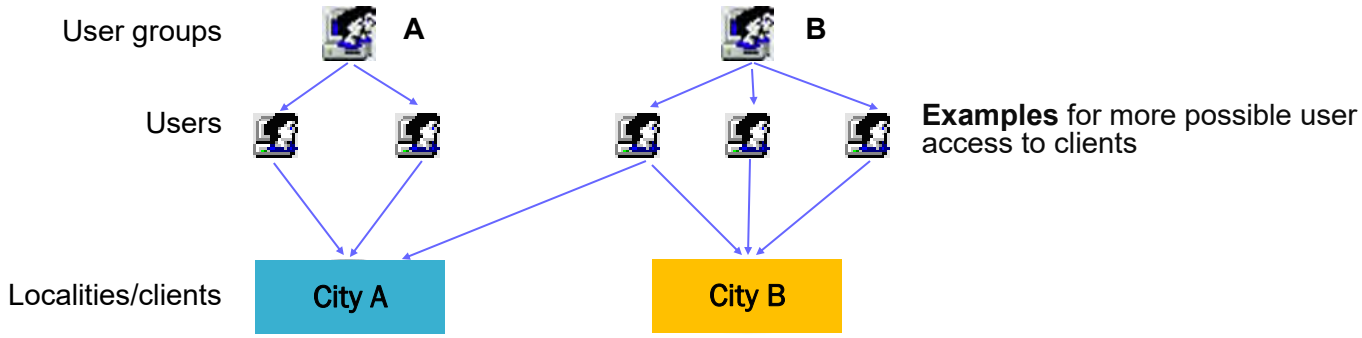
The image below shows that the setting options for user administration are very extensive. We would be happy to help you find the best settings for you.



Capable of working with multiple clients

Several localities may be managed simultaneously in *luxData.licht*.

The individual user groups or users may be assigned to localities. This makes it possible to make sure that only previously specified users are able to view the localities assigned to them and that only they are able to edit this data.

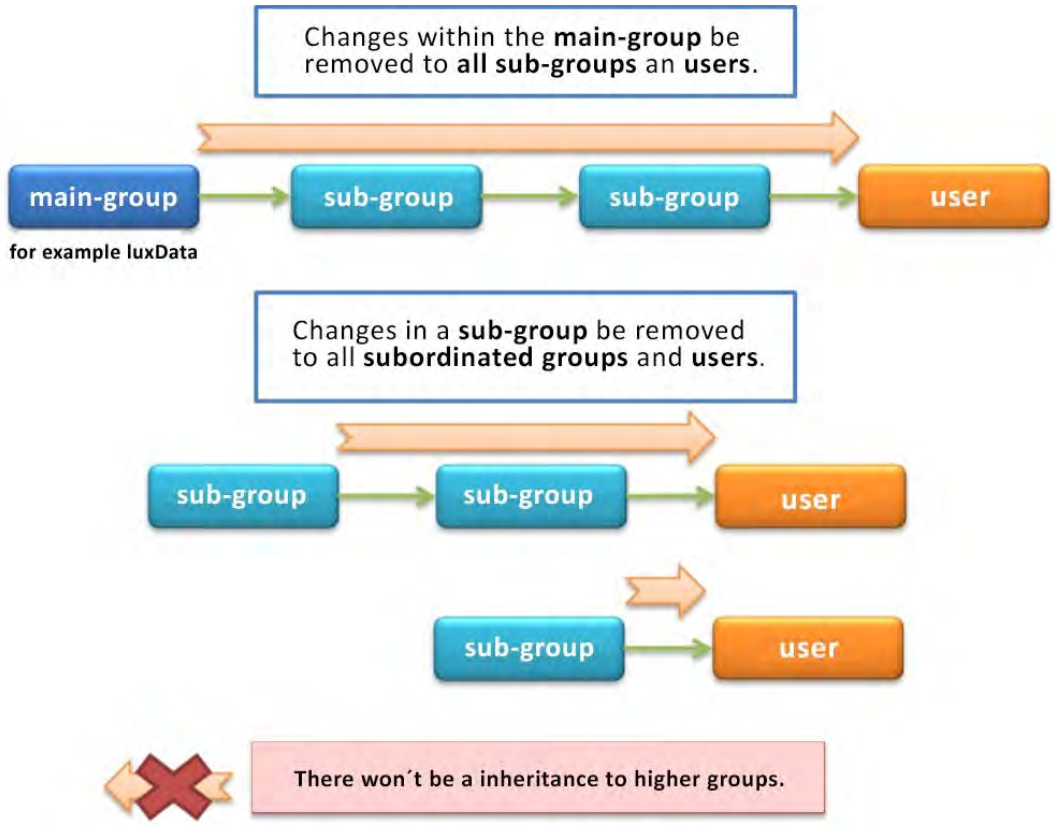


Inheriting rights

Changes to the rights within a group will be inherited by all assigned sub-groups and users.

Inherited rights may also be removed from specific sub-groups or users.

It is also conversely possible to assign more rights to specific users within groups, i.e. rights that the other users in the group have not been assigned.



Creating and customizing reports

luxData.licht already comes with a number of built-in reports that allow important information to be printed out.

The appropriate reports are automatically provided in a report pool depending on the opened and activated forms.

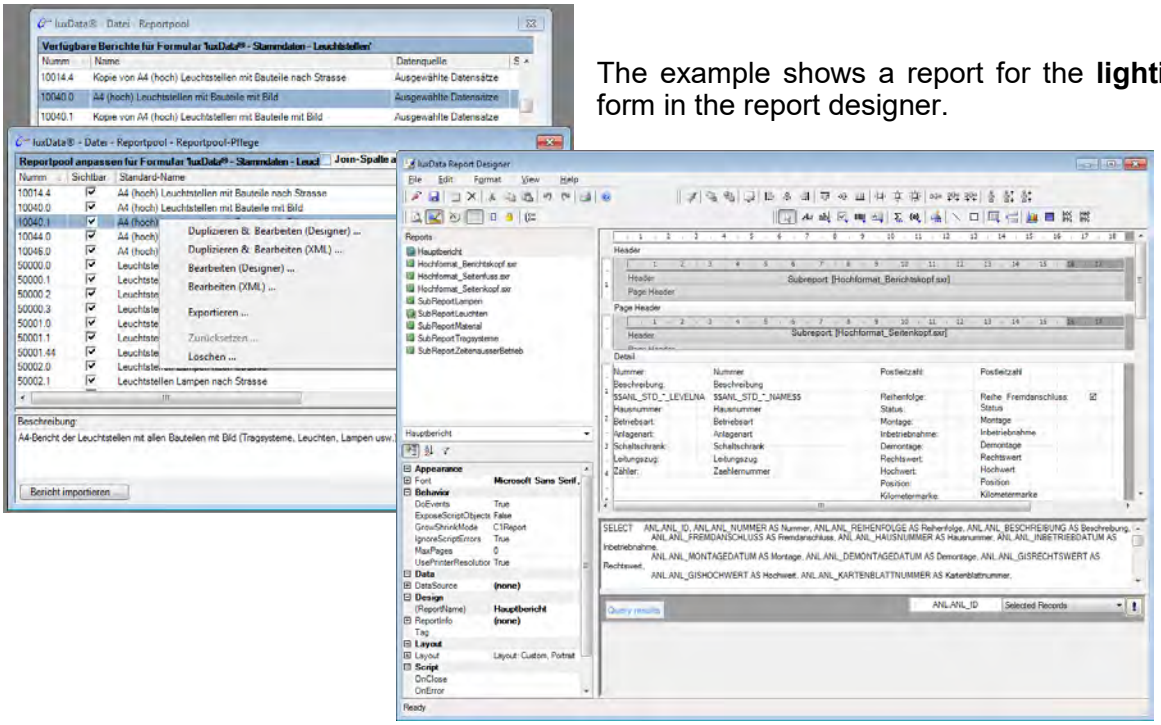
ComponentOne
ComponentOne Report Designer

The report designer in *luxData.licht* by **ComponentOne®** permits existing reports to be copied and adapted depending to requirements.

E.g. headers and footers may be adapted to your standard (in line with your corporate identity).

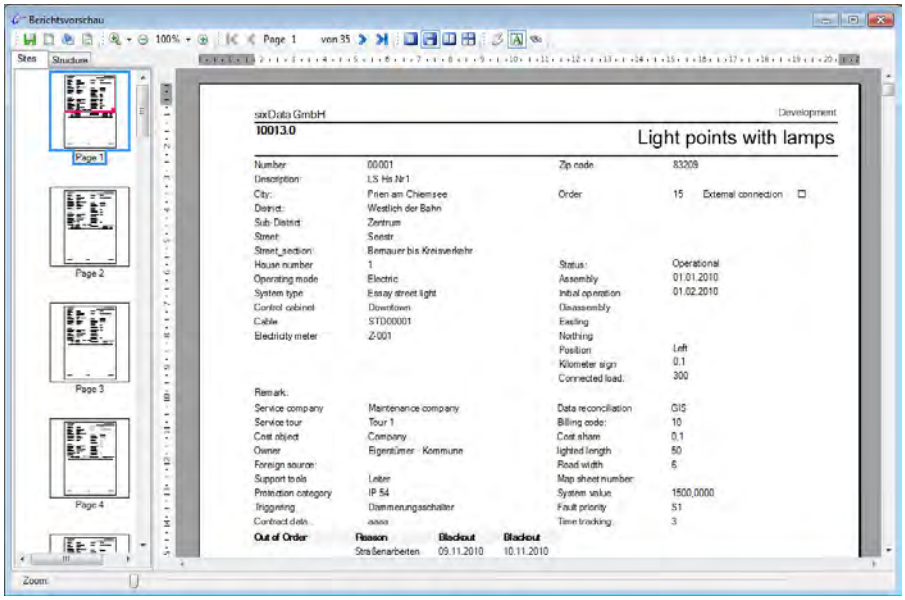
New information may be added to or existing information removed from reports.

Reports may be imported from other programs (e.g. from Access) or exported as XML files.



The example shows a report for the **lighting-points** form in the report designer.

Reports may be edited as required: Colours, positions, data sources, spacing, fonts, font sizes, text colours, visibility, etc. It is even possible to insert images or logos.



luxData.licht comes with a **free** built-in GIS component that allows systems (lighting points and switch cabinets) to be shown on maps.

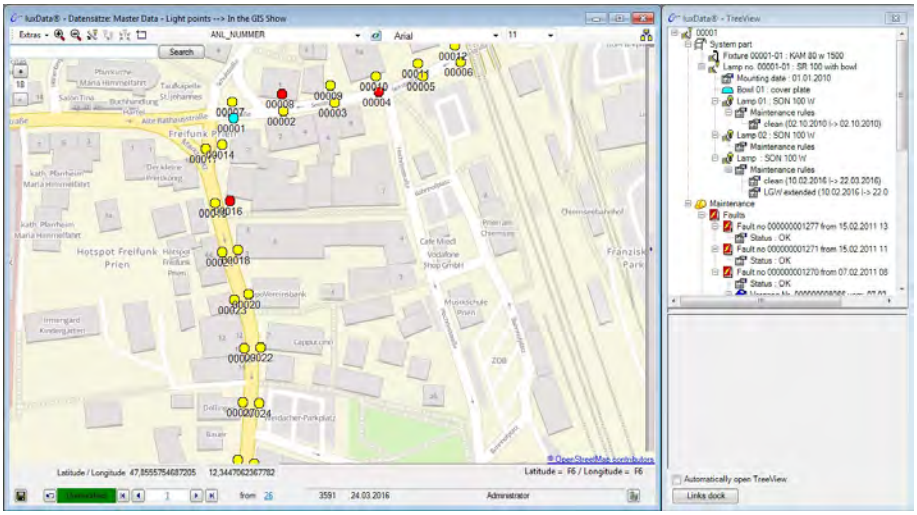
The maps provided by **OpenStreetMap** are used as the default. Additional maps (layers) may be optionally stored in the system.

The map material may be saved to the *luxData.licht database* and so used off-line.

luxData.licht uses the **WGS84** coordinates format for the internal representation of objects.

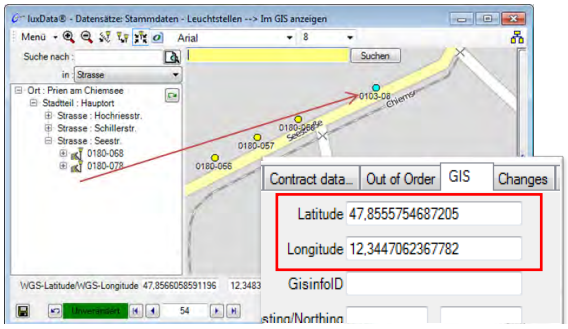
Coordinates may be imported from other GIS systems (irrespective of the format).

Coordinates in other formats (e.g. Gauß-Krüger, Soldner Berlin, CH1903, Austria GK M, UTM) may be converted in *luxData.licht* into the required WGS84 format.



A tree view may also be displayed next to the map window. The tree view will display important information when systems are selected on the map.

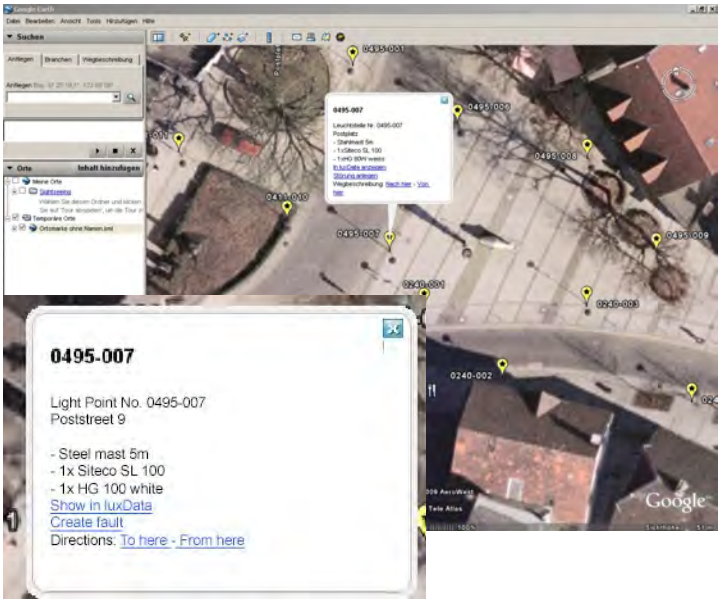
Different forms associated with specific systems may be opened and malfunctions created in the system using a context menu.



Systems may be roughly positioned at the desired location in the map window by **dragging and dropping** them. WGS coordinates will be automatically generated and saved for the systems positioned in this way.

The GIS coordinates may be exported to the **KML format** using the Coordinates Toolbox.

This format allows system information to also be called up and displayed in **GoogleEarth**.



Individual colour coding in GIS maps

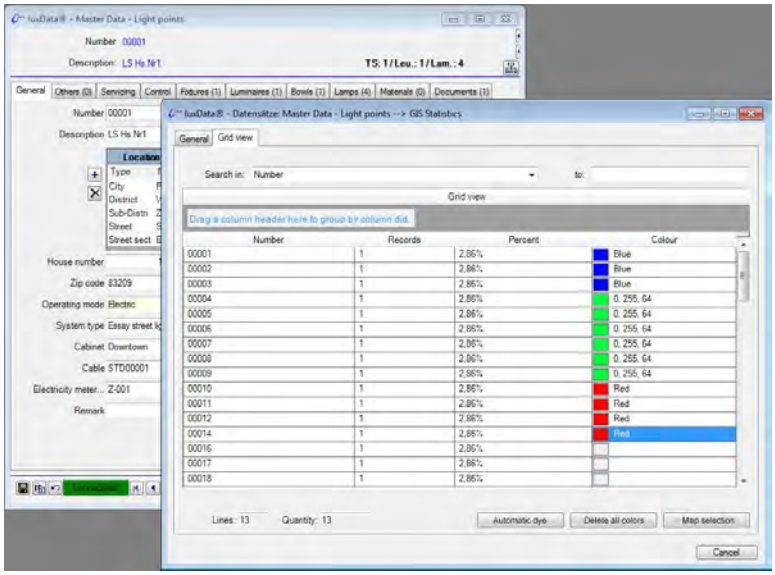
Default colours in *luxData.licht's* integrated GIS map for representing systems:

Yellow	System not highlighted, without malfunction
Red	System not highlighted, with malfunction
Light blue	Highlighted system

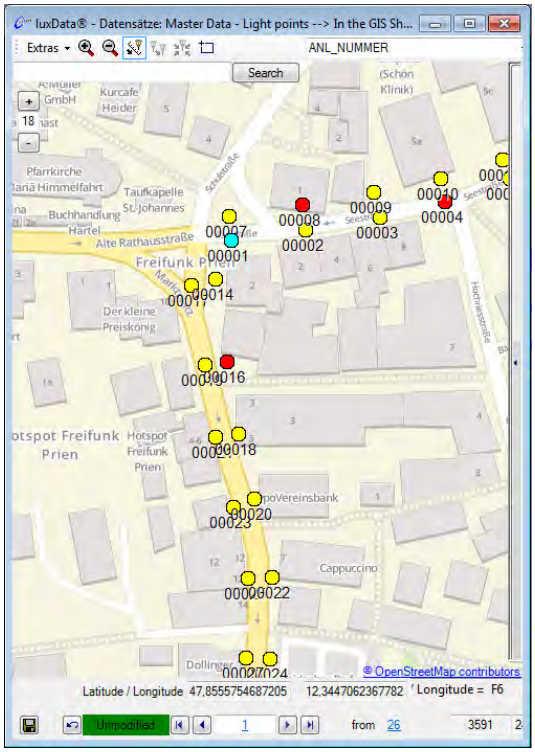
It is possible to highlight previously selected systems in *luxData.licht's* GIS map using special colours.

To this end, any number of lighting points may be filtered from those saved in the database.

These systems may then be assigned their own colours either automatically by or manually using the **GIS statistics**.



The systems may then be transferred to the GIS map with new colours for separate highlighting.



Example

All systems that are still using mercury vapour lamps are to be highlighted in a different colour.

This will highlight all the lighting points in the GIS map that may be entitled to participate in a funding measure.

A broad range of interfaces extends the processing capabilities of luxData.

Switch to reference form - form reference

SAP R/3 is frequently employed with other applications within the framework of supplementary operational and planning business processes. *luxData.licht* may also be adapted to this existing structure.

Particularly for informative data-analysis purposes, data from *luxData.licht* may be imported into the SAP system or data exported and copied from the SAP system to be later imported into *luxData.licht*. The SAP.NET Connector is used to realize this function.

The MS .NET world was chosen as the platform for *luxData* for a variety of reasons.

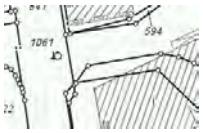
These included strategic considerations but mostly because we are convinced of the benefits that this technology offers.

The integrative approach of Microsoft's development environment also speaks for itself.

The technology allows, for instance, the seamless integration of the SAP.NET Connector provided by SAP. This makes it possible for .NET applications such as *luxData.licht* to directly address field contents in existing R/3 or mySAP.com databases (whereby SAP's internal security concepts are utilized).

luxData.licht also employs this mechanism for dynamic data import from SAP systems. The integrative power of Microsoft's .NET framework has in this way been transferred to the *luxData.licht* application.

GIS



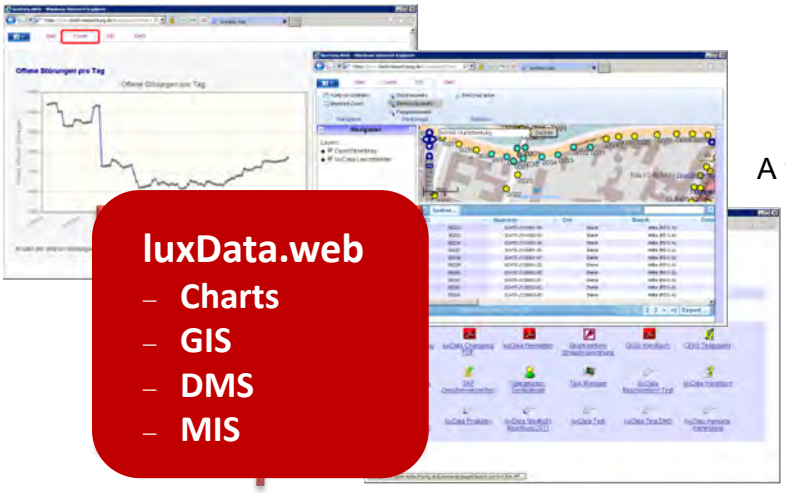
luxData may be connected to different GIS systems using interfaces. These include, for example:

ArcGIS, Smallworld GIS, POLYGIS, GISMobil, webOffice, MapInfo, EasyGIS, Topobase, SICAD, GISeye, INGRADA web

Optimum GIS interfaces provide the following options:

- Selection of objects in luxData.licht for use in GIS.
- luxData.licht is able to share the characteristics of lighting points (light type, lamp type) with the GIS which the GIS will then display using symbols.
- Selection of objects in the GIS and display in luxData.licht.
- Objects may be moved in the GIS and the coordinates refreshed in luxData.licht.
- Creation of lighting points in luxData.licht and subsequent positioning in the GIS.
  For example, position 22 lighting points at the same distance along a construction line of 360 metres.
- Creation of objects in the GIS and subsequent management in luxData.licht.
- Deleting objects in luxData.licht will automatically delete objects in the GIS.
- Objects deleted in the GIS will mark objects for deletion in luxData.licht.
- Searching for objects and streets is possible directly in the GIS using numbers or names.
- Consistency check to verify whether all objects in the GIS also exist in luxData.licht and vice versa.

Options and their possible uses



luxData.web
- Charts
- GIS
- DMS
- MIS

A **web-based portal** with different optional user applications.

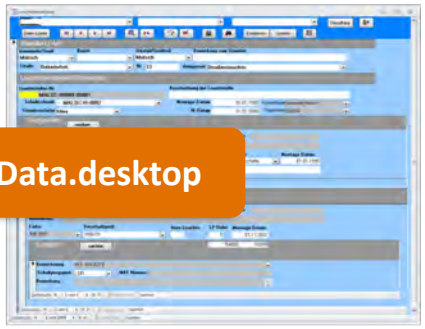
luxData.mobile

luxData.mobileApp

Optimization of maintenance on site through the use of hand-held devices.

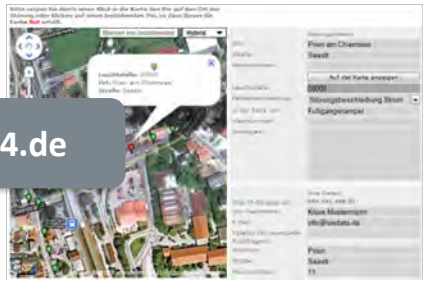
The use of **bar codes** will additionally facilitate the work on site.

luxData



luxData.desktop

Data may be exported to and the processed with **luxData.desktop.** Then synchronizing it with *luxData*. The ideal tool for **recording data on site**.



stoerung24.de

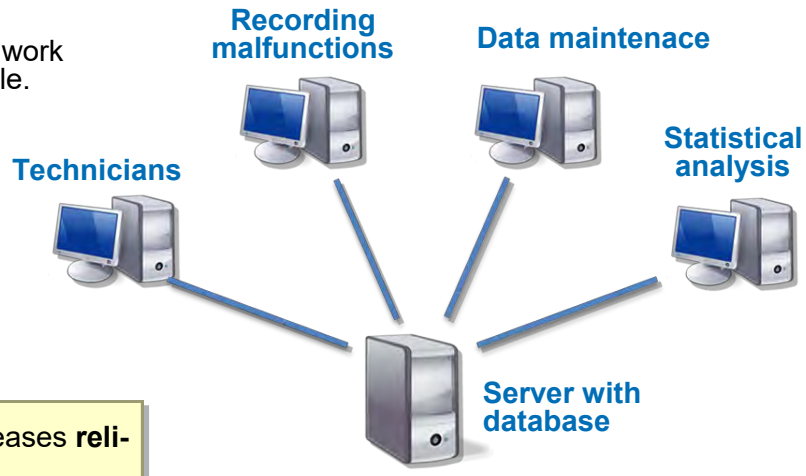
Free Internet portal for residents to report malfunctions by email. Option for importing the data about malfunctions to *luxData.licht*.

General information

- *luxData.licht* uses a **relational database**
  This means that data is saved in several tables that may be associated with each other through relationships as required.
- *luxData.licht* uses the **client-server principle** (multiple-user system)
  This makes it possible for several users to communicate simultaneously with the database server without this, however, causing any data conflicts.

Stand-alone installations are also possible.

Example of the division of work using the client-server priciple.



The client-server principle increases **reliability** and **data protection**.

The backup mechanisms that are today employed as standard in databases mean that the risk of data loss has been virtually eliminated.

These mechanisms include, among others: - Secure **transactions are possible**
- **Data integrity is ensured**

luxData.licht is a modular system.

This means that it is very easy to implement customer-specific extensions by installing **add-ins**.

The default SQL interface in *luxData.licht* means that any type of query may be created for the users' own analyses and that the results may then be exported to a spreadsheet application, for instance.

Databases

luxData.licht may be used with the following databases:

SQL

- SQL-Server 2008
- SQL-Server 2008 R2
- SQL-Server 2012
- SQL-Server 2014
- SQL-Server 2016
- SQL-Server 2017

Free SQL versions

- SQL-Server-Express 2008 (bis 4 GB)
- SQL-Server-Express 2008 R2 (bis 10 GB)
- SQL-Server-Express 2012 (bis 10 GB)
- SQL-Server Express 2014, 2016 und 2017

Oracle

- 8i
- 9i
- 10i
- 11g
- 12i

Free Oracle version

- XE

If one of the listed databases is already being used and there is a licence available for the respective database, then one of these available licences may be used.

Operating systems

luxData.licht may be installed on the following **Microsoft operating systems** (32 and 64 bit):

- Windows Vista SP2, Windows 7, Windows 8 and 8.1
- Windows 2008 Server
- Windows 2008 Server R2
- Windows 2012 Server
- Windows Server 2012 R2
- Windows Server 2016

Microsoft .NET Framework 4.0 or higher is required for all.

luxData.licht is continuously being adapted to newly released operating and server systems.

Networks - bandwidth

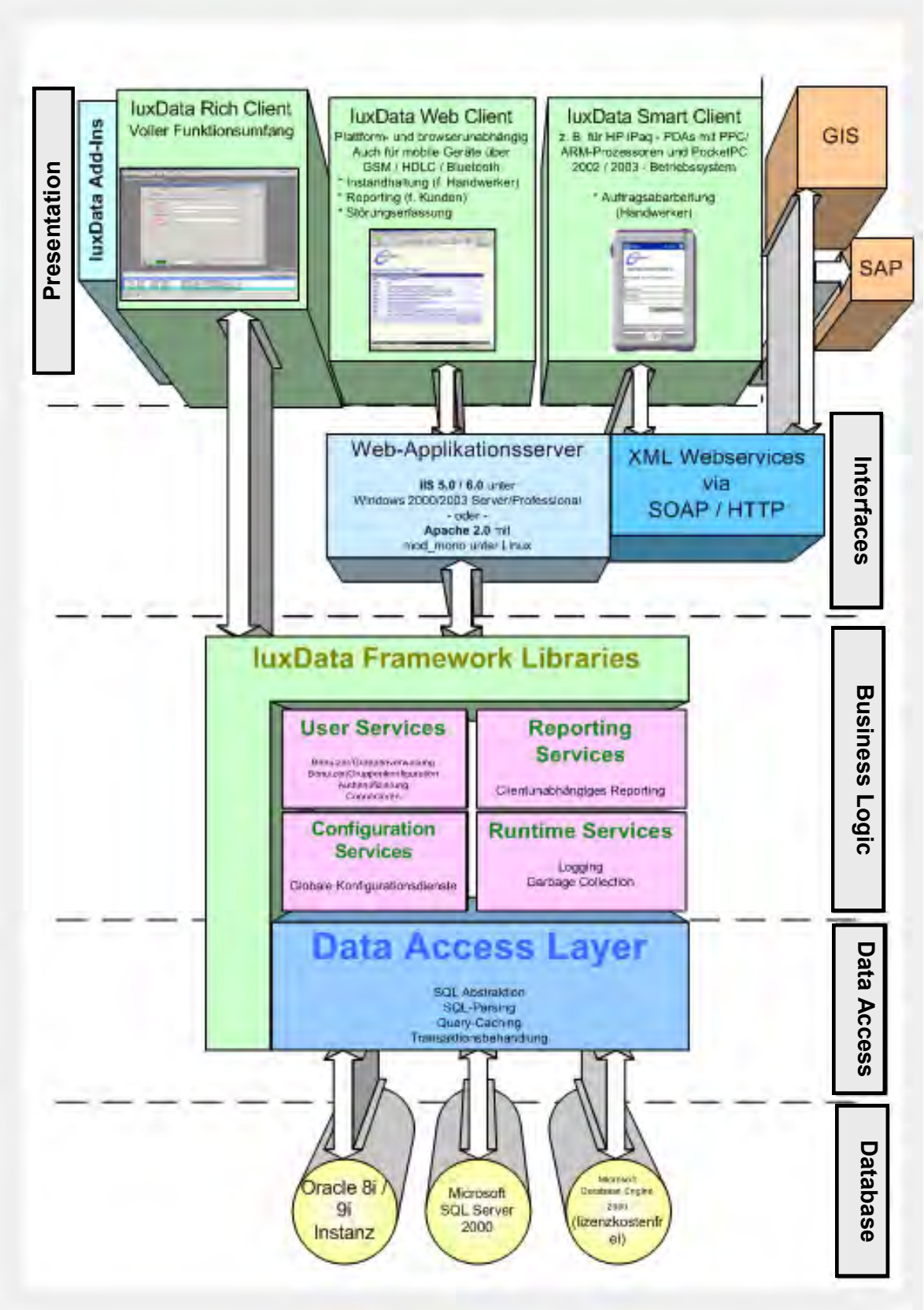
At least 100 Mbit

Hardware - workstation

We recommend the following minumum requirements for *luxData.licht* to run smoothly:

CPU	1.5 GHz or faster
RAM	At least 1 GB RAM (2 GB or more recommended)
Hard disk (free memory)	2 GB
Screen	19“ of larger (screen resolution 1280x1024)
Printer	A4 for printing out reports, logs, etc.
Scanner	Optional
Digital camera	Optional

luxData.licht is a multi-layered object-oriented database application for recording and managing street lighting in all its facets.

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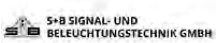
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