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CAD Integration SAP 3D Visual Enterprise
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KORASOFT, BIM for Real Estate

The KORASOFT Workplace Navigator is the graphical backbone for a family of Real Estate and Workspace/Facility Management solutions. It's not a GIS, neither a CAD nor a BIM tool, but combines the data consuming features of each of all its authoring tools into a single graphic user interface. The "BIM for Real Estate" App is its first component supporting SAP's Digital Twin in the Cloud for Real Estate – C4RE. "Well Tagged", i.e. BIM prepared 2D AutoCAD drawings or BIM models are pre-processed by SAP's Visual Enterprise tools to generate a file format that can subsequently be processed by the BIM App (additionally KORASOFT provides Visual Enterprise plug-ins for a direct processing from the AutoCAD and Revit user interface). The resulting file is then uploaded for comparison with the Digital Twin of the building selected from the C4RE portfolio. Differences for objects are displayed for review, grouped by new, changed or end-dated objects. If acceptable, the user can update the Digital Twin from the CAD / BIM provided data with a simple mouse-click. This feature makes it fast and easy to compare different model versions visually and review proposed changes prior to updating the data. An on-premise version supporting BIM data validations with SAP EAM and RE-FX will follow soon.

Maps like Google Maps or Open Street Map assist the master data management of outdoor facilities. The same is true for process data entry and visualization. The portfolio of buildings, properties and/or assets is either managed using SAP's Real Estate (RE-FX) architectural model and its assignments of enterprise asset, occupancy and usage objects or the Cloud for Real Estate. Real Estate contracts and SAP's Enterprise Asset Management (EAM) work orders are the operational ties into the enterprise resource planning as the Asset Intelligence Network is for the SAP Cloud.

What markets are addressed? The master data maintenance from architectural drawings or models created with AutoCAD, Revit or any BIM compatible tool is a suitable fit and starting point for all target Real Estate markets, as is stacking and blocking. The solution supports space layout planning not only for **retail** space like shopping malls but also long-term space rentals as well as ad-hoc kiosk or advertising space usage for a temporary campaign that require constant layout changes. Promptly adopting the master data from the layout changes allow for an up-to-date management of the rental agreements as well as the tracking of user originating maintenance and repair service requests.

Moving between spaces is not only a **corporate**'s real estate manager's challenge; **residential** real estate managers need to keep track of tenant changes likewise. Orders need to be issued to make a move happen or to clean and retro-fit space. Space needs to be utilized, whether by a residential tenant, a retail business owner or the business units of a corporate. Process owners in all of these markets need a simple, integrated process to survey facilities, take notes and make adjustments to master data or issue notifications for services needed, all from a hand-held device that's easy to carry on a survey or walkthrough.

That's especially important for restricted access facilities like apartments or **industrial** premises. 3-dimensional building views aim at the support of the planning of industrial space where vacancy is not so much a question of space but more one of volumes. 2-1/2 pseudo stapled floor drawings help with the planning of office layouts.

Software Architecture

The Workplace Navigator (hence its component BIM for Real Estate too) is based on the SAP Fiori user interface paradigm as well as RE-FX and EAM best practice configurations, uses

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SAPUI5 and is available for both a cloud and on-site deployment. Once the Navigator will be deployed without an ERP backend, the new SAP cloud products Cloud for Real Estate (C4RE), the Asset Intelligence Network and the Project Information Network are taking over from the RE-FX, EAM and PLM (Product Live Cycle Management) modules. Depending on this, the Cloud or on-premise solution of the BIM for Real Estate App needs to be deployed. The diagram below shows the Workplace Navigator as the outer shell around the 2 different SAP backends, a) the ERP system, b) the SAP Cloud. It's the seamless user interface bridge between SAP Cloud and ERP applications like building operation and maintenance, move-, key- and cleaning management or tree cadaster. KORASOFT delivers those applications as enhancements to the SAP standard RE-FX, C4RE or EAM, AIN products (blue and light blue shells around the orange core). The KORASOFT integration products, positioned in the center between the two orange circles (which represent standard SAP products) deliver direct authoring plug-ins into Autodesk or other CAFM vendors' software products.

The other products in the KORASOFT Real Estate and Facility Management Solution family – on top or supporting the Workplace Navigator – are:
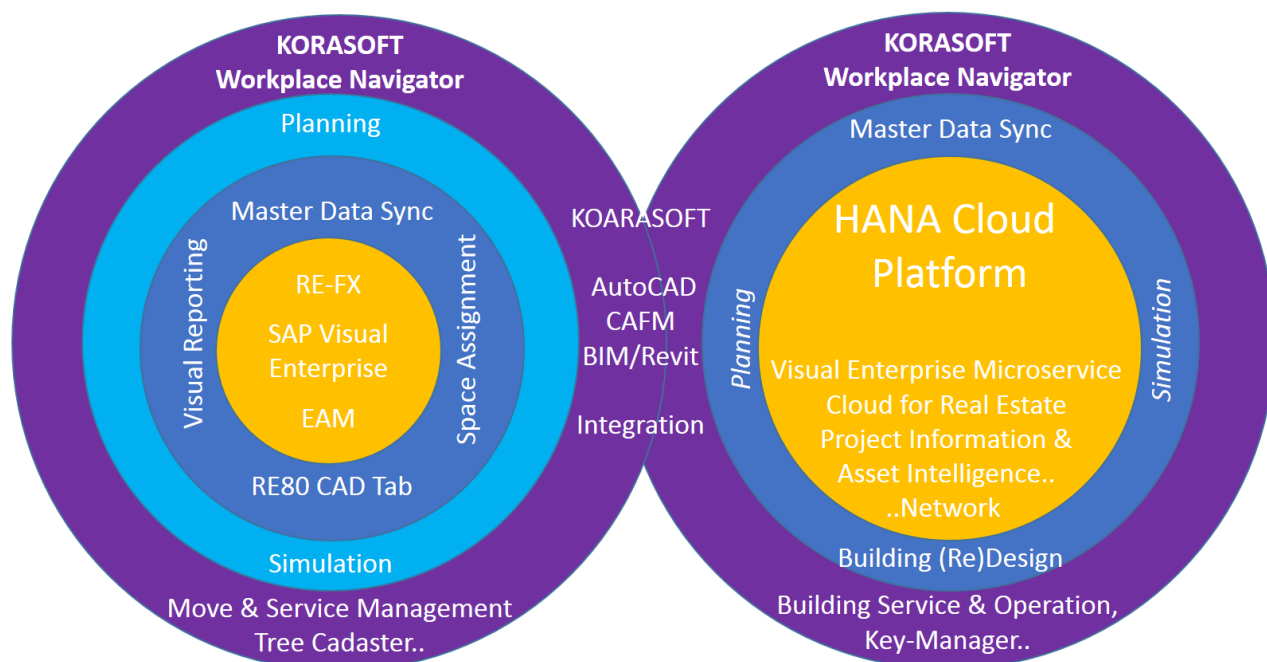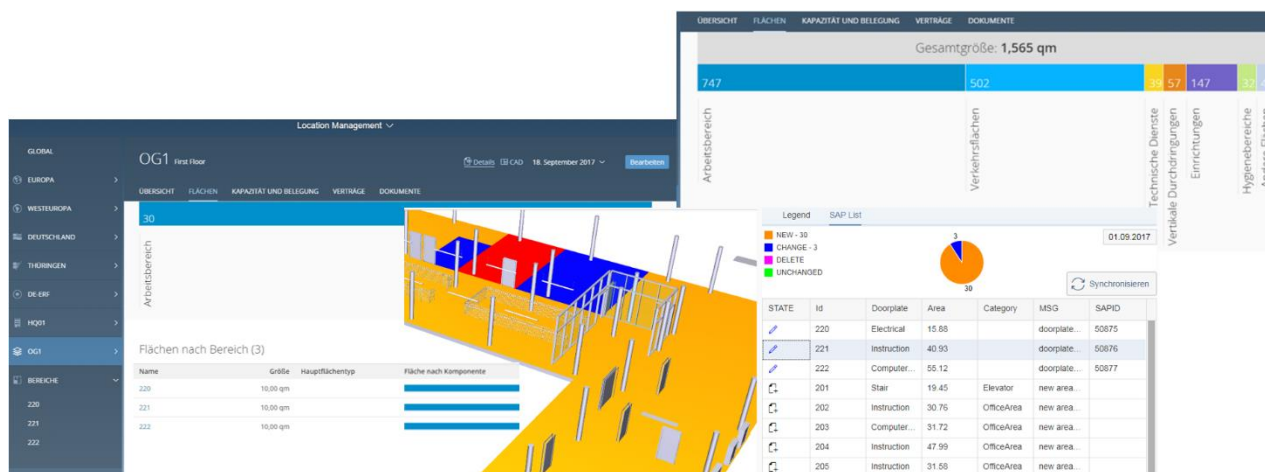

-   The AutoCAD and Revit plug-ins offer a drawing/model check and validation functionality, supporting the structured tagging of drawings for use with SAP 3D Visual Enterprise and SAP's Document Management System. Printing/plotting and SAP data download into CAD drawings/models is an optional addition.
-   Visual planning tools for floor layout modifications and furnishing as well as move planning, using "What If" scenarios for data analysis (the Building (Re)Designer is going to provide BIM/Revit integration into SAP's Project Information Network also)
-   Order Planning and simulation tool for services such as maintenance tasks, cleaning or move services and other Asset Management and purchasing activities from tendering to cost settlement to room occupants
-   Traditional RE-FX, Visual Enterprise based graphic enhancement for master data synchronization, space management and Visual Reporting from the RE Navigator (RE80) transaction's CAD page.

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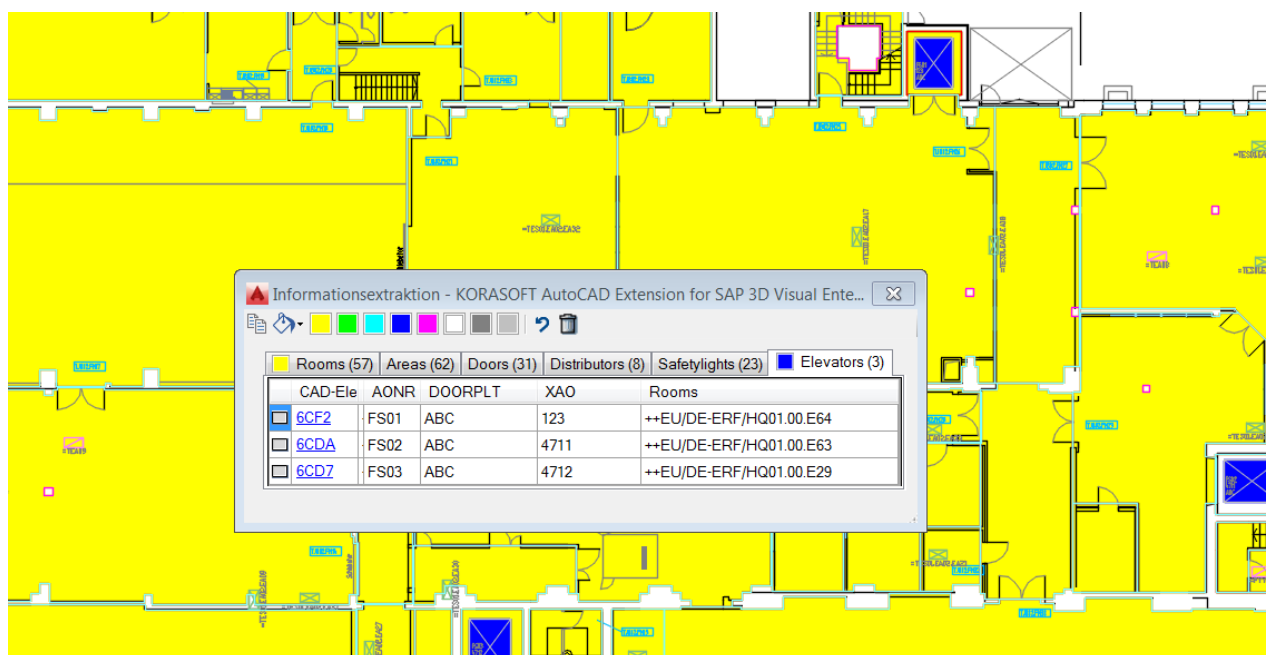SAP® Fiori based WEB-Solutions
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Scenario planning and service simulations are available in ERP backend SAPGUI based solutions and are about ready to get packaged into UI5 and running on the SAP Cloud solutions (italic printed in the screen above) very soon.

Master Data Authoring and Publishing for the Workplace Navigator

Drawings that will be used to create and change SAP master data need to adhere to defined standards. Building Information Model (BIM) models meet these standards as is, all others need to be reviewed and potentially adjusted first. At a minimum, a drawing needs tagged polygons, where the tag-values specify a unique space / workplace ID (unique among all ID's used in the same drawing) and an object or space type. A mapping between SAP and CAD or BIM data will be defined and established before drawing synchronizations. Tags are used to do so in a CAD drawing; the IFC standard is used in a BIM. If those tags can be mapped to object attributes in the SAP database (either in the Cloud – see screen below – or the ERP data model), a drawing can be used to create and change SAP master data.

KORASOFT offers two plug-ins, an AutoCAD and a Revit plug-in, to assist the user with the drawing/model creation, maintenance and review, the so-called **authoring** process. Missing, incorrect or non-unique tags/polygons/objects can be marked / zoomed to for seamless drawing/model maintenance. The plug-in also enables a bi-directional interface between CAD/BIM and SAP. With this interface, CAD or BIM data can not only be used to create and change SAP objects; data from related SAP objects can also be transferred into AutoCAD or Revit. Again, this is true for data from the SAP ERP as well as the Cloud data model. The mapping of these fields into RE-FX as well as "its cloud version" C4RE can be configured by the customer. Additional mappings into the RE-FX Usage View (maintaining pool/rental spaces and/or rental units) or linkages with Enterprise Asset objects (Equipment, Functional Location – see screen below) require consulting guidance from KORASOFT.

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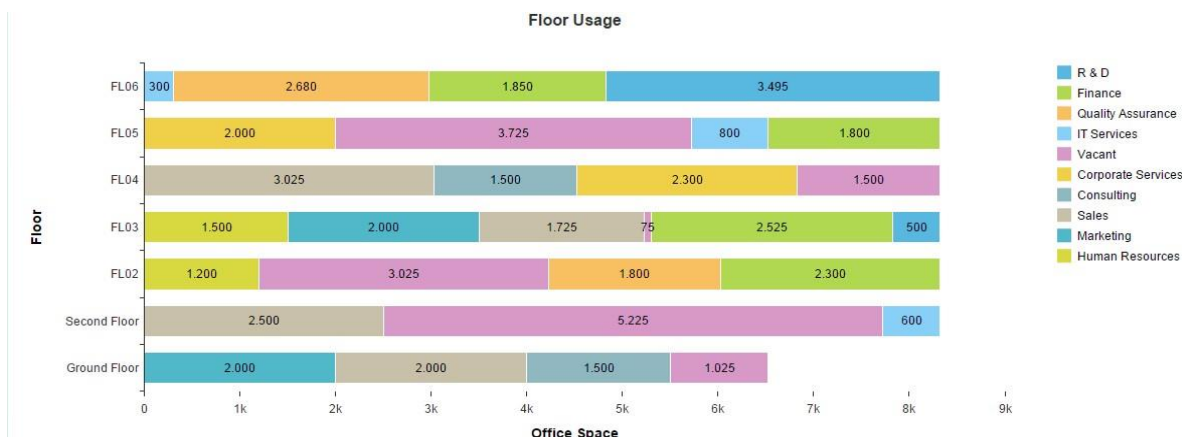SAP® Fiori based WEB-Solutions
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The same is true for the new SAP Cloud solutions Asset Intelligence and Project Information Network.

The process of creating and maintaining SAP master data from a floor layout drawing or a BIM is called synchronization. The first step of this **publishing** process is to display and validate the quality of the source data from AutoCAD or Revit. Based on the tag data mapping between CAD/BIM and SAP object attributes, the synchronization compares SAP and CAD/BIM values of objects existing in both systems. The standard implementation transfers the CAD delivered values into the SAP objects attributes; within the scope of a project SAP data can be derived or calculated from CAD/BIM data. Objects contained in the drawing/BIM will be created in SAP, those existing in SAP and not included in the drawing (anymore) will be end-dated. This operation can be simulated in a test run; all differences between CAD and SAP data will be displayed and inconsistencies that may result in synchronization errors will be highlighted.

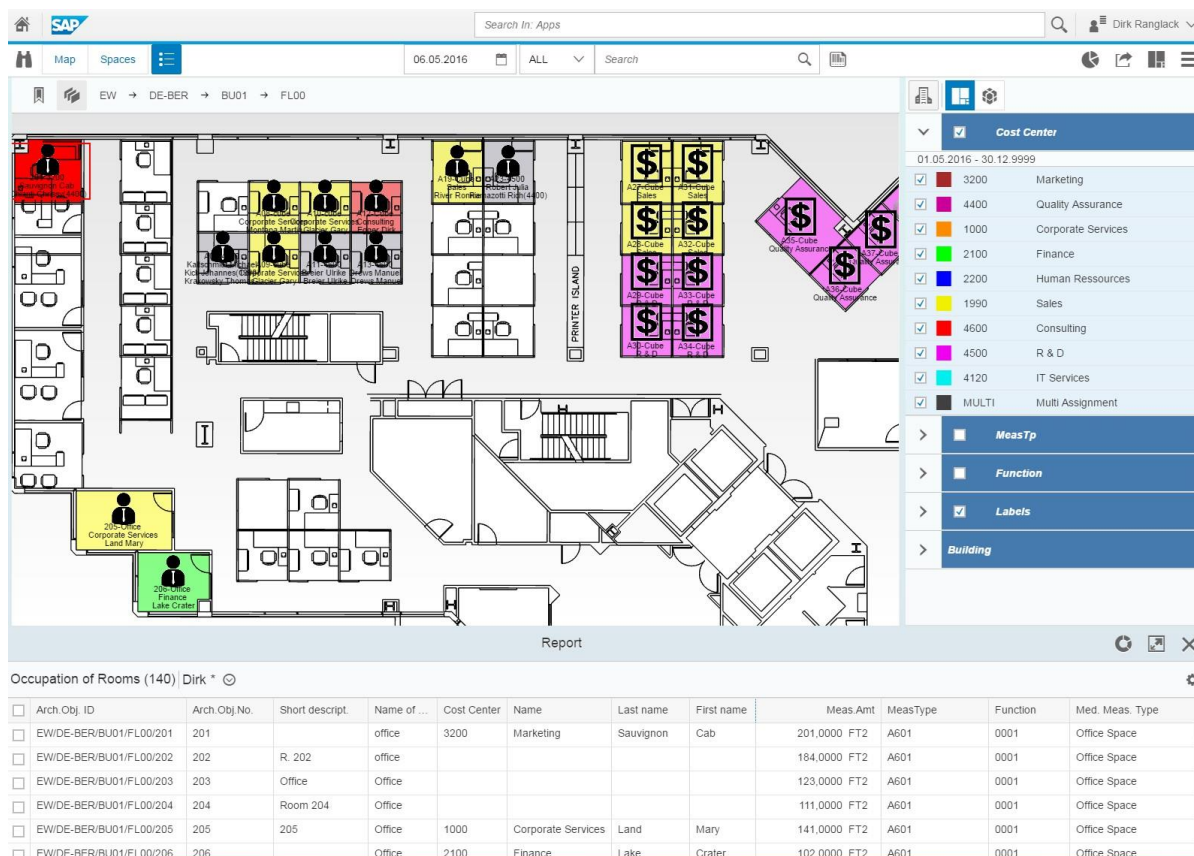## Master Data consuming – the Real Estate and Facility Management

Prior to the advent of Cloud solutions, this mostly Autodesk delivered floor drawings (AutoCAD) or Building Information Models (Revit) could only be accessed from a workstation with a SAP GUI installed. Its usability was limited by the GUI application itself. Most people consider this to be the major pain-point for the application of SAP for the Real Estate and Facility Management. Even blocking and stacking capabilities didn't change the user acceptance of those solutions significantly. The answer to this challenge is S/4HANA and the SAP Cloud platform. HANA is a new database technology that will greatly improve the data processing compared to what we know it today. 'S' stands for 'Simple' which means the use of SAP got faster, simpler and more intuitive. The entire SAP functionality will now be available to users via multiple access points, making this the fastest solution to work seamlessly across office-based, web-based and mobile devices.

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For the Real Estate and Facility/Workplace Management 'simple' means delivering software that is so easy to handle that even infrequent users are comfortable working with it without much (re-)training. Managers and users share the workload of data input, Workplace/Space services can be requested and master data can be maintained through a self-service portal which will automatically trigger the process flow. Managers **benefit** most, they only need to review these tasks and approve for execution (business users may accept a proposed planning), hence reducing their actual workload to key responsibilities.

The Workplace Navigator provides all this with a visual representation of the whole portfolio, individual buildings or floors. The navigation starts with a map displaying the buildings, properties and/or assets of the portfolio and, with just a few mouse clicks, takes the user to a specific target space or workplace of interest. With the next mouse click, actions required for this space can be entered directly on the mobile device or office computer.

How is this done? SAP has started to deliver new User Interface components that allow the implementation of simple, role based, customer tailored, Web based applications – the Workplace Navigator is the first solution out of the upcoming KORASOFT Facility Management and Real Estate product family.

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FIORI with SAPUI5, SAP 3D Visual Enterprise and Visual Business are the founding success factors for this optimization of the Real Estate and Facility/Workplace Management:

- FIORI provides the framework to optimize workplace management processes using the SAPUI5 user interface components
- SAP 3D Visual Enterprise adds the CAD integration for the visualization of space
- SAP Visual Business provides map processing capabilities for a visual portfolio management

KORASOFT, adding extensive consulting experience with Real Estate and Facility/Workplace Management process optimization, merges all of the above into an out-of-the-box Workplace Navigator that can be tailored to each customer's unique process needs in an implementation project (see below).

The Workplace Navigator consists of several SAPUI5 built frontend components that are populated with data either from the ERP backend (by oData services) or the SAP Cloud (by APIs from the SAP API Business Hub). Those components are:

- A Map view on the portfolio (see below)
- The legend pane (on the right - showing the types of buildings in the portfolio in the screen below)
- The map and floor layout views can be color coded by database objects and its attributes (note the screen below shows colored spots and numbered clusters – the color codes are listed in the legend, the clusters can be "exploded" by clicking them – the number in the cluster shows the number of building matching the layers check-marked in the legend)
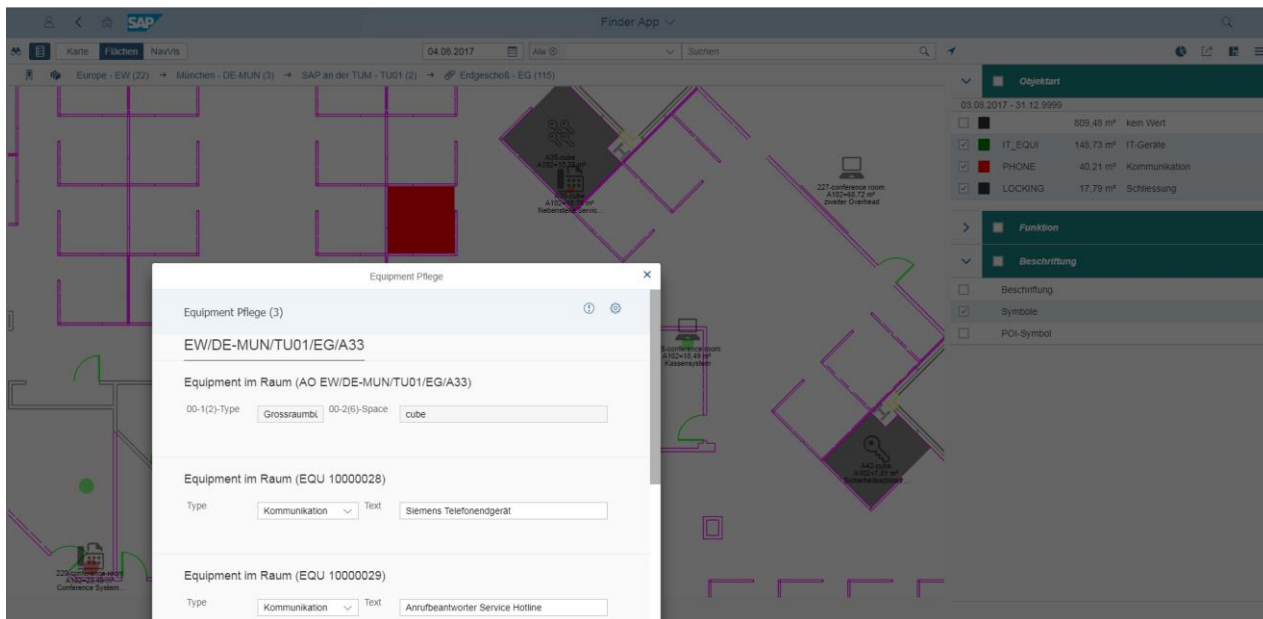- An in-place frame for the integration of SAP external views

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(the indoor navigation system NavVis in the screen below is an example)
- Search pane (all open notifications with description "Dom*" are returned below)
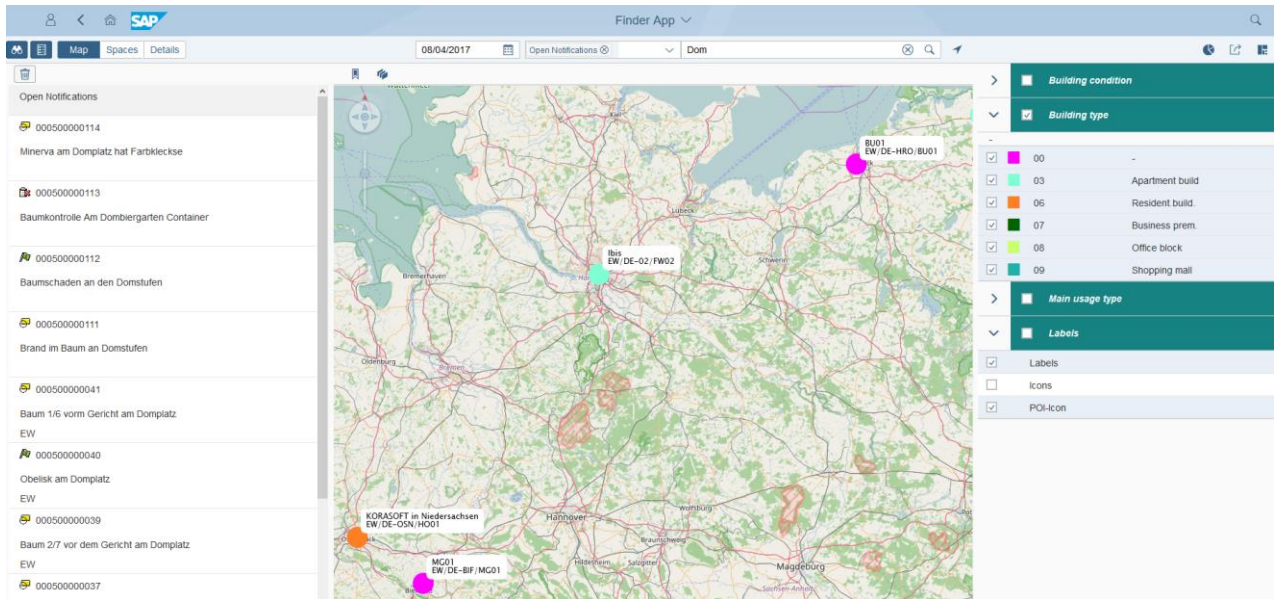

- A report view showing the legend creating data in a list view (see above) and
- A stacking pop-up displaying the occupancy of a building (see above)
- A form for the selected object (objects can be selected either from the search result, the map or a floor diagram). The example shows a notification form for tree that has been inspected at the location that is shown in the map on clicking the search result line too.
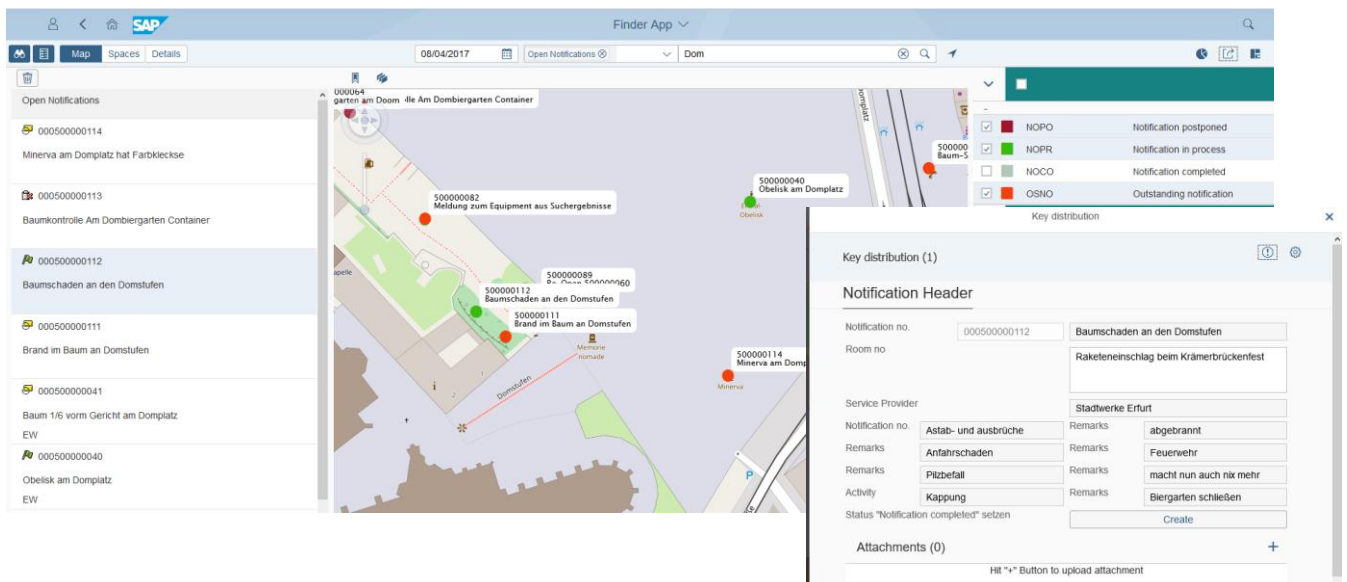
- A floor diagram view showing the layout of individual buildings and their mobile inventory like furniture, fire and safety equipment, IT assets etc. floor by floor (see screen below)

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- The planning role gives access to the drag and drop component of the Workplace Navigator (see screen below). Business Partners (for instance employees) or equipment can be displayed from the SAP backend database via a Web compatible version of a F4 search help, populating a so-called task list. A simple mouse click is all it takes to place an icon representing the marked line in the task list in the drawing display. The icon – and with it the associated object - can then be moved around by the user with another click.
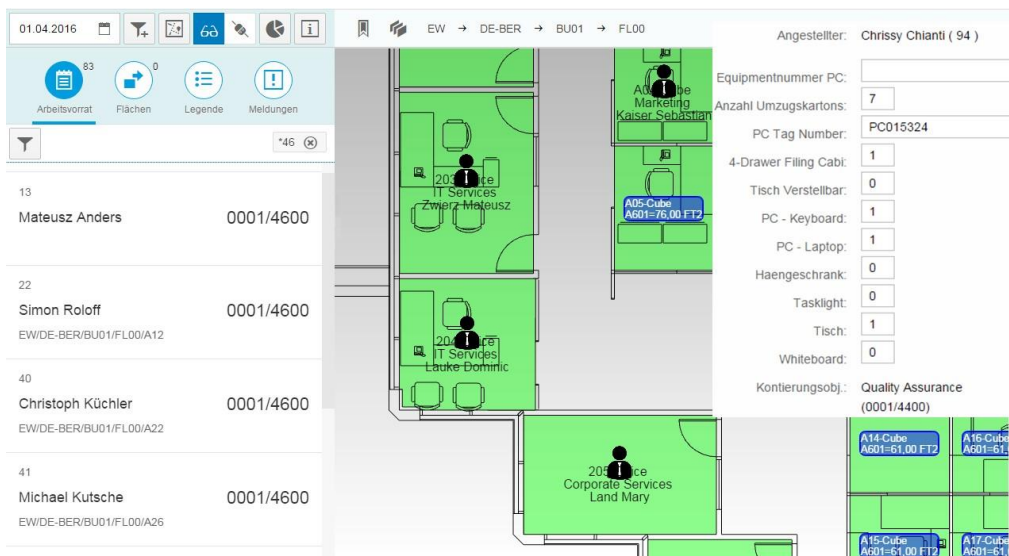

Last but not least, each company feels a shortage of meeting space and wants to transform appropriate continuously occupied space into desk-sharing environments. By scanning the QR-code of a space or workplace, a user may do the booking ad-hoc with a single mouse click from his/her hand-held device; provided availability.

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To do a booking in advance a search would retrieve the space / workplace as well. In case it's not available alternative vacancies are displayed in the floor map. Also, surveys/inspections of space/equipment are handily supported by the QR-code scanning hand-held, running the Workplace Navigator. Both Mac iOS devices and mobile devices running Android are supported.

For small screen devices for instance on a cell phone the Workplace Navigator is delivered without graphic views. For instance, all inspections to be carried out in a regular or incident caused survey are displayed role based in the mobile version of the Navigator:
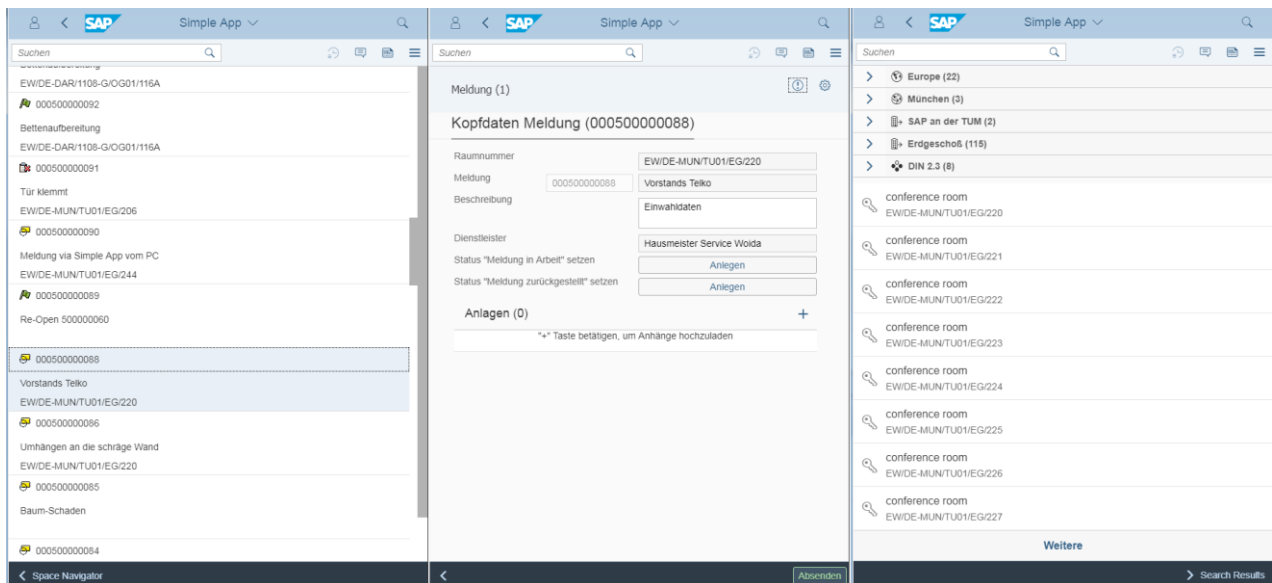
From left to right:

1. List of incidents the hand-held owner needs to look at
2. Notification - either work has to be conducted to solve the issue or the handling of the issue can be postponed
3. While walking the building another incident can be opened by navigating the portfolio, scanning a QR code or simply by Geo coordinates.

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Features and Benefits

The Visual Reports Designer, the search engine and the form editor allow the tailoring of the KORASOFT Workplace Navigator to individual customers' needs and various business scenarios with little or no ABAP skills required. The Navigator is delivered with a set of pre-configured roles – build with these tailoring tools – that include:

- Room data directory (administer fixture and fittings, providing DIN or BOMA area standards),
- Incident and recurring building maintenance / operation (room based maintenance: many, simple objects – rather than few complex machineries or devices),
- Cleaning,
- Fire protection and
- Building safety,
- Key Management,
- Tree Cadaster,
- Occupancy and
- Move Management.