



UBIK[®] - Augmented Reality for the Industry

A white paper from Augmensys GmbH



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1 Why UBIK®?

Using the latest software technology combined with current mobile devices, such as tablets and smartphones, the augmented reality concept brings a fresh breeze into the industry.

New technologies, digital media and the ubiquitous internetworking of all devices promise to improve our efficiency, optimize laborious processes, and maybe even lift the ease of use to the next level. But the enormous amount of data, possibilities and decisions leads to a soaring overstrain of users, and sometimes even empties into a total refusal of new applications. The industrial user is not only permanently confronted with new technologies, but also with the rapidly increasing amount of data that needs to be gathered, reviewed and edited under constant pressure of time and growing pressure to perform.

Augmented Reality with UBIK® offers a wide range of new opportunities to tackle those problems, especially in the process industry, since it allows enriching real plants with any available virtual data – and therefore creates a new, extended industrial reality. By simply aiming at an area in the plant with a mobile device, UBIK® creates the context to the objects in sight automatically. Any information, such as operational, engineering or production data, is then superimposed into the Live-Feed of the device's camera. As a result, every user is enabled to use this data from now on, regardless of his education, skills and knowledge.

This creates immediate value for the user, but it also protects the company's investments: the more purposeful the costly created data is used, the more efficient people will work.



2 Value

UBIK® is a comprehensive solution for enabling Augmented Reality in industrial environments. The forceful application of this concept allows the channeling of complex and overburdening data, by providing it location-based and role-based. The user is therefore no longer under compulsion of learning how to interpret a flood of data on his own; the intelligence of UBIK® ensures that the quality and quantity of information are always aligned to his current situation and problem.

So UBIK® doesn't give priority to the data, but to the user who can take advantage of this data. Thus, UBIK® can create immediate value for any company in various scenarios. In detail, this is for example supported by:

Context-dependent Visualization of Data

- Complex data is pre-filtered, based on natural behavior like looking and walking around
- The user creates the context to the object unconsciously

Aggregated Display of Data

- Starting from simple basic information (ID, Description etc.), any available detail level can be retrieved by "zooming" into the data

In a Nutshell...

...UBIK® discloses a complete new spectrum of users for plant-related data (Engineers, Planners, Operations- and Maintenance staff etc.).

...UBIK® enables any user to leverage valuable data, fast and simple.

...UBIK® simplifies daily work significantly, by merging multiple data sources into a single user interface.

...UBIK® increases the value of existing data by providing it to the user just-in-time, mobile and role-based.



3 Application of UBIK®

UBIK® runs on off-the-shelf mobile devices, such as Tablet-computers or Smartphones. These devices are constantly delivering information about their current geographical position, as well as their bearing and orientation. This data enables UBIK® to calculate the theoretical field of vision of the user, and thus visualizes the objects in the relevant range. The data filtered this way is then presented in real-time on the mobile device, as floating bubbles showing basic information such as the ID of the object. Tapping such a symbol with the finger triggers the UBIK Server to deliver further details about this object. Those details are stored in an object-oriented data model, which permanently consolidates data from numerous sources and provides it to the mobile devices. Depending on the type of information and the current role of the user, it will have a different degree of detail and can even be modified on the mobile device, or just be enriched with additional data, such as photos or voice-memos – where any of these modifications are, of course, transferred back to the server, who will then feed the changes back into the source systems.



3.1 Feature Overview



UBIK® allows the creation of flexible, high performance object models that are capable of consolidating data from almost any sources, either as a onetime effort, on a frequent basis or just on demand whenever it is needed. These models are exposed to a Web Service and can be subscribed by UBIK® mobile devices, which crossfade the objects as bubbles into the camera view, based on their geo-position.

3.1.1 Design object-oriented data models with rich functionality

Use Polymorphism and inheritance at its best

Start your object model with the definition of “Metaclasses”, which derive from UBIK’s internal classes and can hold own and inherited “Metaproperties” and attributes. These Metaproperties specify the features of your classes and have various configuration options. They are always strongly typed, can be formatted, checked against rules, multilingual or generally indexed, and can, of course, also hold dimension units and calculate with them in real time. After the definition you will be able to derive content objects from your Metaclasses, which will inherit all those specifications and hold their distinctive values.

Define arbitrary relations between objects

UBIK objects can be set in relation to each other in different ways. While it is possible to define 1:n relations (“References”), UBIK® also allows the creation of n:n relations. As any other Metaclass, relations can possess Metaproperties and have their own inheritance hierarchy.

Program runtime behavior of your objects in native code and/or visual Workflows

As your custom Metaclasses derive from UBIK’s internal classes, you can simply use the powerful code editing tools of UBIK®, to customize their built-in events and incorporate your own runtime behavior. No need to learn a special scripting language or to abdicate any functionality, just use pure C# and leverage everything .NET offers.

In addition, you can leverage the entire Microsoft Workflow Foundation, as it is part of the UBIK® core. Visual design, tracking and debugging in Flowcharts brings data model configuration to the next level.

Configure in views how users see the objects

Your Metaclasses can be part of as many views as you want, and those views are the key to present the object model to the users. So you can present the very same classes in completely different ways and hierarchies, to support the user and meet his expectations as good as possible.

3.1.2 Release data model

Compile object model to native code and relational data

Once defined, you can compile your custom model and switch it into runtime mode. By doing this, UBIK® will first of all create a relational table structure in your database, in order to provide high-performance access to your data. But it will also compile your Metaclass- and property definitions, as well as the custom object behavior defined in the customized events, into native .NET assemblies and invoke them in all applications. This means that every spe-

cific definition you made, every workflow you programmed and therefore the entire object model you built, will be as powerful and reliable as the built-in UBIK® objects. This all comes along with comprehensive versioning and deployment functionalities.

Navigate through data still object-oriented, but with the integrity and performance of an RDBMS

As your classes have now become native .NET objects, you can invoke and use them in any way you want, and in any other application you might think of. No matter where you call them, they will always be absolutely type safe, and incredibly fast.

3.1.3 Interface to data source

Leverage standard interfaces, i.e. ISO15926

UBIK® will ship a fully featured ISO15926 data model soon, and it also brings the respective interface component. So if you have a source that complies with ISO, you can seamlessly connect and use it for Augmented Reality, or simply make your legacy data mobile.

Create custom interface plugins, to any available source

Creating such interfaces allows you to leverage data from basically any system, as long as you can connect to it in any way. UBIK's interfaces can be written in C# on pure .NET again, so the entire scope of this technology is available and should thus allow vast interfacing, even to the most exotic sources.

Manage interface behavior and consolidation workflows

All your interface components are managed by UBIK's built-in interface service, which controls the order, timing and status of the different components.

3.1.4 Publish data model

Define contexts for applications and/or roles

UBIK® data models are automatically web-enabled. However, you can define different contexts for as many applications as you need in order to tailor the way your object model is used to the varying needs of the different users, roles and tasks they are performing.

Link contexts to views

Views can be linked to these context objects and therefore provide the very same data reliability and user experience on the mobile device as on the server.

Interact with mobile devices at the push of a button

All you need on the mobile device is the UBIK App and an internet/intranet connection to your Webserver, and then you're immediately ready to use your object model in the field. SSL encryption will secure your data transmission; explicitly enabling trustworthy mobile devices on the server will further help you to meet your companies' security needs.

3.1.5 Use data in the field

Aim mobile device on objects and get information instantly

Let your users experience what Augmented Reality is all about. As soon as your relevant objects know their geo-data, they'll be able to view them in AR.

Zoom into more detailed information, fast and secure

The defined views will control how your users see the data in the field. They'll be able to navigate through them in the very way you want them to.

Have access to the full data model published on the server

You can provide the users with all the information you linked on the server, even external documents such as manuals, or whatever else is needed.

Edit data and save it back to the server, thus even to the sources

Objects can also be published writable, allowing your users not only to view and navigate through the data, but also input and modify objects; where write access can be controlled and administered down to single property level.

Record pictures or voice messages and enrich your data input

Let your users use the built-in camera or voice recorder of their device, to support them in documenting what they encounter in the field. Those intuitive ways of gathering data will convince even the most depreciative user of the value of UBIK®.

Teach in new objects directly in the field, based on your geo-position

Getting the geo-position for your objects is also an easy task. There's no need to gather that data in advance and start costly conditioning projects: just do it when somebody visits an object in the field for whatever reason, let him aim the mobile device on it and press "Teach In". UBIK will use the current geo-position of the handheld and store it on the Tag-ID the user provides - that's it. This data is transmitted back to the server, and everybody else in the field will immediately benefit from it.

4 Summary

The most recent decades were primarily dominated by creating and enhancing data and technologies. New information systems were created at a very high pace, improved in their performance, linked together and expanded in capacity. The users had to constantly adapt themselves to these systems, in order to gain benefits from the development.

The trends of the most recent past have shown a new way: the data and its continuous availability have become self-evident by now, and new mobile devices with innovative operating concepts (tablets, smartphones) have disclosed a completely new group of users.

This trend is expected to continue, even in everyday industrial use. While today complicated data processing and time-consuming access to expert systems are still a handicap, for example in industrial maintenance, the future access to valuable data will no longer depend on the expertise and availability of engineers. The safe and easy use of mobile devices, based on a mature software technology, discloses new possibilities for using existing data efficiently and purposefully.

Augmented Reality, in combination with the consolidation of all available company data, has the potential to change a lot for the better – not just on slides, but measurable for the management, and sensible for the user.

5 Contact

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