ISO 19100 Series Standards in a Model Driven Architecture for Landmanagement

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The Company

- **Largest GIS application company in Europe**
  - Approx. 250 people
  - More than 10000 licenses and >2000 customers all over the world
  - 80% of the German Cadaster market and many large Intl. cadastre agencies use AED-SICAD technology

- **Our offering**
  - State-of-the-art GIS applications for landmangement / cadastre and utilities
  - Consulting services for cadastre and utility projects

- **More than 20 years of experience**
  - GIS and GIS Application development
  - Large infrastructure project management
  - Cadastre Information System implementation
ISO 19100 Series Standards used / observed in Design and Implementation

- 19103 Conceptual Schema Language
- 19106 Profiles
- 19107 Spatial Schema
- 19109 Rules for Application Schema
- 19110 Methodology for Feature Cataloguing
- 19111 Spatial Referencing by Coordinates
- 19115 Metadata
- 19118 Encoding
- 19119 Services

- 19128 Web Map Server Interface
- 19136 Geographic information - Geography Markup Language
- 19139 Metadata – Implementation Specification

- OGC Web Feature Server 1.0
- OGC Filter Encoding 1.0
Model Driven Architecture based on **AFIS®-ALKIS®-ATKIS®** Standard

ISO Harmonized UML Model

XML Schema Definitions (XSD)

XML Application Metadata

<appinfo/>

Application Framework

XML Class Generator

**AFIS®-ALKIS®-ATKIS®** UML Model

Rose Script
Model Driven Architecture based on **AFIS®-ALKIS®-ATKIS®** Standard II

**ArcGIS Geodatabase UML Model**

- UNISYS XMI Export Tool
- **XML Metadata Interchange (XMI)**
- ESRI CASE Schema Wizard
- ArcSDE
- relational Datamodel

**ISO Harmonized UML Model**

- Rose Script

**AFIS®-ALKIS®-ATKIS® UML Model**
ISO Harmonized UML Model

AFIS®-ALKIS®-ATKIS® UML Model

GML 3.0
XML Schema Definitions (XSD)
Rose Script
Standards-based Exchange Interface (NAS)

NAST Data
NAS Request Response
WFS 1.0
Filter Encoding 1.0

Model Driven Architecture based on AFIS®-ALKIS®-ATKIS® Standard III
3-Schema Architecture of AED-SICAD Landmanagement on ArcGIS

- Internal Database Schema
  - Oracle 9i
  - ArcSDE
  - ArcGIS Geodatabase (ArcCatalog)
  - Feature Catalog
  - Class Extensions
  - Workspace Extensions
  - Application Extensions
  - UML
  - XML
  - XMI

- Conceptual Application Schema
  - UML

- External Application Schema
  - NAS Data
  - XSD
  - GML 3.0

- AFIS®-ALKIS®-ATKIS® on ArcGIS

- NAS Import / Export

- AFIS®-ALKIS®-ATKIS® on ArcGIS
Landmanagement Product Components

AED-SICAD Application Framework

- Landmanagement
  - LM View and LM Web – Information and Analysis
  - LM Survey – Surveying Calculations
  - LM Editor – Data Collection and Quality Check
  - LM Server – GeoData Server
Components for Workflows

- **Surveying**
  - GPS/TPS

- **LM Mobile - LM Pad**
  - ArcGIS inside

- **LM Survey**
  - ArcGIS inside

- **LM Editor**
  - ArcGIS inside

- **LM Server**
  - ArcGIS inside
  - Enterprise Geodata Server

- **Desktop**
  - LM View and LM Web
    - ArcGIS inside

- **Browser**
  - Surveying
    - GPS/TPS
  - LM Survey
  - LM Editor
  - LM Mobile - LM Pad
  - LM Server
  - LM View and LM Web
Integration of Surveying and GIS

- Progressive Applications for Landmanagement from AED and SICAD
- Latest GIS-Technology from ESRI
- Modern Technology for Field Survey from Leica
The role of AED-SICAD in Cadastre Projects

- **Definition status quo**
- **Planning of target system**
- **Operation**
- **Implenentation**
- **Cadaster**
- **E-government**
- **Privatization**

- AED-SICAD establishes professional contacts
- Consulting by German Landesvermessungsämter
- AED-SICAD supports the client
- Consulting by German Cadastre Agencies
- AED-SICAD Services
  - AED-SICAD Cadastre Software
  - AED-SICAD Project Management

AED-SICAD = active partner for technology, innovation and maintenance
The Philosophy of Our GIS Applications

- **Process orientation**
  - As simple as possible
  - Ergonomic
  - Software adapts to the business processes

- **Interoperability**
  - Between GIS systems
  - In the IT World

- **Continuous Data Flow**
  - From field to office and back

- **Investment security**
  - Smooth transition to new technologies
  - Component-oriented architecture to reduce software license costs
International Landmanagement Solution based on

ESRI ArcGIS Technology
ISO/OGC Standards
FIG Concept Cadastre 2014
Some Functions

- Project Administration
- Workflow Management System
- Import Primary Data Set and Surveying Calculation
- Up-to-dateness Check and Quality Check including Database Simulation
- Processing Tools for customer-specific Update Processes
- Processing Tools for standard Update Cases
- Update Certificates
- Reporting Process
- Plausibility Check
- Export Interface (GML 3.0)
- ... and many more

Configurations for

- Private Surveying Companies
- Cadastral Authorities
- Topography (basic functionality)
Workflow Implementation within Landmanagement Solution

AED-SICAD Metadata Model
- Basic Data Model
- Based on UML
- Flexible Customizing
Workflow Illustration (1)

**Business Process**

- Lot Division
Workflow Illustration (2)

Operation

- Coordinate Calculation

→ Operation automatically starts ArcMap
New Points must be digitized / imported
Editing guided by Lot Division Wizard

Step 1: Defining initial status
Lot Division Wizard

Step 2: Digitizing new boundary
Lot Division Wizard

Step 3/4: Changing lot attributes
Lot Division Wizard

Step 5/6: Positioning lot number
Reporting on Processes and Activities
Operation

- **Update Decision** → Creating official update report (legal document)
Cartographical Generalization

- Integrated in EDIT Component
  - Point Reduction
  - Simplification (Buildings)
  - Aggregation
  - Axis Calculation
  - Any Combinations

- Link to external programs CHANGE and PUSH (ikg)
  - Integration of Functionality from Change and PUSH into EDIT Component
Success Factors (1)

- Integrated Product Family for all User Types
  - Mobile Applications
  - Surveying
  - Editor
  - Server
  - Web, Viewing
  - E-Commerce Interface

- Based on ISO and OGC
  - Complete Application Schema, Geometries, Topology is based on ISO Norms
  - OGC WMS implemented
  - OGC WFS (Including filter encoding) implemented
  - OGC GML 3 implemented
Success Factors (2)

- **Open and well documented Standard Interfaces**
  - Export Interface GML 3
  - Configurable Styles

- **Object oriented full history**
  - „What was the status of this lot on Nov 1, 2000?“
  - After 200 years cadastre experience, the German AdV has recognized that the juridical history of lots is absolutely necessary.

- **Fully Integrated Solution**
  - Alpha-numerical data (registry of persons, further parcel attributes) fully integrated with graphical data
  - Point data also fully integrated
  - Same GUI for all applications

- **Experience**
  - 20 years of AED-SICAD experience in Cadastre System development, implementation and management
  - German Cadastre may be the most advanced Cadastre system
AED-SICAD - Some of our Land Management Customers

- Federal States of Germany
  - Baden-Württemberg
  - Northrhine Westphalia
  - Lower Saxony
  - Sachsen-Anhalt
  - Saxony
  - Hamburg
  - Berlin
  - Saarland
  - ... 80% market share in German Cadastre Market!

- City of Luxembourg
- City of Namur
- Shanghai
- Tianjin
- Singapore
- And many more
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