Applications for GNSS-based Field Control regarding to Agricultural Subsidies of the EU

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EU-Regulations

• InVeKoS = „Integrated Administrative and Control System“
• Established by the European Commission
• Subventions of the „European Guarantee Fund for Agriculture“ (EGFL)
• 90% (ca. 40 Billion EUR) from the EGFL for direct subsidies
  (Source: http://ec.europa.eu/agriculture/direct-support/iacs/index_de.htm)
• Administration and control of the payments to farmers
• Task: transformation of the „Common Agrarian Policy“ (GAP) inside the EU member states
EU-Regulations

- Legal specifications for InVeKoS:
  Regulation (EG) no. 1122/2009 from the Commmission with implementing regulations
  (Source: http://ec.europa.eu/agriculture/direct-support/iacs/index_de.htm)
  Regulation 2014/32/EU 26.02.2014 Harmonization of statutory porivisions about the allocation of measurement devices on marketplace

- Control of the correct transformation of direct subsidies for argriculture
- The selection of the farms to control are accidentally
- Wrongly payed aids or variation of the area size results in paying penalty
InVeKoS includes:

• A computer-based database
• A system to identify farm owners, agricultural tracts of land and animals
• A System to identify and register the pecuniary claims, aid requests and an integrated control system

→ Compliance of the aid criteria have to be checked by an administrative and control system and with on-the-spot checks directly in the field
GI-Mobil VOK-Modul

Important Software-Features

- NTv2-Transformation (Germany)
- Integrated plausibility check of data structure
- Geoprocessing tools
- Feature-registration per keypress
- Multifarm-modus
New Software-Features in GI-Mobil 3.0

- ArcGIS Online / ArcGIS Server connection
- Use of rastercatalogs for improving the performance
- Export for CSV
- Quick-Field function (optional)
- Completed data transfer application (optional)
- Assignment of software permissions are user defined
Architecture GI-Mobil

OEM-Tool
• Branding
• Generation of the GI Mobil.exe

ArcPad Studio
• Setting the Toolbars
• Integration of Javascript

GI Mobil
• Main application
• Look & Feel of ArcPad

GI Mobil Extension
• C++ Extension
• Implements .NET-Interface
• No implementation of functionality

GI Mobil Helper
• .NET-App running simultaneously to GI Mobil
• Includes all extra functionalities
• License management

Javascript

.NET-Interface

Escape
GI-Mobil VOK-Modul

Software-Components

- GI Deployment Center
- VOK Sync
- VOK Mobil
1. Start the Software and choose a farm(s)

- GNSS-supported registration
- Connection to correction data services like VRS (SAPOS), SBAS/EGNOS or rowdata for postprocessing
- Interface to external laser range finders
2. The Controller have to choose a farm

3. Activate the GNSS-Recevier
Legend oriented at the central system

Index with group-layers and editability

Legend VOK Mobil
- Photos
- Hilfspunkt
- Hilfslinie
- Hilfsfläche
- Feldstück
- Feldstück_Nachbar
- ALE_DFK
- VOK_LE
- DFK
- Kulap
- VOK_Schlag
- Benutzer-Shapefile

Index
- 2012_163-000-0016
- 2012_176-111-0056
- 2012_999-999-0005

Polygon-Layer
- Hilfslinie
- VOK Schlag
- VOK_LE
- Linien-Layer
- Hilfslinie
- Punkt-Layer
- Hilfspunkt
- Fotos
4. Realize areas / points (directly with the hardware button)
5. After completing the evaluation can be reviewed

**InVekosInfo**

<table>
<thead>
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<th>1630000016</th>
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<tbody>
<tr>
<td>SchlagNr:</td>
<td>0</td>
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<td>FeldstückNr:</td>
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<td>Code_Nutz:</td>
<td>115</td>
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<tr>
<td>VOK-Schlag:</td>
<td>1,9786 ha</td>
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<tr>
<td>Toleranz von:</td>
<td>1,8902 ha</td>
</tr>
<tr>
<td>Toleranz bis:</td>
<td>2,067 ha</td>
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</table>

**FKS-Ergebnisprotokoll**

- Projekt: protokoll
- Betrieb: Handbuch
- Schlag: 123/45
- Datum: 27.05.11

**Flächen-Statistik**

- Kontrollfläche: 1,8992 ha
- Umfang: 673,2999 m
- Gesamt-Abzug: 0,018 ha
- Netto-Fläche: 1,8813 ha
- Antragsfläche: 1,89 ha
- Toleranz: 0,0073 ha
- Untergrenze: 1,8127 ha
- Obergrenze: 1,9473 ha
- Abweichung: 0,07 %

**Ergebnis**

!!! Innerhalb der Toleranz !!!
GI-Mobil VOK-Workflow

Photoworkflow with viewing direction as an attribute
Process of the GNSS-supported on-the-spot checks using the example of Bavaria

central dataset
(data management on establishment level)

1. control step
aerial photo analysis

2. on-the-spot checks
critical or unclear areas and certain percentages
Transfer of data to the mobile devices:
Tablet with external GNSS or Handheld

Measurements
if required GNSS-Measurements
Process of the GNSS-supported on-the-spot checks using the example of Bavaria

Transfer of the data to the notebook (checkout/checkin mechanism of ArcGIS for Desktop)

Evaluation of data on the notebook (optional porstprocessing of data without realtime correction by internet service)

central system
Some examples of country-specific adjustments

**Hessen**

- HTML EXPORT / Report generation (with X/Y-coordinates)
- Back-Up function for the software on the mobile device
- Calculation of the slope gradient of wine areas

**Rheinland-Pfalz**

- Individual automised data transfer tool for the existing data structure
- Geoprocessing tools: splitting polygons, point/line to area, fill gaps
Some examples of country-specific adjustments

Sachsen-Anhalt

- Authentification queries for different user groups using the login
- Automated tolerance calculation directly on the mobile devices
- Optional use of a laser range finder
Validation of the system via the EU

validated GNSS-receivers are published from the JRC (Joint Research Centre of the European Union Science Service)
Validation of the system

**Measurements methodology:**
- Measured parcels:
- Measurements method:
- Measurements data:

**Validation protocol published on the web sites of JRC**

**Geox7 with vertex method and VRS Corrections**

Four classes were removed as outliers.

<table>
<thead>
<tr>
<th>Equipment parameters:</th>
<th>Device1</th>
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<td><strong>External software</strong></td>
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<table>
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<th>C</th>
<th>D</th>
<th>E</th>
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Open Questions for Solution Providers and Developers

- What’s following Windows Mobile?
- What will be the reaction regarding to operating systems of the GNSS producers?
- How successful will Windows Phone be (Windows 10 Mobile)?
- What is the best way to offer Apps with ArcGIS Runtime with a core development for different operating systems?
- When is the right time to start with native Apps and Xamarin?
• The Trimble R2 GNSS-Receiver a Product of the latest GNSS-generation

for full flexibility regarding to:

✓ Scalable Precision Submeter/Decimetre/Centimetre

✓ GNSS-Controller for operating systems: Windows, Windows Mobile, iOS, Android

✓ Free selection of correction services: VRS (SAPOS), EGNOS, Trimble RTX

• A simpler entrance to GNSS-technology lead to a Democratization of Accuracy!

(Brent Jones from Esri 3. September 2015)
Productdevelopment by GI

ArcGIS Plattform
GI Mobil
GI Field
GI Project
Trimble GNSS
Thank you for your attention!