

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

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- 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

- Legal specifications for InVeKoS:

Regulation (EG) no. 73/2009 Council Directive with regulations for the direct aids

Regulation (EG) no. 1122/2009 from the Commission 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 provisions about the allocation of measurement devices on marketplace

- Control of the correct transformation of direct subsidies for agriculture
- 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

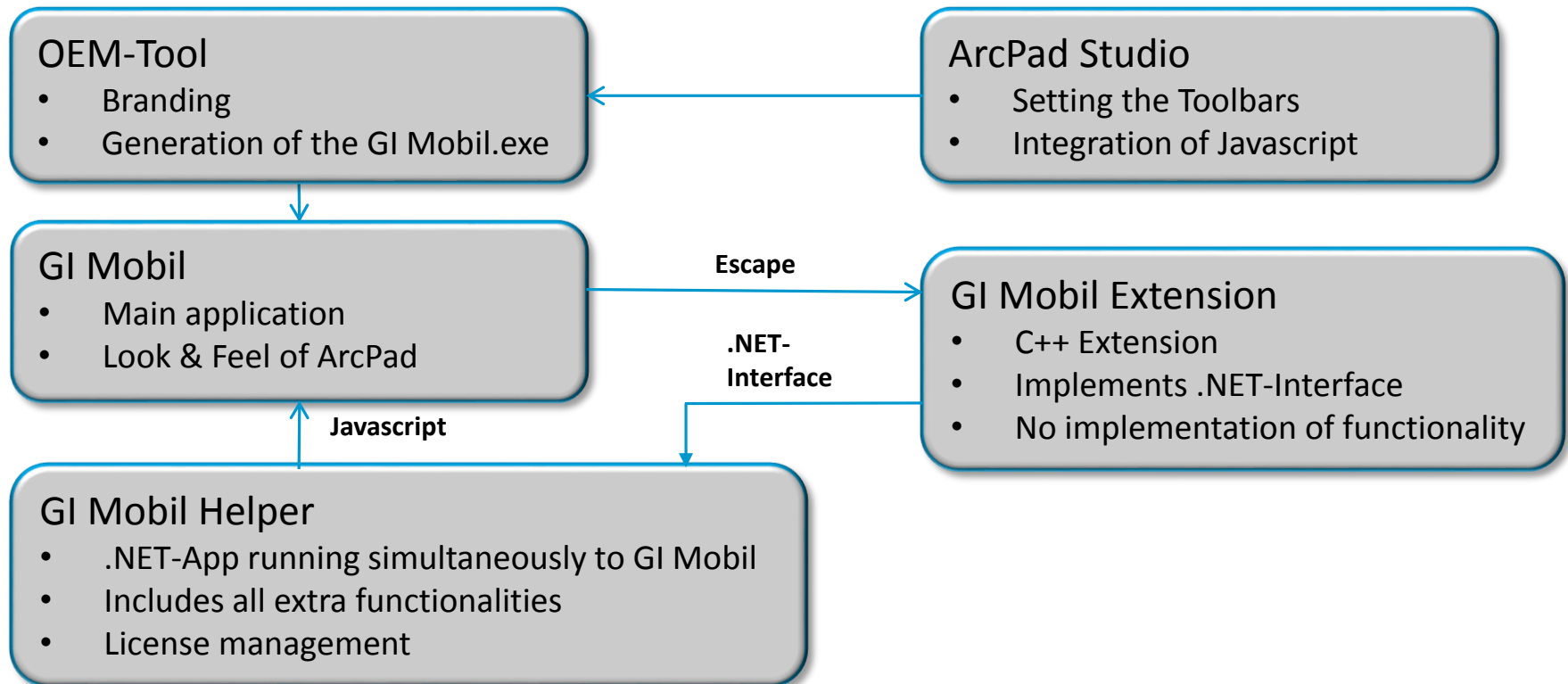
Important Software-Features

- 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

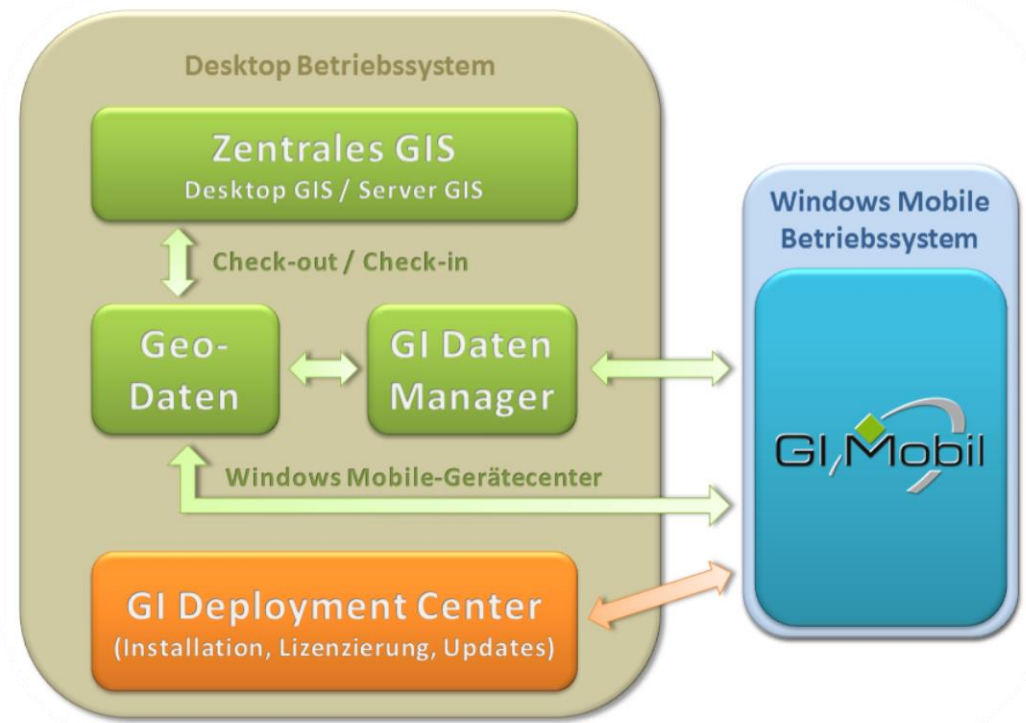
- ArcGIS Online / ArcGIS Server connection
- Use of rastercatalogs for improving the performance
- Export for CSV
- Quick-Field function (optional)
- Completed data transfer application (optional)
- Assignment of software permissions are user defined

Architecture GI-Mobil

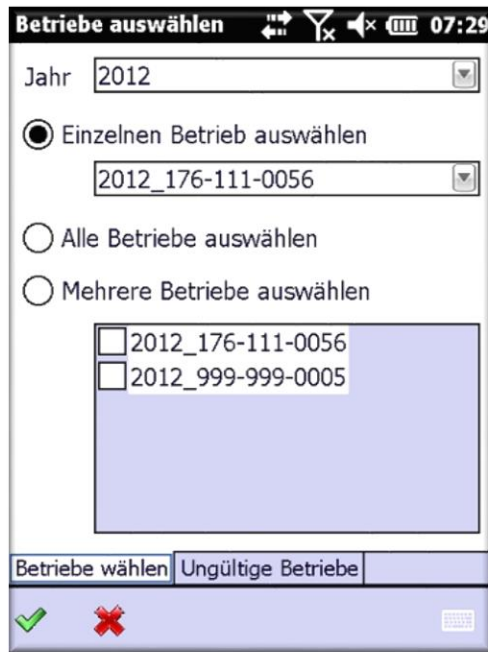


Software-Components

- 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 rawdata for postprocessing
- Interface to external laser range finders

GI-Mobil VOK-Workflow

2. The Controller have to choose a farm



3. Activate the GNSS-Receiver

Legend oriented at the central system

Legende VOK Mobil

- + Photos
- Hilfspunkt
- Hilfslinie
- Hilfsflaeche
- Feldstueck
- Feldstueck_Nachbar
- ALE_DFK
- VOK_LE
- DFK
- Kulap
- VOK_Schlag
- Benutzer-Shapefile

Index with group-layers and editability

Legende 07:48

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

Betriebe Betriebsdaten Editierbarkeit InfoDaten

✓ ✗

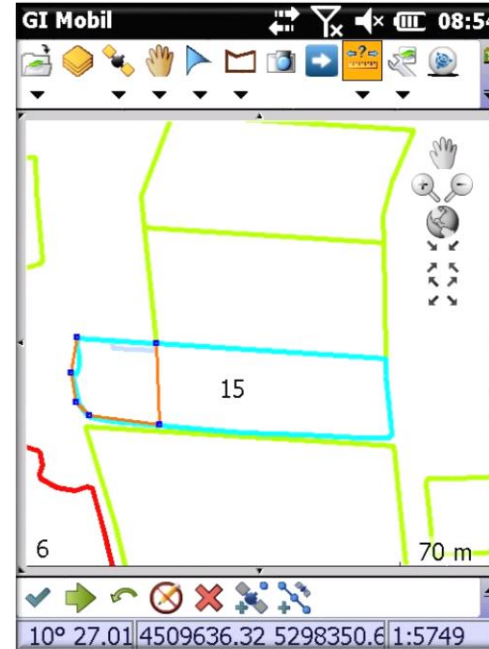
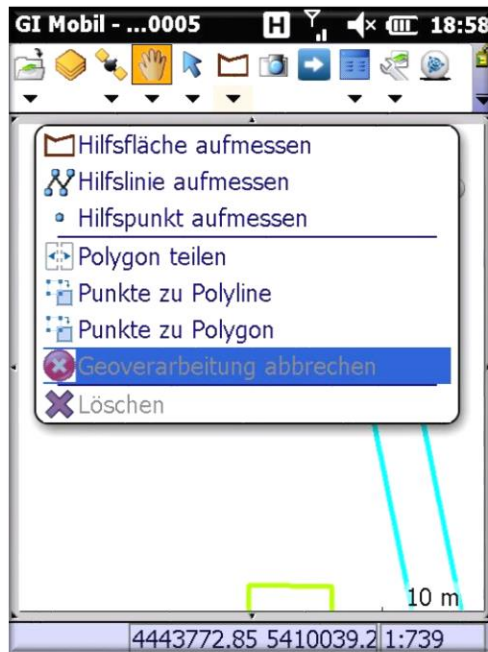
Legende 07:48

- Polygon-Layer
 - Hilfsflaeche
 - VOK Schlag
 - VOK LE
- Linien-Layer
 - Hilfslinie
- Punkt-Layer
 - Hilfspunkt
 - Fotos

Betriebe Betriebsdaten Editierbarkeit InfoDaten

✓ ✗

4. Realize areas / points (directly with the hardware button)




5. After completing the evaluation can be reviewed

InVekosInfo 08:45

BTNR:	1630000016
SchlagNr:	0
FeldstückNr:	14
Code_Nutz:	115
VOK-Schlag:	1,9786 ha
Toleranz von:	1,8902 ha
Toleranz bis:	2,067 ha

✓


**FKS-
Ergebnisprotokoll**
Maßstab: 1:4500



Projekteigenschaften
Amt:
FLIK:
Projekt: protokoll
Betrieb: Handbuch
Schlag: 123/45
Datum: 27.05.11

Flächen-Statistik
Kontrollfläche: 1,8992 ha
Umfang: 673,2998 m
Gesamt-Abzug: 0,018 ha
Netto-Fläche: 1,8813 ha
Antragsfläche: 1,88 ha
Toleranz: 0,0673 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

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

Transfer of data to the mobile devices:
Tablet with external GNSS or Handheld



Measurements

if required GNSS-Measurements

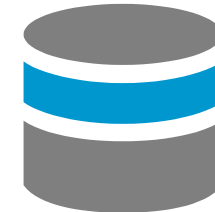
Process of the GNSS-supported on-the-spot checks using the example of Bavaria



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



Evaluation of data on the notebook (optional postprocessing 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

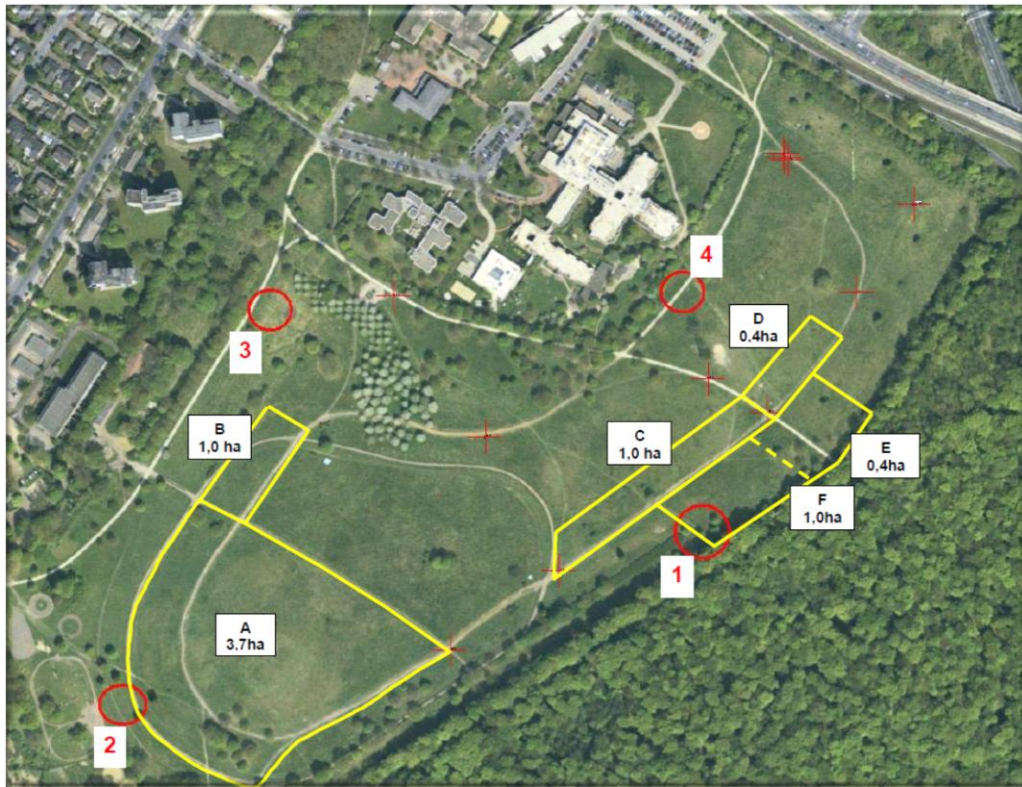
- Individual automatised data transfer tool for the existing data structure
- Geoprocessing tools: splitting polygons, point/line to area, fill gaps

Some examples of country-specific adjustments

Sachsen-Anhalt

- Authentication 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-Receiver
are published from the JRC**
(Joint Research Centre of the
European Union Science Service)

Validation of the system



Measurements methodology:	Validation protocol published on the web sites of JRC						
Measured parcels:	Measurements performed on the 6 ground parcels of varying size, shape and mask						
Measurements method:	GeoX7 with vertex method and VRS Corrections						
Measurements data:	Four classes were removed as outliers.						
Equipment parameters:		Device 1	Device 2	Device 3			
	Receiver	Geo7X					
	Antenna / Type	Internal					
	Receiver serial no.	5423441653	541440138	5431443376			
	Internal software	TerraSync 5.61					
	System software	Windows Mobile					
External software	—						
Collation of variances:	Test/Parcel	A	B	C	D	E	F
	srj^2	2843.09	425.61	650.16	189.09	292.28	722.84
	sdj^2	913.47	191.40	8.99	42.43	608.68	1438.45
	sLj^2	0.00	0.00	0.00	0.00	79.10	178.90
	sRj^2	2843.09	425.61	650.16	189.09	371.38	901.74
	Tolerance	0.18	0.18	0.14	0.11	0.24	0.26

Open Questions for Solution Providers and Developers

- What's following Windows Mobile?
- What will be the reaction regarding to operatin 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



GI GEOINFORMATIK GmbH
Augsburg

Wir verbinden Technologien
zu Ihren Lösungen



ArcGIS Plattform

GI Mobil

GI Field

GI Project

Trimble GNSS



Thank you for your attention!