



DIGITAL TRANSFORMATION FOR RESPONSIBLE LAND ADMINISTRATION

FIG Commission 7 & 2 Annual Meeting 2023

2-4 October 2023, Deventer



# Accelerating Fit for Purpose Land Administration

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kadaster



UNIVERSITY  
OF TWENTE.



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# Accelerating Fit for Purpose Land Administration: Presenters

**Chrit Lemmen:**

*Professor Urban & Regional Planning and Geo-information  
Management, ITC - University of Twente*

**Brent Jones:**

*Global Manager, Cadastre/Land Records - ESRI*

**Markus Koper:**

*Application engineer Trimble (Land Administration  
software)*

**Javier Morales:**

*Assistant professor Geo-Information Processing, ITC -  
University of Twente*

**Mathilde Molendijk:**

*Regional manager Kadaster (Latin America)*

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# Reality meets FFP – The Colombia Experience

- From FFP theory towards implementation
- Context: Peace agreement 2016 – formalisation of rural land in post conflict areas high on agenda
  - 9,4% of the entire country is up-to-date
  - 70% of the cadaster updated in 2026 -> (estimated 12'000,000 parcels)
  - 3.9 millions hectares formalized in four years
  - Our collaboration started in 2014 (Colombian agencies, Kadaster, ITC, ESRI, Trimble)

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# FFP meets Reality – The Colombia Experience

- What to expect in this keynote session?

-  Chrit will talk about methodology and standards required to do this,
-  Brent and Marcus on the technology
-  Javier on the operationalization in the field
- Mathilde: wrap up & discussion on key messages 

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# The making of FFP in Colombia – Behind the scenes

- Video “The importance of being a grass-root surveyor” (Colombia, 2023).

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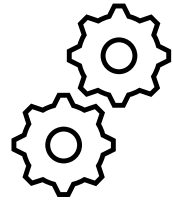
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# The making of FFP in Colombia



## Methodology and Standards

*Chrit Lemmen*

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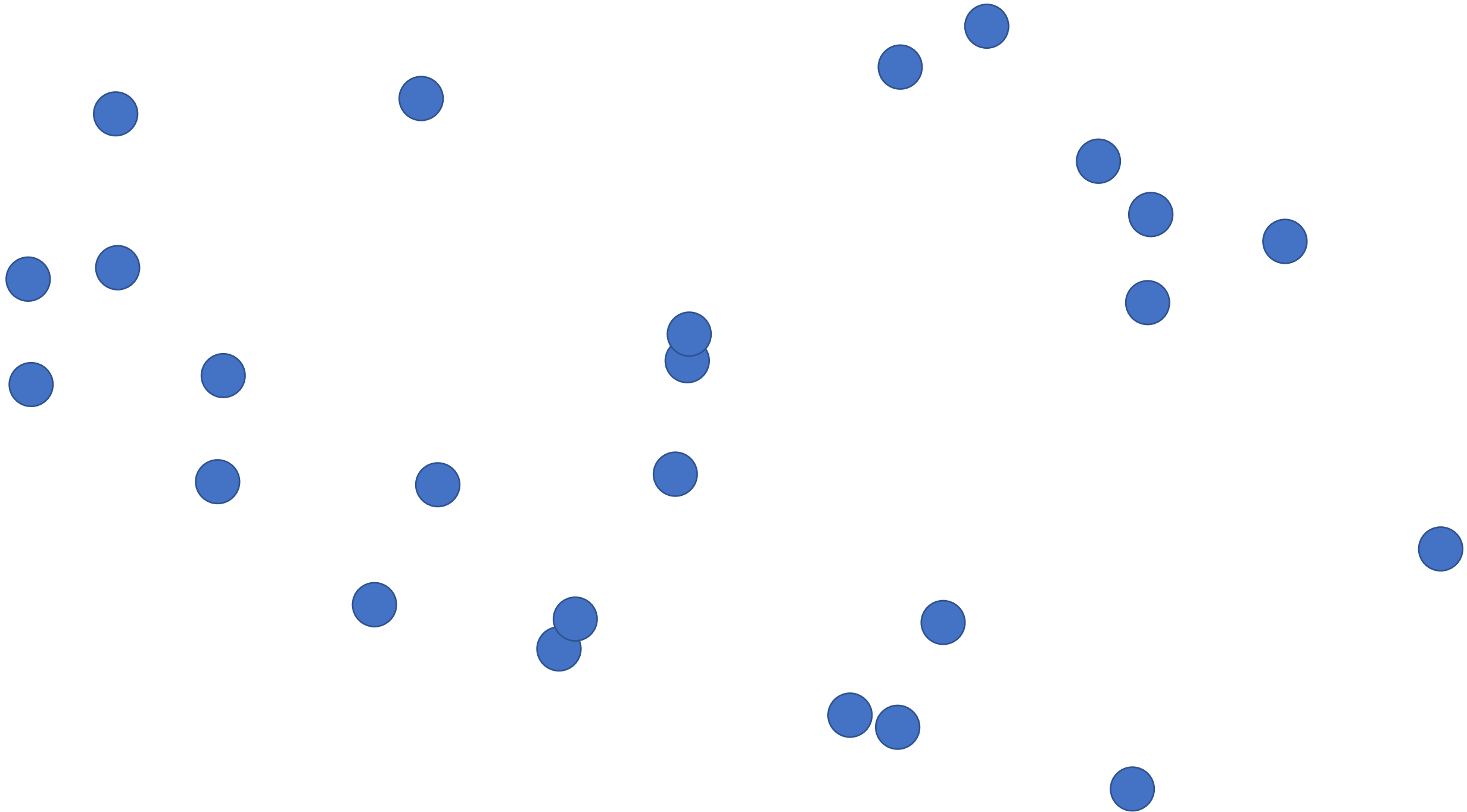


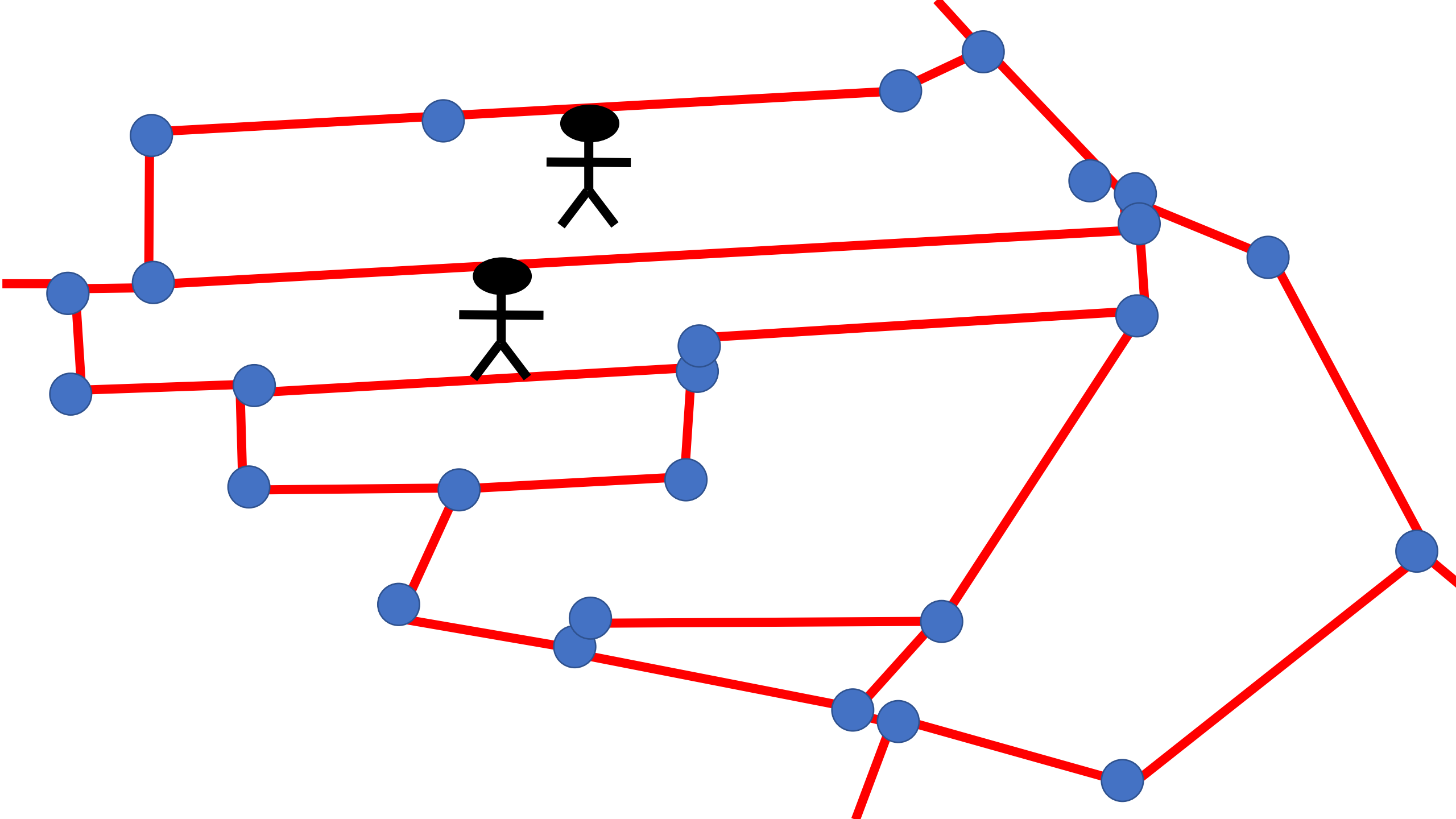
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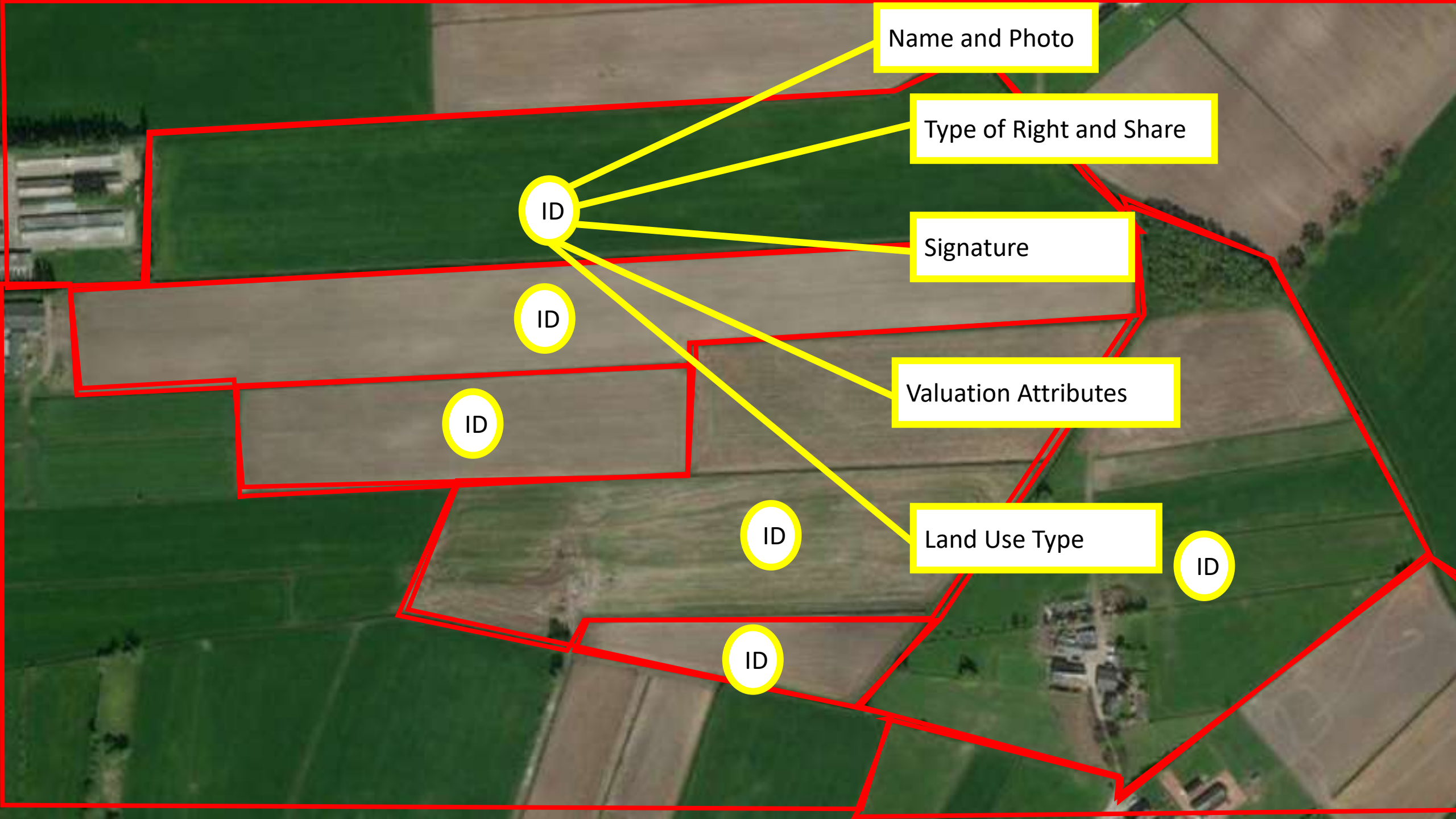












Name and Photo

Type of Right and Share

Signature

Valuation Attributes

Land Use Type

ID

ID

ID

ID

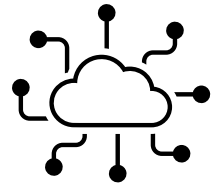
ID

ID





# The making of FFP in Colombia



## The Data Management Technology

*Brent Jones*

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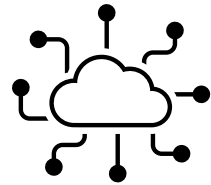


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# The making of FFP in Colombia



## The Measuring Technology

*Markus Koper*

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# Fit-for-Purpose Land Administration

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Land registry and tenure data collection  
Colombia – “Land in Peace” Project  
Kadaster International / ESRI / Trimble





Sustainable, Reliable,  
Scalable, Quality  
***Solutions***

For the duration of  
projects and beyond

*Accuracy Matters*



GNSS Receiver

GNSS Correction Service

Esri Field Software





# Trimble Catalyst - GNSS Positioning

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DA2 - GNSS Receiver

AND

Trimble Correction Service

- Simple to use
- Trimble Catalyst Correction service
  - Via Satellite enables OFFLINE workflow
- **cm to sub-meter accuracy**
  - Location-enabled Android™ and iOS field apps

**1 cm H / 2 cm V**  
Max. Precision

**Android & iOS**  
Used With

**v4.2**  
Integrated Bluetooth

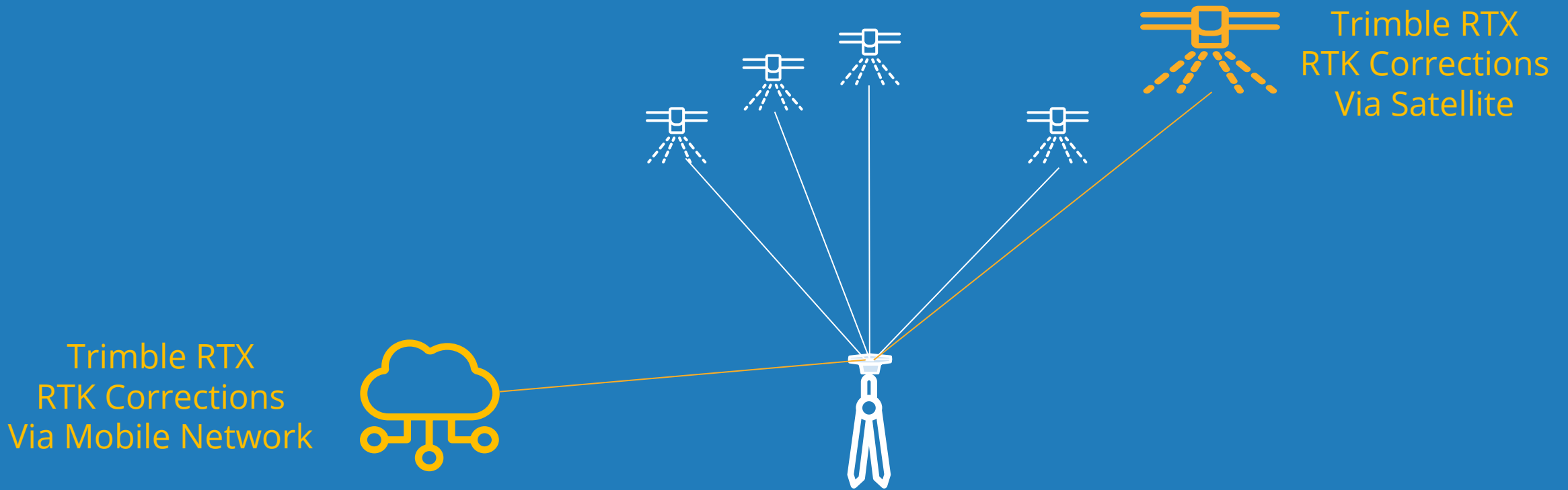
**GPS, Galileo, GLONASS, BeiDou, QZSS, IRNSS, MSS, SBAS**  
Satellites



# Trimble Catalyst & RTX Service

## How it works

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Trimble Correction Hub provides access to RTX services  
Worldwide available  
via mobile network or satellite



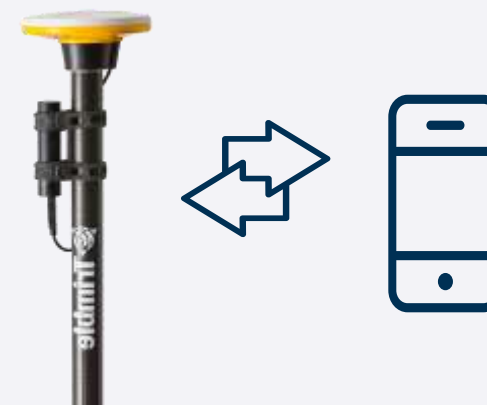
# Trimble Mobile Manager



Connect Trimble Catalyst GNSS to:

Any location-enabled app that uses locations from the device operating system - Via **Trimble Mobile Manager**

- Google Maps
- Esri ArcGIS Field Maps
- QFIELD
- And many more...



TMM is for free! Download via Google Play / App Store

Learn more: <https://help.trimblegeospatial.com/TMM/Home.htm>



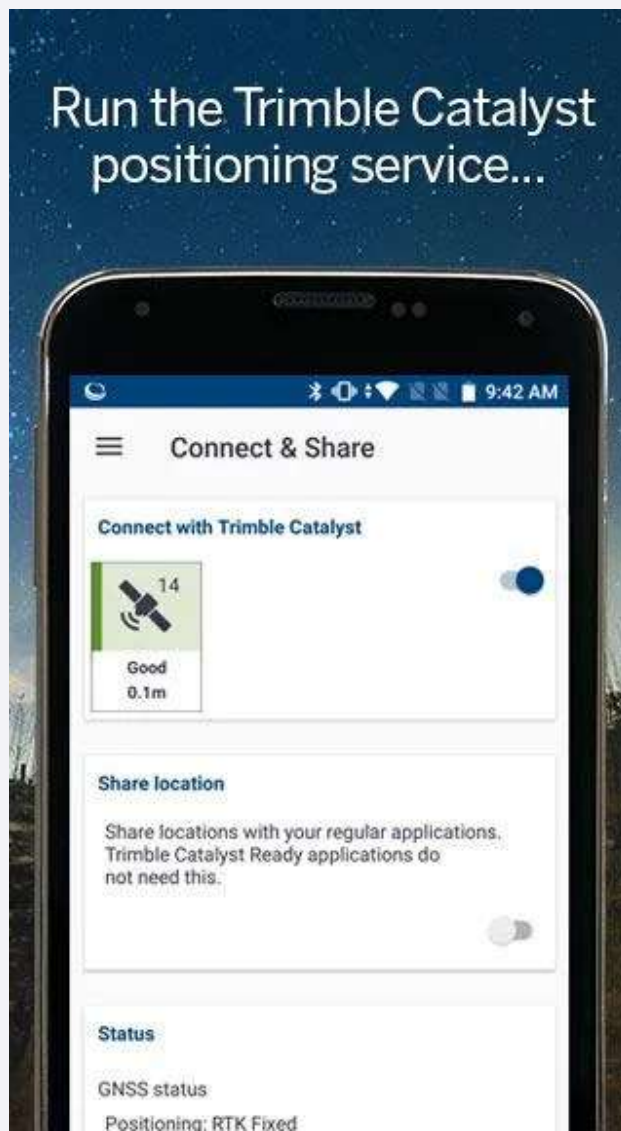


# Trimble Mobile Manager - How it works

Log-in with your Trimble account...



Run the Trimble Catalyst positioning service...



Share high-accuracy positions with other apps on your phone.





# Trimble Catalyst DA2 GNSS System for Esri LAMP

*Trimble Catalyst Bundle for **Esri Land Administration Modernization Program** participants*







# Thank You

Contact:

Markus Koper  
Business Development  
Trimble Land Administration  
[markus\\_koper@trimble.com](mailto:markus_koper@trimble.com)

תודה  
 KIITOS  
 BEDANKT  
 Teşekkürler  
 DANKIE  
 Ευχαριστώ  
 Спасибо  
 GRACIAS  
 SALAMAT  
 VIELEN DANK  
 KÖSZÖNJÜK  
 NGĀ MIHI  
 उगडा यनदर  
 GRAZIE  
 VINAKA  
 KASIH  
**THANK YOU**  
 merci  
 HVALA VAM  
 DIOLCH  
 MULTUMIM  
 Xin Cảm Ơn  
 TACK  
 Dziękujemy  
 ДЯКУЄМО  
 شكراً  
 Obrigado  
 शुक्रिया  
 AČIŮ  
 БЛАГОДАРИМ ВИ  
 HVALA VAM  
 TAKK  
 Ďakujem vám  
 HVALA VAM  
 ANTE  
 MULŢUMIM  
 Xin Cảm Ơn  
 ありがとうございます





# The making of FFP in Colombia



Operationalization in the Field

*Javier Morales*

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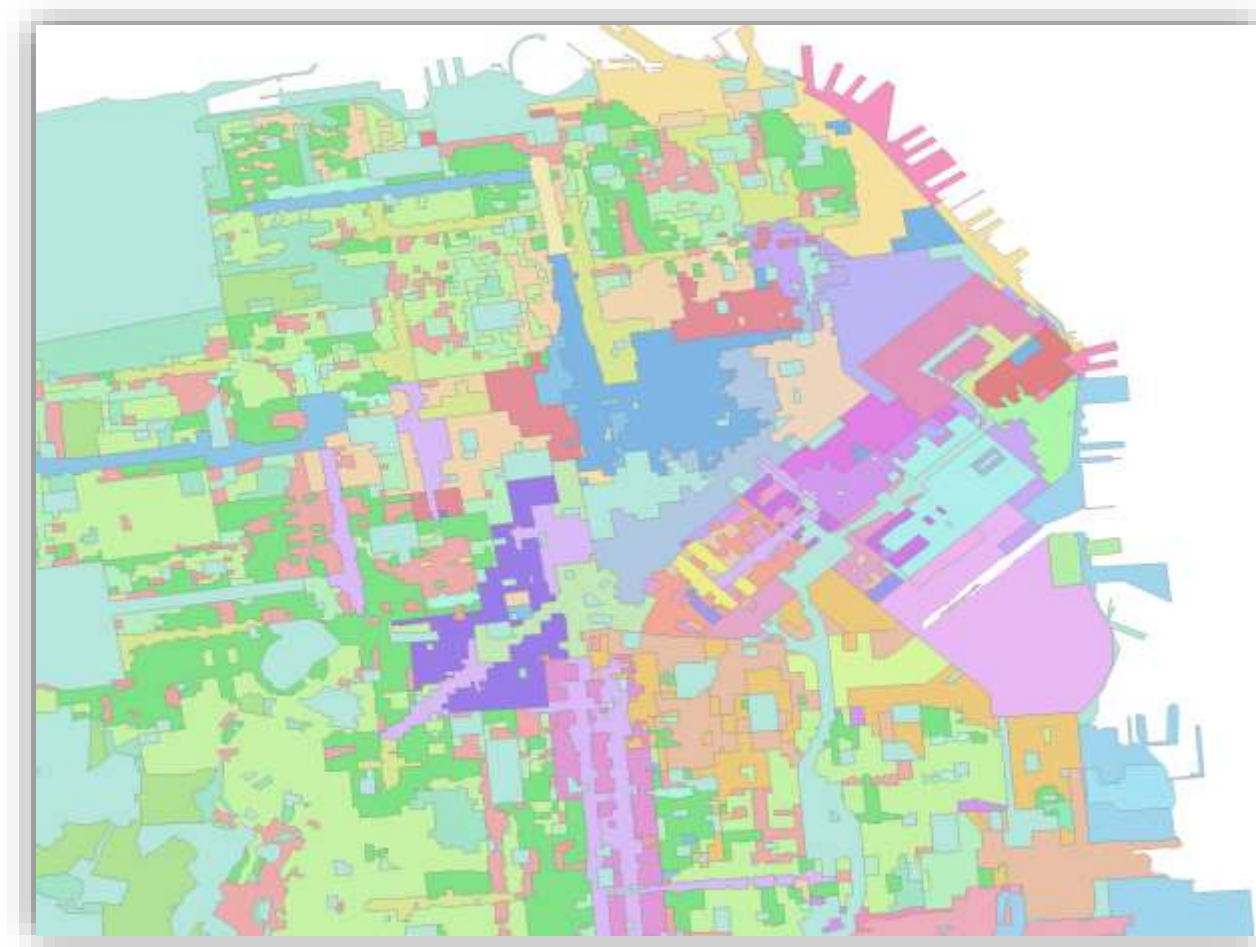


# THE FOCUS WAS ON THE CITIZENS & THEIR REALITY (WHICH IS DYNAMIC)

- Lease
- Protected
- Ownership
- Government
- Occupation

⋮

03-Oct-2023



Community recognized people to land relationships

## The Facts

a full partition

Detached from  
agency specific  
procedures  
& from  
unsubstantiated  
technical standards  
for rural areas

# EVOLUTION FOR SUCCESS



Citizens



Investors



Private Sector



Regulators

do not propose a solution



develop the methodology together  
in a stepwise fashion  
and **in the field** not in the office



Government Employees



Communities



Academia

Commitment &  
Independent View





# IDENTIFIED RELEVANT OBJECTS – LAND TENURE

## REQUIRED TO CAPTURE PEOPLE-TO-LAND RELATIONSHIPS

```
CR_Derecho
<<CR_DRR>>
Tipo[] : CR_DerechoTipo
Fraccion_Derecho[] : Cadena de texto
```

```
CR_Informalidad
<<COL_DRR>>
Tipo[] : CR_InformalidadTipo
Fraccion_Informalidad[] : Numérico
```

```
CR_Interesado
<<COL_Interesado>>
Tipo[] : CR_InteresadoTipo
Tipo_Documento[] : CR_InteresadoDocumentoTipo
Documento_Identidad[] : Cadena de texto
Primer_Nombre[] : Cadena de texto
Segundo_Nombre[] : Cadena de texto
Primer_Apellido[] : Cadena de texto
Segundo_Apellido[] : Cadena de texto
Sexo[] : CR_SexoTipo
Razon_Social[] : Cadena de texto
```

```
COL_Fuente
<<Objeto>>
Estado_Disponibilidad[] : COL_EstadoDisponibilidadTipo
Ed_Archivo_ID[] : EdArchivo
Tipo_Principal[] : CL_Forma_Presentacion_Codigo
Fecha_Documento_Fuente[] : XMLDate
```

```
COL_UnidadEspacial
<<ObjetoVersionado>>
Area[] : COL_AreaValor
Dimension[] : COL_DimensionTipo
Est_Direccion_OB[] : EstDireccion
Etiqueta[] : CharacterString
Relacion_Superficie[] : COL_RelacionSuperficieTipo
Volumen[] : COL_VolumenValor
Geometria[] : OM_MultiSurface3D
```

```
COL_CadenaCaresLimite
<<ObjetoVersionado>>
Geometria[] : OM_Curve3D
Localizacion_Texto[] : CharacterString
```

```
CR_PuntoLindero
<<COL_Punto>>
ID_Punto_Lindero[] : Cadena de texto
PuntoTipo[] : CR_PuntoTipo
Acuerdo[] : CR_AcuerdoTipo
Fotoidentificacion[] : CR_FotoidentificacionTipo
Exactitud_Horizonta[] : Numérico
Exactitud_Vertica[] : Numérico
```

# IDENTIFIED RELEVANT OBJECTS – LAND TENURE

REQUIRED TO CAPTURE PEOPLE-TO-LAND RELATIONSHIPS

CR\_Derecho  
<<CR\_DRR>>  
Tipo[1] : CR\_DerechoTipo  
Fraccion\_Derecho[1] : Cadena de texto

CR\_Informalidad  
<<COL\_DRR>>  
Tipo[1] : CR\_InformalidadTipo  
Fraccion\_Informalidad[1] : Numérico

CR\_Interesado  
<<COL\_Interesado>>  
Tipo[1] : CR\_InteresadoTipo  
Tipo\_Documento[1] : CR\_InteresadoDocumentoTipo  
Documento\_Identidad[1] : Cadena de texto  
Primer\_Nombre[0..1] : Cadena de texto  
Segundo\_Nombre[0..1] : Cadena de texto  
Primer\_Apellido[0..1] : Cadena de texto  
Segundo\_Apellido[0..1] : Cadena de texto  
Sexo[0..1] : CR\_SexoTipo  
Razon\_Social[0..1] : Cadena de texto

COL\_Fuente  
<<Oid>>  
Estado\_Disponibilidad[1] : COL\_EstadoDisponibilidadTipo  
Ext\_Archivo\_ID[0..1] : ExtArchivo  
Tipo\_Principal[0..1] : Cl\_Forma\_Presentacion\_Codigo  
Fecha\_Documento\_Fuente[0..1] : XMLDate

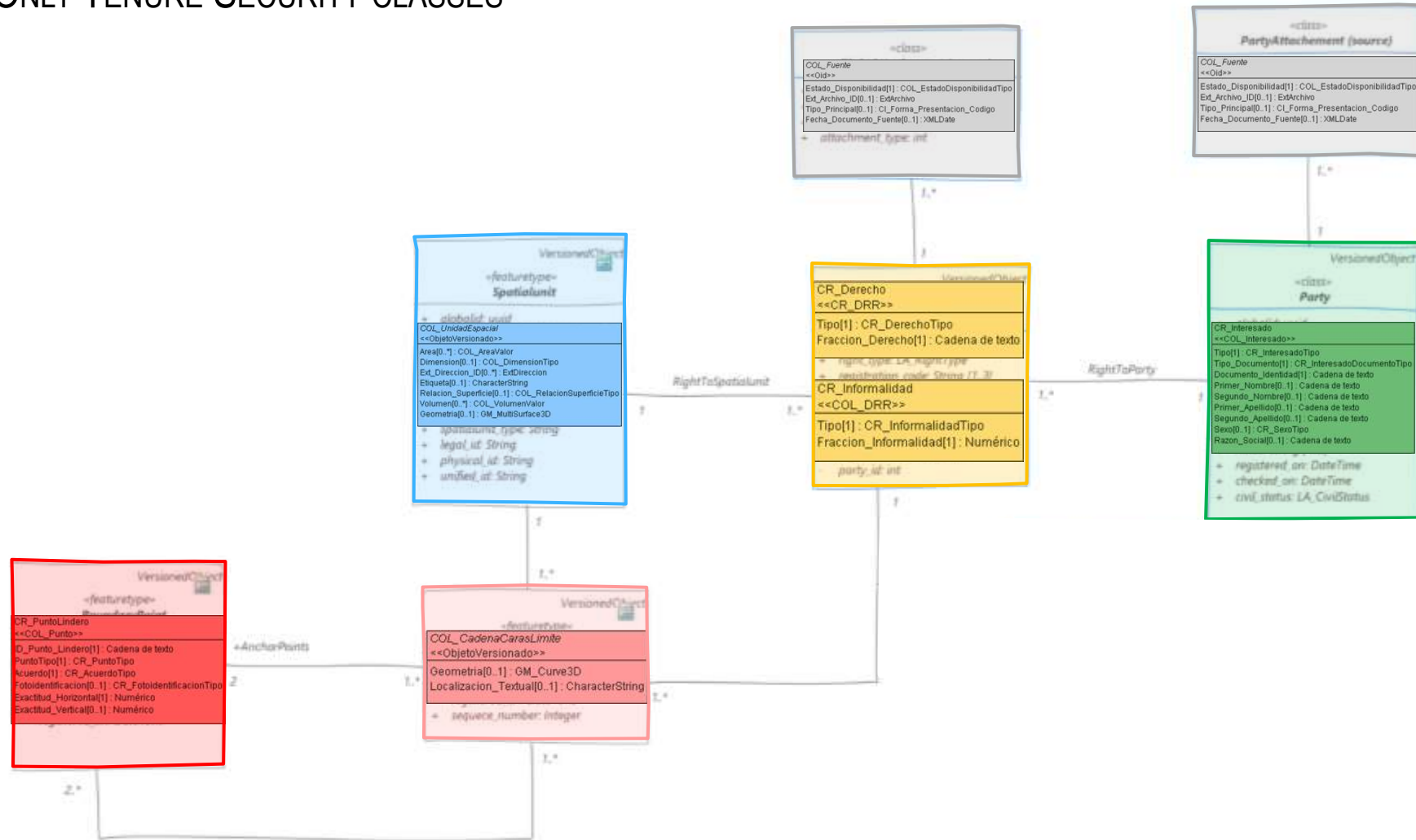
COL\_UnidadEspacial  
<<ObjetoVersionado>>  
Area[0..\*] : COL\_AreaValor  
Dimension[0..1] : COL\_DimensionTipo  
Ext\_Direccion\_ID[0..\*] : ExtDireccion  
Etiqueta[0..1] : CharacterString  
Relacion\_Superficie[0..1] : COL\_RelacionSuperficieTipo  
Volumen[0..\*] : COL\_VolumenValor  
Geometria[0..1] : GM\_MultiSurface3D

CR\_PuntoLindero  
<<COL\_Punto>>  
ID\_Punto\_Lindero[1] : Cadena de texto  
PuntoTipo[1] : CR\_PuntoTipo  
Acuerdo[1] : CR\_AcuerdoTipo  
Fotoidentificacion[0..1] : CR\_FotoidentificacionTipo  
Exactitud\_Horizontal[1] : Numérico  
Exactitud\_Vertical[0..1] : Numérico

COL\_CadenaCarasLimite  
<<ObjetoVersionado>>  
Geometria[0..1] : GM\_Curve3D  
Localizacion\_Textual[0..1] : CharacterString

# RECONSTRUCTING THE MODEL - RESULTING IN A FFP LADM PROFILE

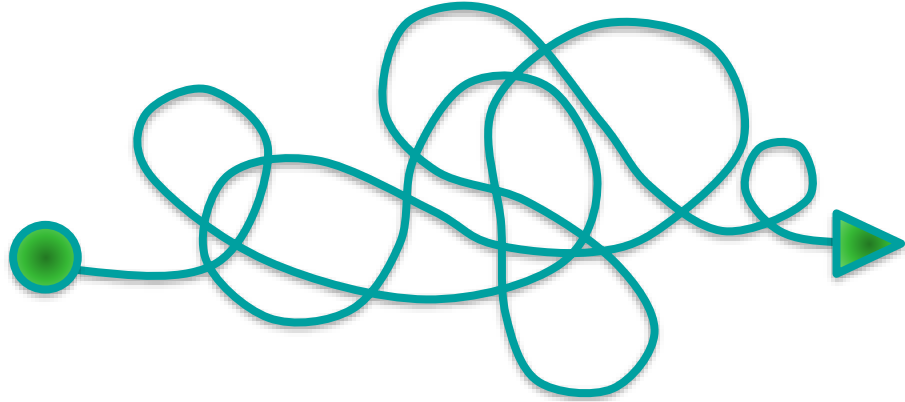
## USING ONLY TENURE SECURITY CLASSES





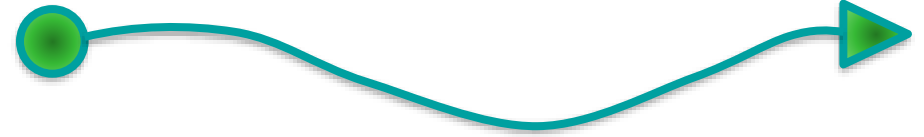
# STREAMLINING TECHNOLOGY FOR CITIZEN APPROPRIATION

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From Tools developed  
by professionals **FOR** professionals

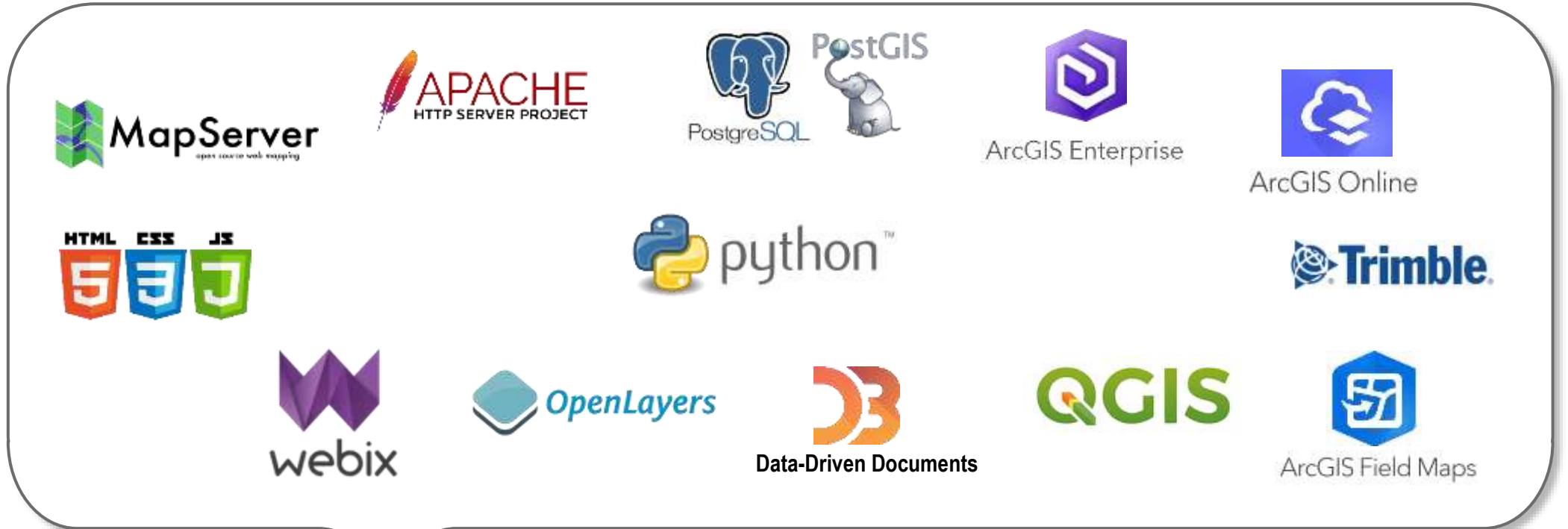
TO



Tools developed  
by professionals & users  
for land  
administration communities

While still delivering the products  
required by the official  
Land Administration System

# THE FFP TECHNOLOGY SUITE



Interoperability Standards  Web Services & APIs

## THE MAIN LESSON HERE!!!

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© Alex Honnold

as you go further  
it only gets  
more difficult

but that makes  
it a whole lot  
more interesting  
and very  
rewarding



# The making of FFP in Colombia



## The Key Messages

*Mathilde Molendijk*

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# FFP meets Reality – The Key Messages



- Trust of the community in LA data collection is key
- Sustainability of technology in land administration is key
- Local youngsters are the undiscovered treasure for field data collection and maintenance of land administration data.
- Technology was no just a tool it became a beneficiary and it has evolved to really meet the requirements of FFP users & FFP Stakeholders

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