

The FIG logo consists of the letters 'FIG' in white, bold, sans-serif font, set against a red rectangular background.

# FIG WORKING WEEK 2017

Helsinki Finland

29 May - 2 June 2017

Presented at the FIG Working Week 2017,  
May 29 - June 2, 2017 in Helsinki, Finland

## Initial inventory of 3D Cadastre use cases in the Caribbean

**Freddy Every (Aruba), Charisse Griffith-Charles (Trinidad and Tobago), Riëncy Holder (Netherlands Antilles), Mathilde Molendijk (The Netherlands), Peter van Oosterom (The Netherlands) Rolando Ocampo Alcántar (Mexico), Jocelyne Marie Marguerite Croes (Aruba), Christiaan Lemmen (The Netherlands), Hendrik Ploeger (The Netherlands) and Michael Sutherland (Trinidad and Tobago)**

**Session TS01H: Cadastre in a Multidimensional World,  
30 May 2017, 14:00-15:30 hours**

Surveying the world of tomorrow -  
From digitalisation to augmented reality

Organised by



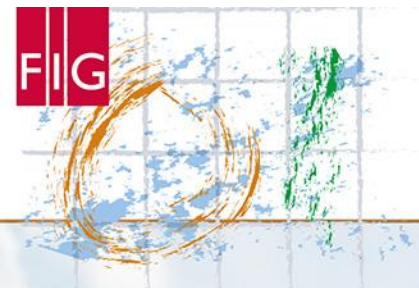
Platinum Sponsors:



esri



Trimble



# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

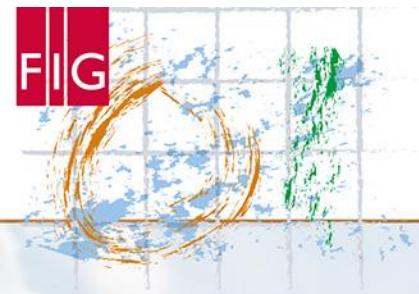
## Overview

- Introduction
- Aruba
- Bonaire
- Trinidad&Tobago
- Conclusion and future work



Platinum Sponsors:





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

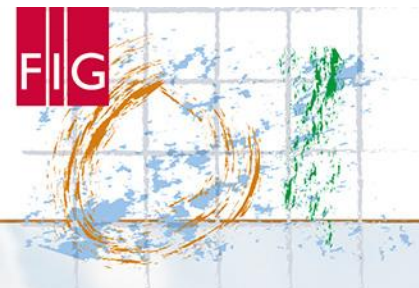
## Introduction

- 3D Cadastre in the Caribbean is important for providing good governance
- most countries are Small Island Developing States (SIDS)
- required to manage large areas of marine space → multi-layered rights
- dense population in the urban areas → must manage use of vertical space
- transition between shore and sea
  
- due to relatively small → actual implementation 3D Cadastre is feasible
- operational experience is then also of high value for other countries



Platinum Sponsors:





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

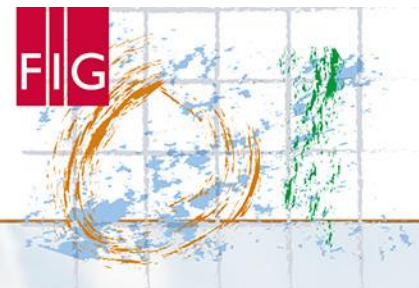
## Overview

- Introduction
- Aruba, 3D Cadastre use cases
  - A1. Condominium and apartment rights registration
  - A2. Registration of heritage buildings and landmarks
  - A3. Land and marine definition and rights management
  - A4. Public and private property overlap
- Bonaire
- Trinidad&Tobago
- Conclusion and future work



Platinum Sponsors:





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

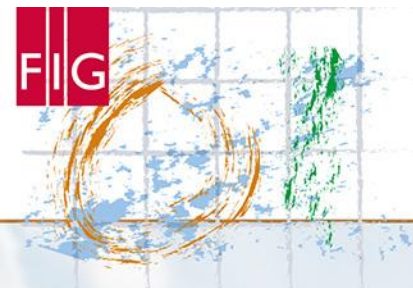
## A1. Condominium and apartment rights registration

3D Cadastre records of individually owned condos and apartments

Legal and taxation purposes

Time-sharing →  
4D registration



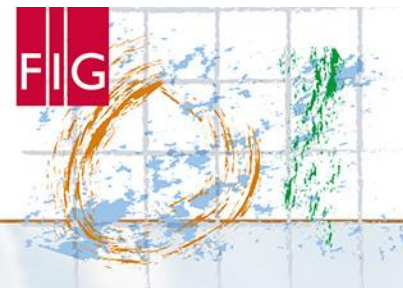


## A2. Registration of heritage buildings and landmarks

Relate 3D physical object with proper 3D legal space

3D aspects are crucial (ruins may be partly subsurface)





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

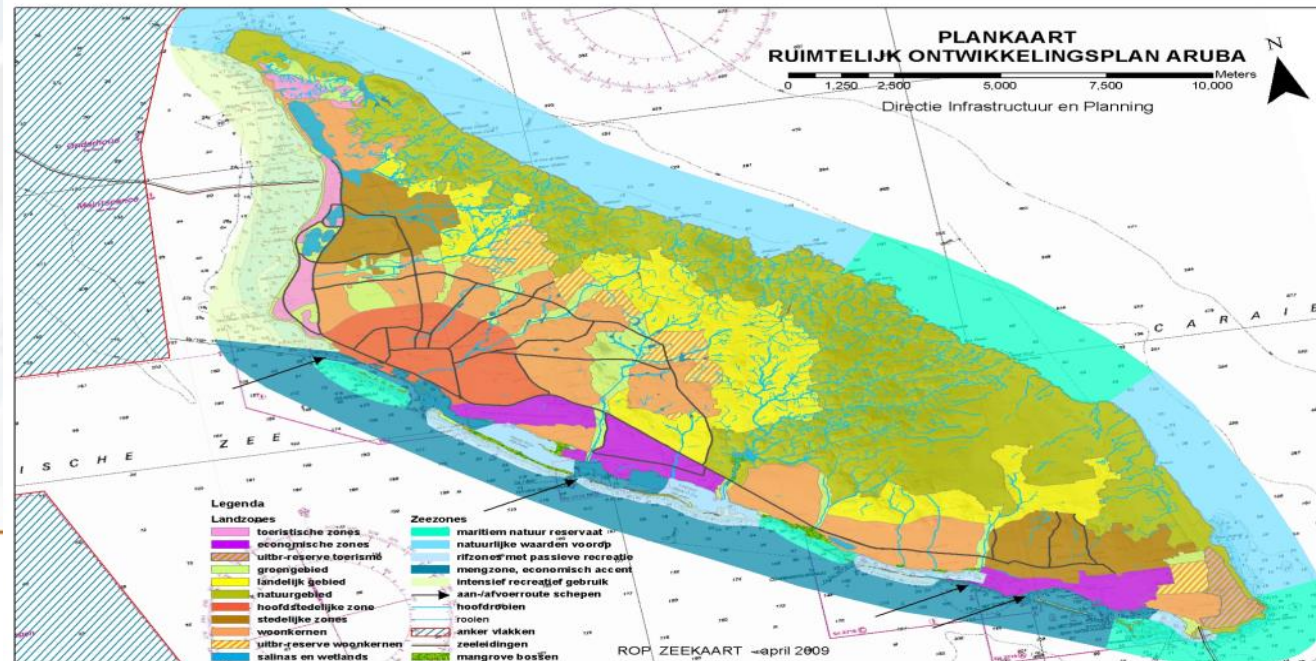
From digitalisation to augmented reality

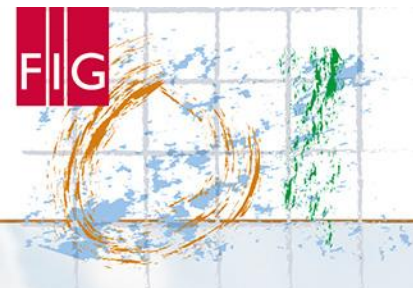
## A3. Land and marine definition and rights management

Spatial Development Plan into a 3D Cadastre

Better register complex situations

Improve management commercial, touristic, residential, protected natural areas, waterways usage and exploration.





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

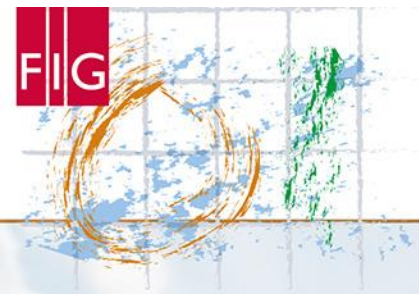
From digitalisation to augmented reality

## A4. Public and private property overlap

Canal, below public road, connects harbor with indoor of hotel  
3D private rights need to be well registered







# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

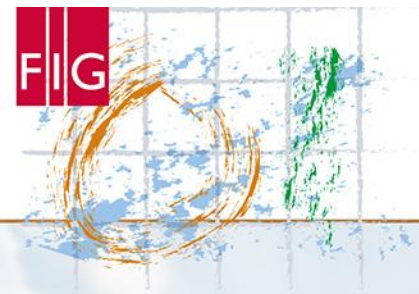
## Overview

- Introduction
- Aruba
- Bonaire, 3D Cadastre use cases
  - B1. Registration apartment rights
  - B2. Registration marine rights
  - B3. Registration of utility lines (under and above ground) and sewerage
- Trinidad&Tobago
- Conclusion and future work



Platinum Sponsors:





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

## B1. Registration apartment rights

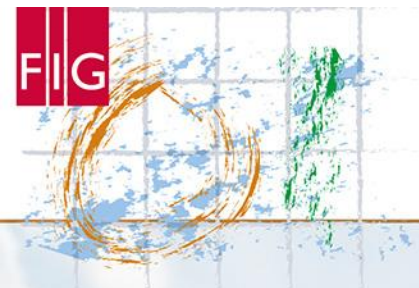
Individually owned apartment rights

Common area included in complex description

Needs to visualize these in 3D

Also important for taxation





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

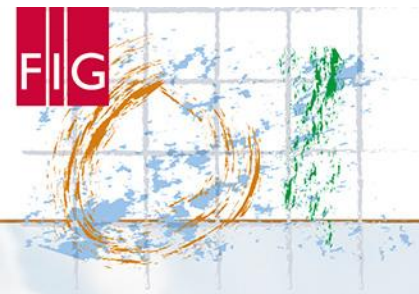
## B2. Registration marine rights

Seabed and sea are owned by different entities

Registry of the layered marine rights to register the piers

Legal,  
commercial and  
taxation purposes





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

## B3. Registration of utility lines (under+above ground), sewerage

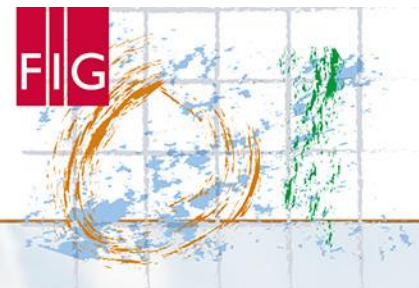
Prevent occurring accidents during the digging, proposal →

3D registry of the existent and future networks of utility lines and sewerage

Utilities are partly under ground and partly above the ground

Supports spatial planning





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

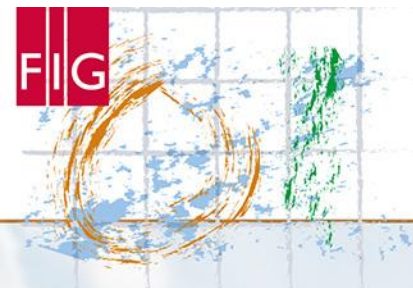
## Overview

- Introduction
- Aruba
- Bonaire
- Trinidad&Tobago, 3D Cadastre use cases
  - T1. 3D data on buildings with overlapping rights
  - T2. Layered marine rights
  - T3. Complex buildings with above ground tunnels
  - T4. 3D Informal rights
- Conclusion and future work



Platinum Sponsors:





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

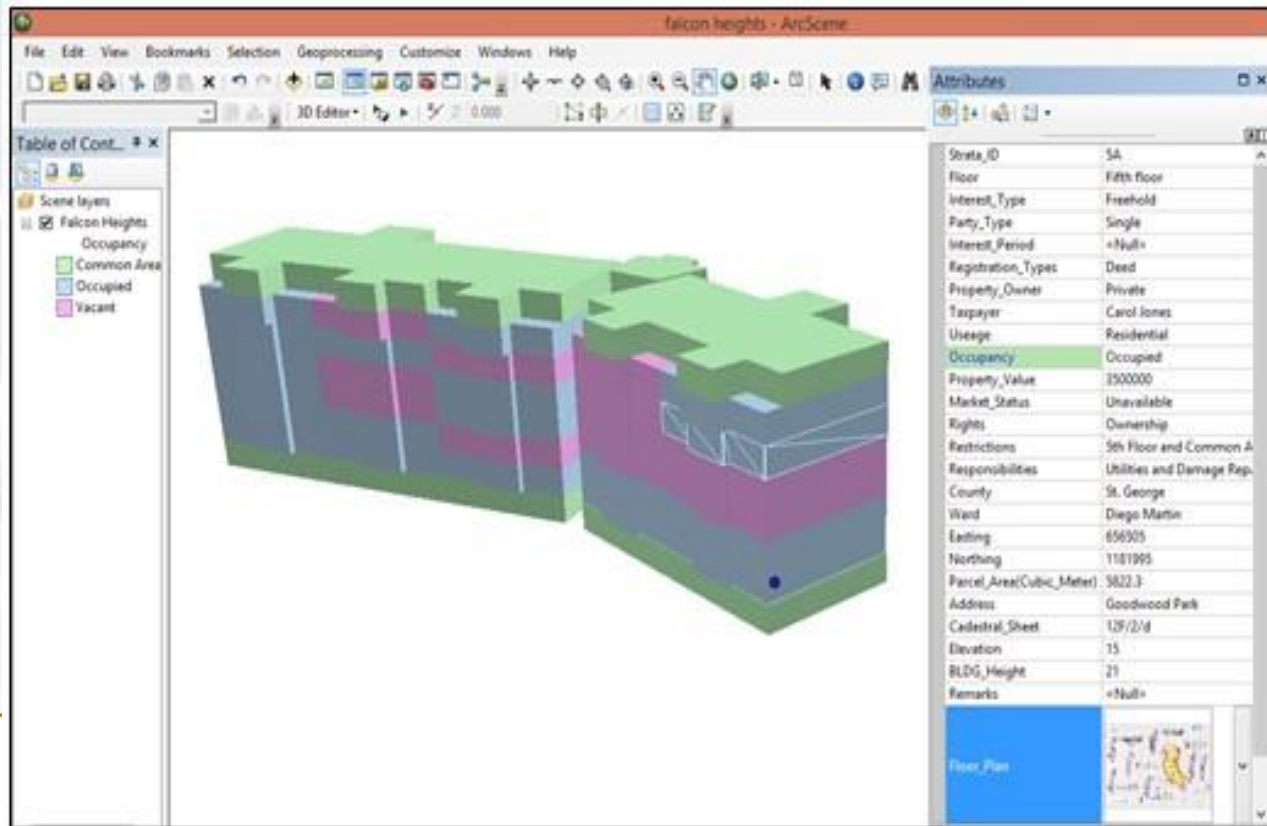
## T1. 3D data on buildings with overlapping rights

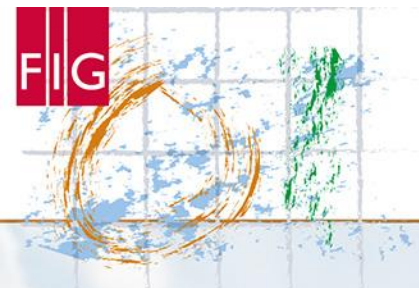
High rise/high valued individual condominiums interlaced with communal access routes

To be defined (+visualized)  
in 3D Cadastre

Also important for taxation

Example: Falcon Heights  
(Port of Spain, Trinidad).





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

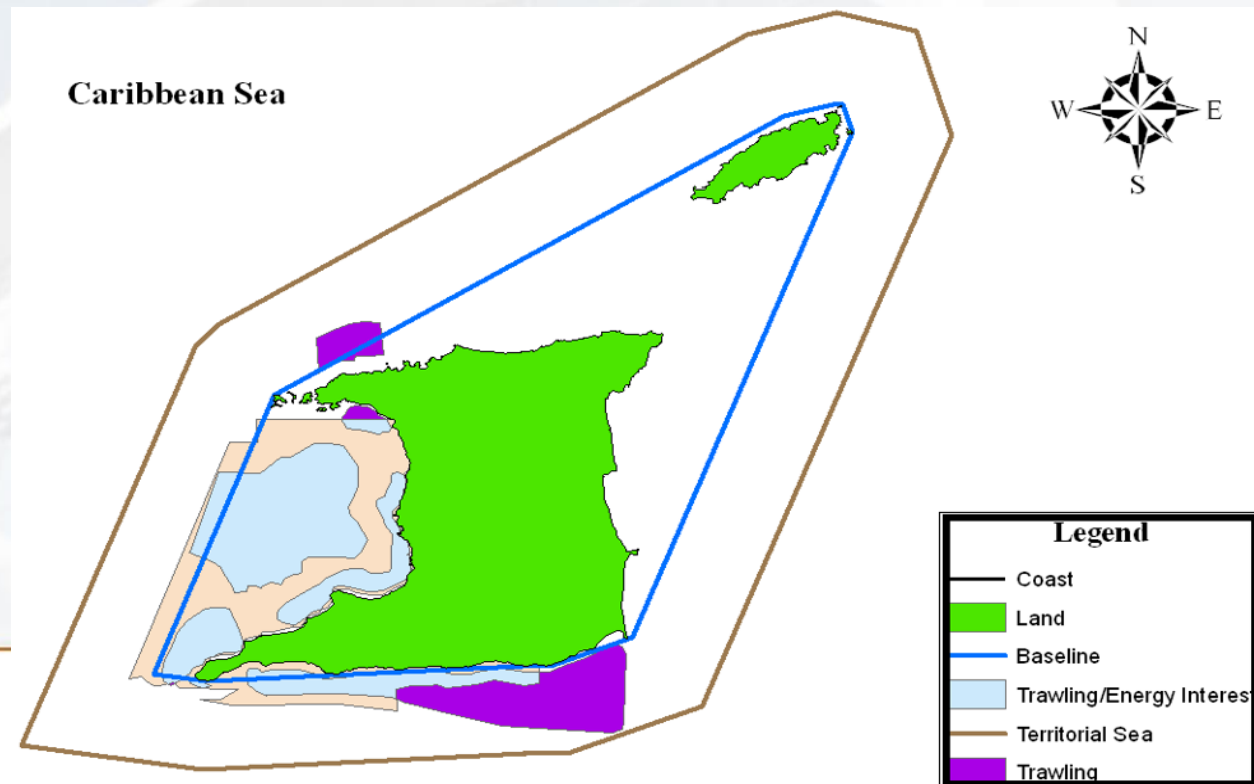
## T2. Layered marine rights

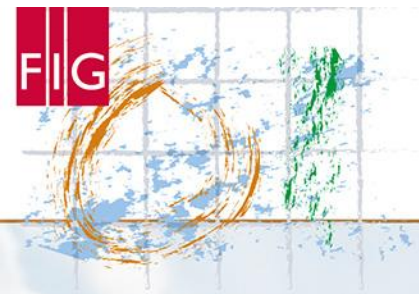
Many layered rights in the marine areas

T&T derives income from leasing seabed companies (avoid encroachment)

But also:

- Shipping lanes
- Trawling/traditional fishing
- Protected environ. areas





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

## T3. Complex buildings with 'above ground tunnels'

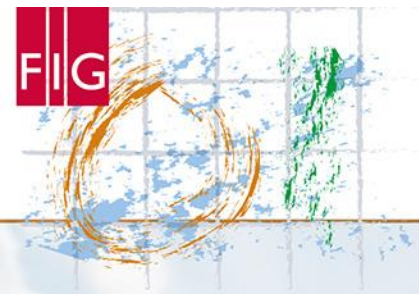
Complex buildings with overhead access walkways

Private rights 3D above public rights to use the streets exist

Example: Richmond Street  
(Port of Spain, Trinidad)







# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

## T4. 3D Informal rights

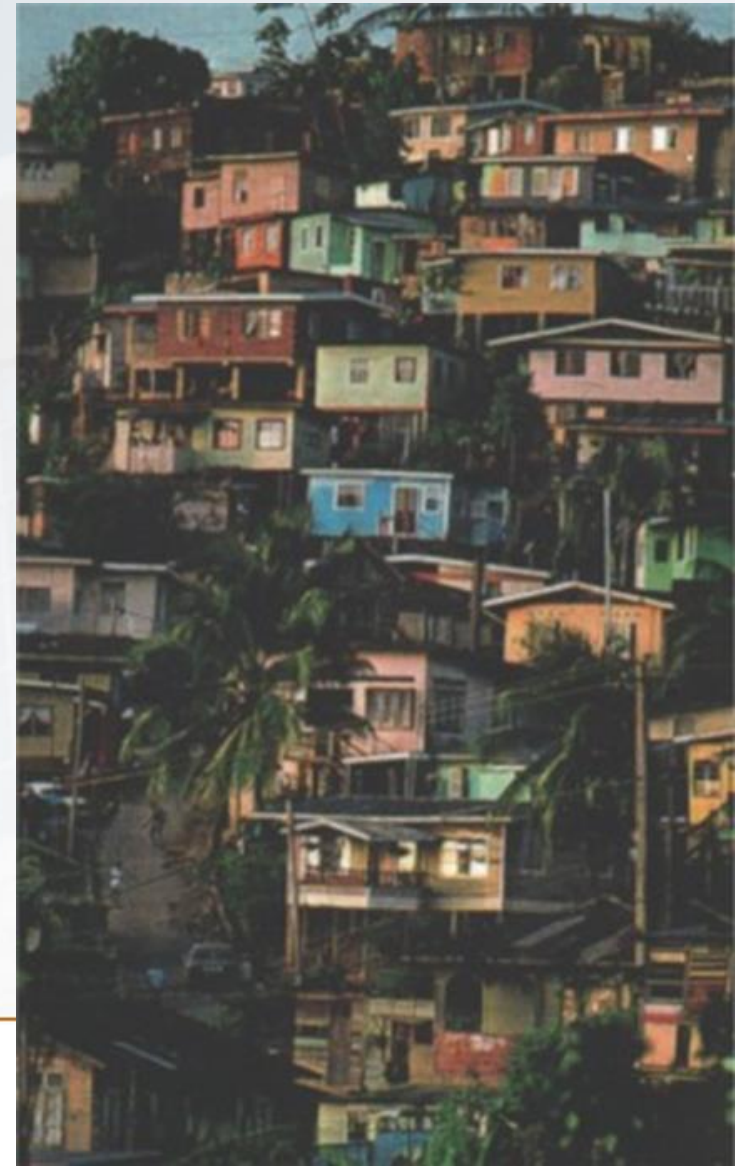
Informal rights must be recognized and preserved

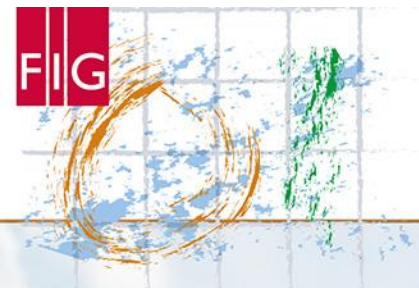
Tightly and intricately woven together with communal access and easements

Many 3D overlaps and overhangs

Example:

Laventille on the outskirts of Port of Spain, Trinidad





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

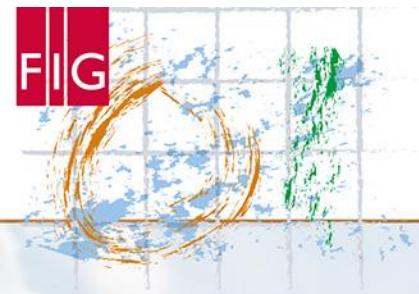
## Overview

- Introduction
- Aruba
- Bonaire
- Trinidad&Tobago
- Conclusion and future work



Platinum Sponsors:





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

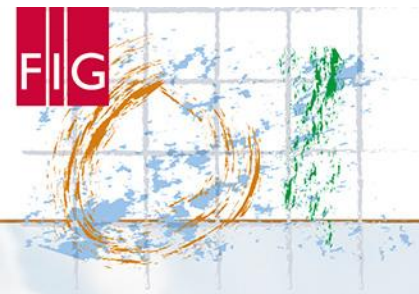
## Conclusion (and future work)

- Holistic view is needed: including land, building, utilities, protected areas (restrictions due to environmental policies, ecology, and cultural history), natural resources RRRs (groundwater, mining), subsurface, airspace, marine resources,...
- Mentioned cadastral use cases have 3D nature (not reflected in registration)  
→ Registering these in 2D system is often quite confusing and complex
- Aruba hosts UN Center of Excellence (COE) on Sustainable Development for SIDS  
→ 3D Cadastre in the Caribbean would be of great benefit to Sustainable Development Goals (SDG) role out in setting indicators, monitor and evaluate



Platinum Sponsors:





# FIG WORKING WEEK 2017

Surveying the world of tomorrow -

Helsinki Finland 29 May - 2 June 2017

From digitalisation to augmented reality

## (Conclusion and) Future work

- Analyzing existing law
- Proposals for new law where needed
- 3D data collection for the sample use cases
- Developing Caribbean 3D LA information model (based on ISO 19152 LADM)
- Prototype system development (including 3D visualization)
- Cost-benefit analysis
- **Final goal: integrated multi-purpose 3D Cadastre, covering legal, organizational and technical aspects**



Platinum Sponsors:





# amsterdam

**FIG** WORKING WEEK 2020  
MAY 9 – MAY 15



**Smart Surveyors for Land  
and Water Management**

