



Governo dos Açores



European Union Network for  
the Implementation and Enforcement  
of Environmental Law

# IMPEL Mini-Conference on “Advances in the use of technology in environmental and regulatory monitoring”

Conferência Nacional IMPEL  
14/02/2020  
Funchal



European Union Network for  
the Implementation and Enforcement  
of Environmental Law

## IMPEL Cross-cutting Tools and Approaches Expert Team

- Agência Europeia do Ambiente, Copenhaga, dias 7 e 8 de novembro de 2019;



# Programa



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## Thursday 7<sup>th</sup> November 2019 (0830 Registration)

<b>1</b>	<b>Registration</b>	<b>08:30 - 09:00</b>
<b>1.1</b> <b>30 mins</b>	<b>Registration</b>	<b>All</b>
<b>2</b>	<b>Welcome &amp; Introductions</b>	<b>09:00 - 09:15</b>
<b>2.1</b> <b>10 mins</b>	<b>Welcome</b>	<b>Simon Bingham</b>
<b>2.2</b> <b>5 mins</b>	<b>Tour de table</b>	<b>All</b>
<b>3</b>		<b>09:15 - 10:15</b>
<b>3.1</b> <b>60 mins</b>	<b>The Finnish MONITOR program</b>	<b>Petri Lijaniemi Finland</b>
<b>***</b>	<b>Coffee Break</b>	<b>10:30 - 11:00</b>
<b>4</b>		<b>10:45 - 13:00</b>
<b>4.1</b> <b>45 mins</b>	<b>Applications of advanced data analytics for environmental oversight</b>	<b>Jasper van Vliet Netherlands</b>
<b>4.2</b> <b>45 mins</b>	<b>Cutting edge technology for environmental monitoring</b>	<b>Joel Davidse Netherlands</b>
<b>4.3</b> <b>45 mins</b>	<b>Copernicus data for water management authorities in Germany - water quality assessment, flood prevention, enhancement of hydrological models.</b>	<b>Annalena Goll Germany</b>

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<b>5</b>		<b>14:00 - 15:30</b>
<b>5.1</b> <b>45 mins</b>	<b>The future of bio-monitoring</b>	<b>Willie Duncan</b> <b>United Kingdom</b>
<b>5.2</b> <b>45 mins</b>	<b>Operational use of innovative monitoring techniques in the Environment Agency</b>	<b>Alison Matthews</b> <b>United Kingdom</b>
<b>***</b>	<b>Coffee Break</b>	<b>15:30 - 16:00</b>
<b>6</b>		<b>16:00 - 17:00</b>
<b>6.1</b> <b>60 mins</b>	<b>Open session exploring the barriers, challenges and opportunities to implementing new technology</b>	<b>All</b>

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## Friday 8<sup>th</sup> November 2019 (0825 Start)

<b>7</b>	<b>Welcome back</b>	<b>08:25 - 08:30</b>
<b>7.1</b> <b>5 mins</b>	Welcome	Simon Bingham
<b>8</b>		<b>08:30 - 10:45</b>
<b>8.1</b> <b>45 mins</b>	Estonian Environmental Inspectorate drone program	Allar Leppind Estonia
<b>8.2</b> <b>45 mins</b>	GPS tracking of waste	Jonas Lundin Sweden
<b>8.3</b> <b>45 mins</b>	Application of mobile technology for waste inspections	Stuart Fallis United Kingdom
<b>***</b>	<b>Coffee Break</b>	<b>10:45 - 11:15</b>
<b>9</b>		<b>11:15 - 12:45</b>
<b>9.1</b> <b>45 mins</b>	Smart2019 at the Province of Overijssel	Remko Wicherson Netherlands
<b>9.2</b> <b>45 mins</b>	Scotland's digital end-to-end system for diffuse pollution farm inspections: 4 years on.	Jonathan Bowes United Kingdom
<b>10</b>	<b>Close out</b>	<b>12:45 - 13:00</b>
<b>10.1</b> <b>15 mins</b>	What next?	Simon Bingham



## Part 1: New methods for environment monitoring and surveillance – MONITOR 2020-programme, Finland

IMPEL-Conference, Copenhagen 7.11.2019  
Petri Liljaniemi  
Ministry of the environment FINLAND

## Part 2: Satellites in environmental surveillance and monitoring – Finnish solutions

IMPEL-Conference, Copenhagen 7.11.2019  
Petri Liljaniemi  
Ministry of the environment FINLAND



Human Environment and Transport Inspectorate  
Ministry of Infrastructure and Water Management



Human Environment and Transport Inspectorate  
Ministry of Infrastructure and Water Management

Jasper van Vliet

Assistance from algorithm:  
Selecting inspection targets

Algorithms for the  
Verification of Emissions  
from ships with Satellites  
(AVES)

Which schip has the highest priority for inspection ?



**Schip A**

- Diepgang: 1½ meter
- Tonnage: 1.000 ton
- Eigenaar heeft ook nog twee andere schepen in bezit
- Eigenaar is een investeerder die zijn hoofdactiviteiten BUITEN de scheepvaart heeft
- Vaart voornamelijk in Brabant en Limburg



**Schip B**

- Diepgang: 3½ meter
- Tonnage: 8.000 ton
- Eigenaar heeft alleen dit schip in bezit
- Eigenaar heeft zijn hoofdactiviteiten binnen de scheepvaart
- Vaart voornamelijk in Friesland

AVES Project ambitions

Design a robust methodology to detect emission profile of individual ships: NO<sub>x</sub>, SO<sub>x</sub>.

- State of the Art
- Explainable
- Clarity on weak and strong points
- Open access

## Technology



### **Opportunities with:**

Satellites

Drones

GIS



### **Implementation:**

Barriers

Challenges

Joël Davidse MSc Geo-Information Science  
ID-LAB (50%) data analyst GIS & Remote Sensing  
ILT AEROSENSING (50%) drone operator





## *COPERNICUS data*

for water management authorities in Germany

—  
water quality assessment, flood prevention,  
enhancement of hydrological models

Dr. Annalena Goll, Copernicus for LAWA

Ministry for Environment, Energy, Food and Forestry Rhineland-Palatinate



CLIMATE CHANGE



MARINE MONITORING



ATMOSPHERE MONITORING



LAND MONITORING



SECURITY



EMERGENCY MANAGEMENT

## The Future of Biomonitoring- Catching the Wave



**Willie Duncan**  
**SEPA**

### Why do we monitor the environment

To understand the environmental condition.

To understand the impact of discharges.

To track improvements arising from interventions.



## Operational use of innovative monitoring techniques in the Environment Agency

Dr Alison Matthews, Geomatics Manager  
Jon Hateley, Crispin Hambidge, Matt Loewenthal, Jonathan Porter

IMPEL conference on Advances in the use of technology in  
environmental and regulatory monitoring

7<sup>th</sup> and 8<sup>th</sup> November 2019 Copenhagen



### Contents

- Introduction to the Environment Agency
- The case for innovation
- Case studies
  - Earth observation
  - Fish passage
  - Continuous monitoring
  - Microbial source tracking
  - eDNA
- The future

## Estonian Environmental Inspectorate „drone program“

“Advances in the use of technology in environmental and regulatory monitoring”

7th – 8th November, Copenhagen

Ardi Lepp



### OUR DRONES

- 18 drones (at least 1 in each County Office)
- DJI Phantom 2 (1 pcs)
- DJI Phantom 3 Adanced (3 pcs)
- DJI Phantom 4 Pro + (10 pcs)
- DJI Mavic 2 Pro (3 pcs)
- DJI Inspire 1 V2.0 + Zenmuse XT Thermo
- Ca 2000 euros (15000 euros)



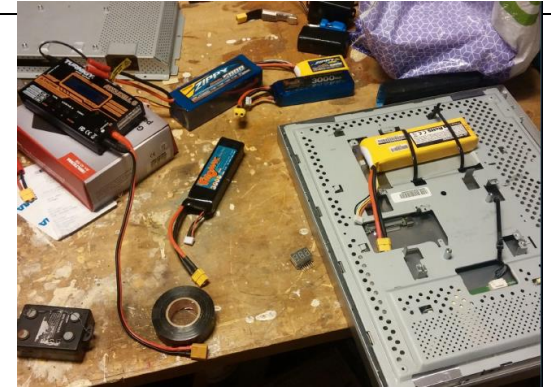
## TOPICS

- Introduction
- Drones
- Drone users
- Possibilities
- Regulations
- Case studies
- Limitations and setbacks
- Next steps
- Key notes

## GPS TRACKING PROJECT



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# GPS TRACKING PROJECT – TRACKING ILLEGAL WASTE STREAMS WITH GPS TRACKERS

## GPS TRACKING PROJECT



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## DEVELOPMENT

- WEEE tracking development by Swedish regional authorities.
- Lead-acid battery tracking development by Finnish national authorities.
- Both authorities helped each other in their respective development project.
- Meetings in Finland on two separate occasions. One for the planning phase and one for the execution phase.



# Holanda



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## SMART 2030

Remko Wicherson

Manager Innovation- and Datalab  
Province of Overijssel, the Netherlands  
November 8<sup>th</sup>, 2019



## 4 types of innovation

- UAV images
- Aerial and satellite images
- Sensors
- Other data

sand extractions



number of swimmers



wheat plantations  
in reet fields





## How?



2 types of compliance inspection:

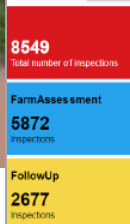
1. Full farm
2. Follow-up



On:  
 Field management  
 Fertilizer & pesticide handling  
 Slurry, manure & oil storage  
 Drainage  
 Waste

- Using 15 farm specialists with Ruggon PX501B tablets
- Bespoke GeoField software (mobile GIS, data capture)
- Tibco Spotfire (dashboards, analytics)

## Benefits



• Efficiency & cost savings (~80% back office)

- 3.5 hours saved per initial visit
- 1.5 hours is saved per follow-visit
- ~£120 saving per inspection

• GeoField cost (£280k) – ROI in ~2 years

- Data quality radically improved:
- digital
  - Consistent
  - Georeferenced

- Dynamic data access (in field) – classification, NVZ, farm details, licensed points etc etc
- Rapid farmer feedback - days not months
- Accelerated environmental improvement
- Freeing up OPS staff to focus on real work not paper shuffling/data cleansing

RBMP Cycle	No. farms	Savings (FTE)		
		Initial visit	Revisit (63%)	Total
2012-2015	2500	7.1	1.2	8.3
2016-2021	11530	32.0	8.6	40.6
		<b>= 48.9 FTE or £1.4m</b>		

# Dificuldades e desafios



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# Oportunidades



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