



# **Public Private Engagement - Private Perspective**

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# Presentation concept

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- Introduction
- Business models in HW purchase  
(Dr. Michael Staudinger)
- Private perspective on each BM
- PPE Case study ZAMG - Meteopress  
(5 years of PPE)
- Controversial slides
- Appeasement slides





# Introduction



# METEOPRESS

## WEATHER RADARS & AI NOWCASTING



***Meteopress's mission is to protect the people around the world against the effects of climate change and dangerous weather.***

We offer innovative and top quality weather radars that are significantly more affordable than anything comparable on the market.

A disruptor in the radar industry, C-band, S-band, and X-band dual-polarization Doppler weather radars are the most important division of the company with more than 35 radars deployed in the last 7 years.

# METEOPRESS

WEATHER RADARS & AI NOWCASTING



## Company facts:

- est. 1992 - 30 years of history
- 40+ highly skilled employees
  - 15 meteorologists
  - 10 HW & Radar developers
  - 10 SW & AI developers
- company principles:
  - Build-Measure-Learn
  - Innovate Or Die
  - Freedom: No Rules Rules

# METEOPRESS

WEATHER RADARS & AI NOWCASTING





# Business models



# Business models for SOFF Implementation

1. **Fully public:** Fully State/NMHS owned and operated GBON infrastructure
2. **Public-Private:** State/NMHS owned and Private Partner operated
3. **Public-Private:** State/NMHS and Private Partner owned
4. **Fully Private:** owned and operated by a private partner with a direct contract with the State/NMHS

Source: Dr. Michael Staudinger

Presentation at HydrometAFRICA 2022





Hochficht, C-band

# ZAMG & Meteopress PPE



Znojmo (CZ), X-band



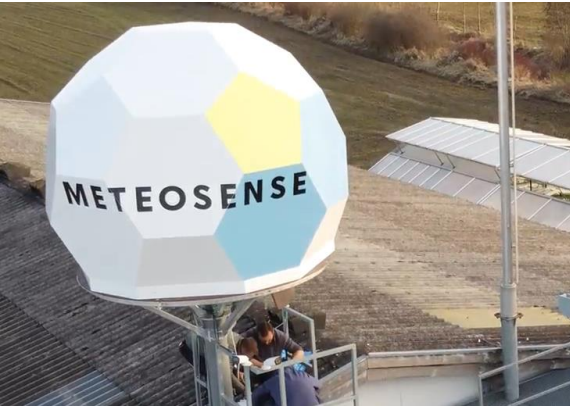
OPERATIONAL RADAR



RADAR IN PREPARATION

Vienna, X-band

Reichersberg, X-band



# Radars & AI Nowcasting



# Business models for SOFF Implementation

## Model 1: Fully State/NMHS owned and operated GBON infrastructure

- State has full control of the hydromet services
- **System and data ownership** as well as **operation and maintenance** lie with the **NMHS**
- **Single components** of the observing system can be outsourced to the **private sector**
- Private sector can access data for commercial purposes as per the GBON and WMO data policy conditions

# Business models for SOFF Implementation

## Model 1: Fully State/NMHS owned and operated GBON infrastructure

### Private Perspective:

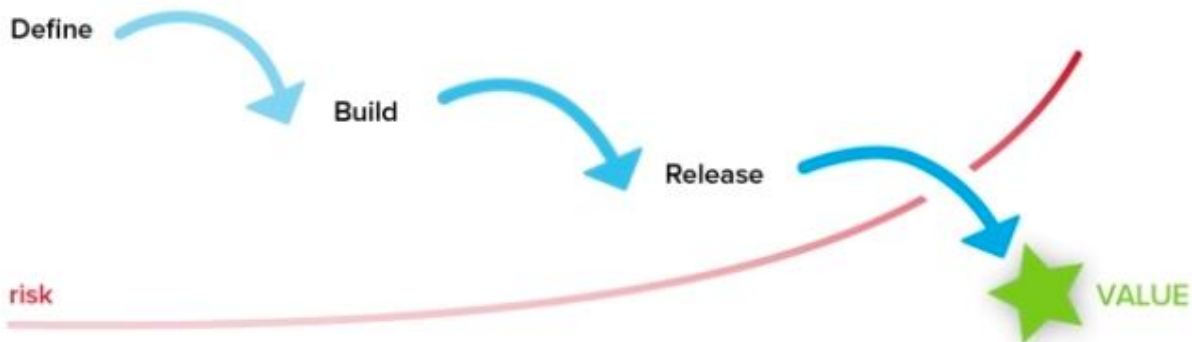
#### Upsides:

- legal safety - local legal framework & WMO Guidelines exist
- managerial safety - proven model
- operational safety - independence - only light connection to the “health” of the Supplier

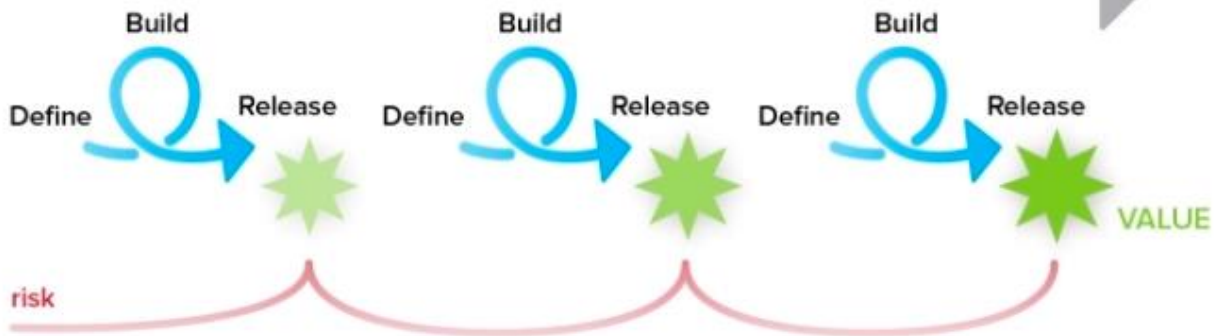
#### Downsides:

- waterfall approach - requires genius & complex tender specs
- overpriced (price are inflated by suppliers and local integrators for safety and margins)
- high skill workers necessary (high costs on small networks)
- maintenance contracts expire (dozens of radars around the world not in operation)
- limited upgrades, extra costs for spares
- vendor lock-in (no open interchangeable formats - manufacturers not motivated)
- PPE not possible

# WATERFALL



TIME



# AGILE

# Business models for SOFF Implementation

## Model 2: State/NMHS owned – Private Partner operated

- **NMHS** is responsible for the **design**
- **Private partner constructs** and **operates** the basic observations infrastructure – fully publicly funded
- Private partner in charge of **operation and maintenance**
- **Data ownership** is with the **State/NMHS**, but data are in the public domain without usage fees
- Commercial use of data by the contracted partner is possible
- At the end of the contract, the NMHS is free to enter new types of contracts and might extend the operating and maintenance period with the contractor.

# Business models for SOFF Implementation

## Model 2: State/NMHS owned – Private Partner operated - Private Perspective:

### Upsides:

- legal safety - local legal framework & WMO Guidelines exist
- operational safety (HW in the experienced hands)
- economies of scale (shared costs of maintenance personnel vs. travel costs)

### Downsides:

- waterfall approach (expects genius & complex tender specs)
- managerial safety - models being explored
- connected to financial health of the supplier
- maintenance contracts expire (dozens of radars around the world not in operation)
- limited upgrades, extra costs for spares
- PPE possible but complex (Supplier motivation?)

# Business models for SOFF Implementation

## Model 3: State/NMHS and Private Partner owned

- **NMHS** and **private partner** jointly **design** the system (Design-Build-Operate)
- **Private partner** contributes to the initial **investment**.
- Private partner **contracts** and **operates** the system.
- **Data ownership** is with the private partner.
- **State** pays the **private partner** to make data available in the public domain free of charge.

After the contract ends, the ownership of the system is transferred to the NMHS. However, the NMHS is free to enter new types of contract after this period if resources are limited.

# Business models for SOFF Implementation

## Model 3: State/NMHS and Private Partner co-owned - Private Perspective:

### Upsides:

- agile (Build-Measure-Learn)
- lower cost of deployment & operation (Private motivated to build economically)
- long-term partnership, upgrades and operability
- economies of scale (maintenance, joint devs, spares)
- revenue sharing possible - PPE!
- engages both groups - Public & Private

### Downsides:

- legal safety - local legal framework & WMO Guidelines do not exist
- operational safety - private partner can seize to operate
- managerial safety - model being explored
- connected to financial health of the supplier





Hochficht, C-band

# ZAMG & Meteopress PPE



Znojmo (CZ), X-band

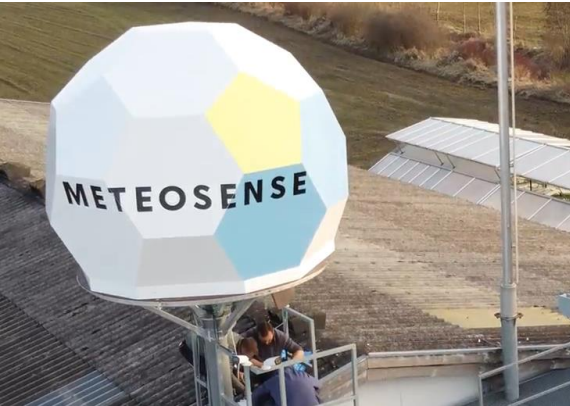


OPERATIONAL RADAR



RADAR IN PREPARATION

Reichersberg, X-band



Vienna, X-band



# Radars & AI Nowcasting

# Business models for SOFF Implementation

## Model 4: Fully owned and operated by a private partner

- The **private partner builds, operates and owns** the system.
- **Data ownership** is with the private partner.
- An agreement describes how the NMHS can access the data and allows usage of data in the public domain free of charge as per WMO data policy.
- Data can be used by the private partner to provide commercial services.

# Business models for SOFF Implementation

## Model 4: Fully owned and operated by a private partner - Private Perspective:

### Upsides:

- agile (Build-Measure-Learn)
- lowest cost of deployment & operation (Private motivated to build economically)
- flexibility and customer-supplier long term model (high-level SLA)
- long-term partnership, upgrades and operability
- economies of scale (maintenance, joint devs, spares) - role fulfilled with
- revenue sharing possible - PPE! (currently the future of business models in Private)
- engages both groups - Public & Private

### Downsides:

- cash-flow heavy on Supplier
- outside of the box approach / change of paradigms
- “critical infrastructure” country rules problem
- operational safety - private partner can end contract
- managerial safety - model being explored
- connected to financial health of the supplier



# **Case study: ZAMG & Meteopress PPE**



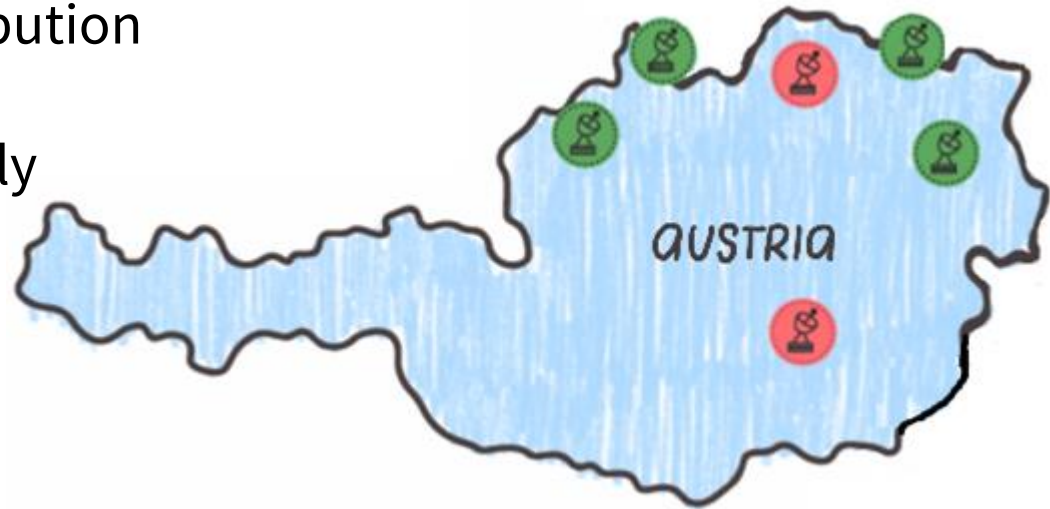
# ZAMG & Meteopress PPE



# Radar Business model in a nutshell

## Joint Radar network development

- shared interest
  - radar coverage of Austria
- shared costs
  - equal financial contribution
- shared results
  - data are shared equally





# Benefits on both sides

## **Result for ZAMG:**

- One C-band radar and three X-band radars network with 1-2 more planned for next 2-3 years.
- Total cost at 30 % of usual budget
  - 50:50 contribution
  - lower budget overall compared to known tenders
- Zero maintenance and operational exp. for ZAMG
- agile and gradual upgrades with very modest budgets



## **Benefits for Meteopress:**

- data from Austrian Coverage
- joint R&D and feedback
- future project expansion



# Technical Aspects of the ZAMG Network

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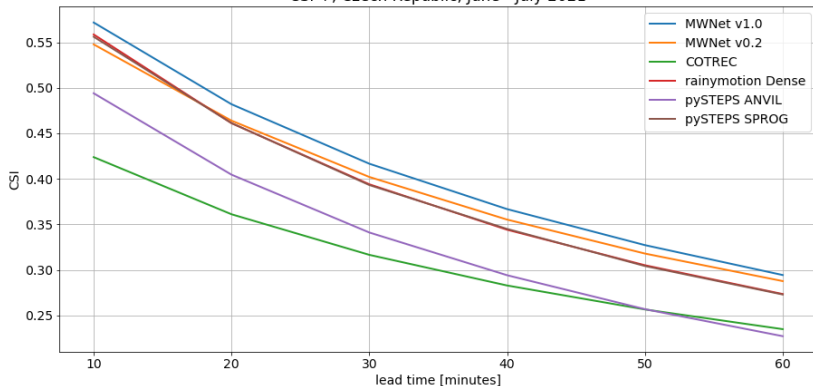
- Network consists of Meteopress C-band and X-band Solid-State weather radars based on one modular platform (upgradable)
  - **C-band - 5kW Solid-State, 1 deg beam:**
    - equivalent to 250kW magnetron
    - low attenuation - more data when it really matters
    - high quality data (incl. Dual-Pol., Doppler, ...)
    - ultralight construction - 1deg beam antennas with weight below 750kg/1500lbs.
    - low power consumption, low infrastructure needs
  - X-band - 1.6 kW Solid-State, 1 deg beam
- All available as Meteopress RadarCrate



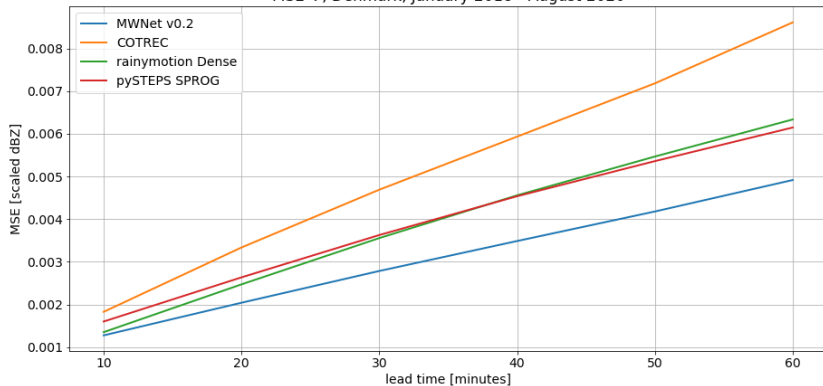


# AI-REN: Radar Echo Nowcasting

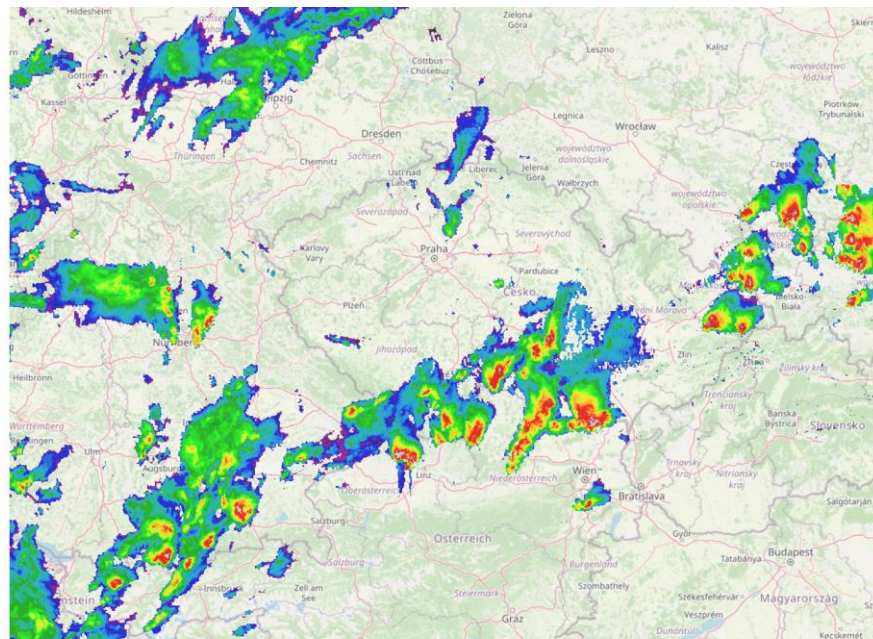
CSI ↑, Czech Republic, June - July 2021



MSE ↓, Denmark, January 2018 - August 2020



~ **52 % lower MSE than COTREC** during 2021 convective season in the Czech Republic



-10 min

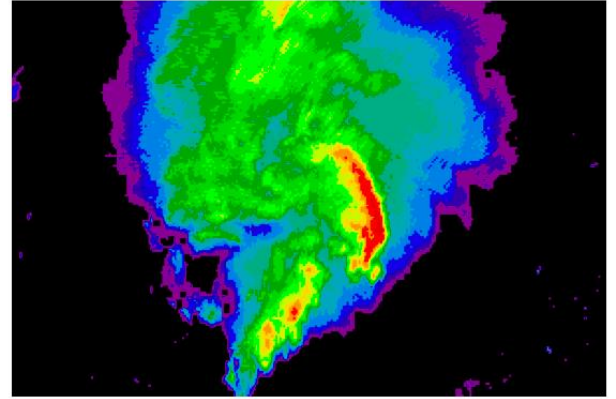
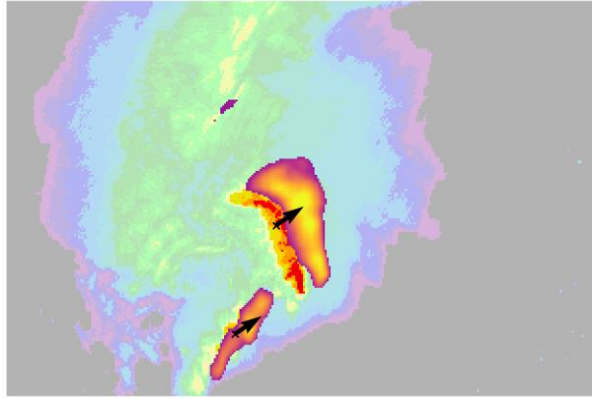
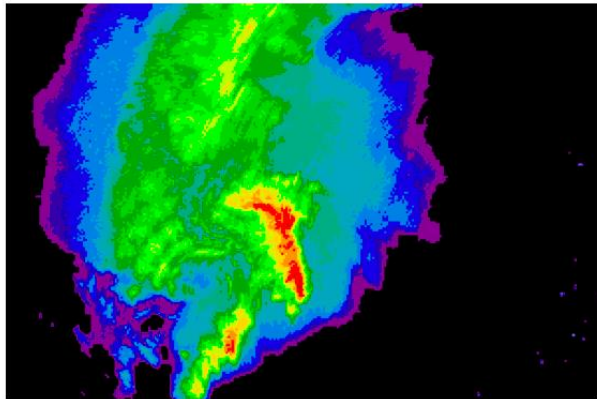
Example above: 2021-06-24 Tornado Situation - prediction & warning

# AI-REN: Automatic Severe Storms Warning

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Predicts radar cells with a defined reflectivity.

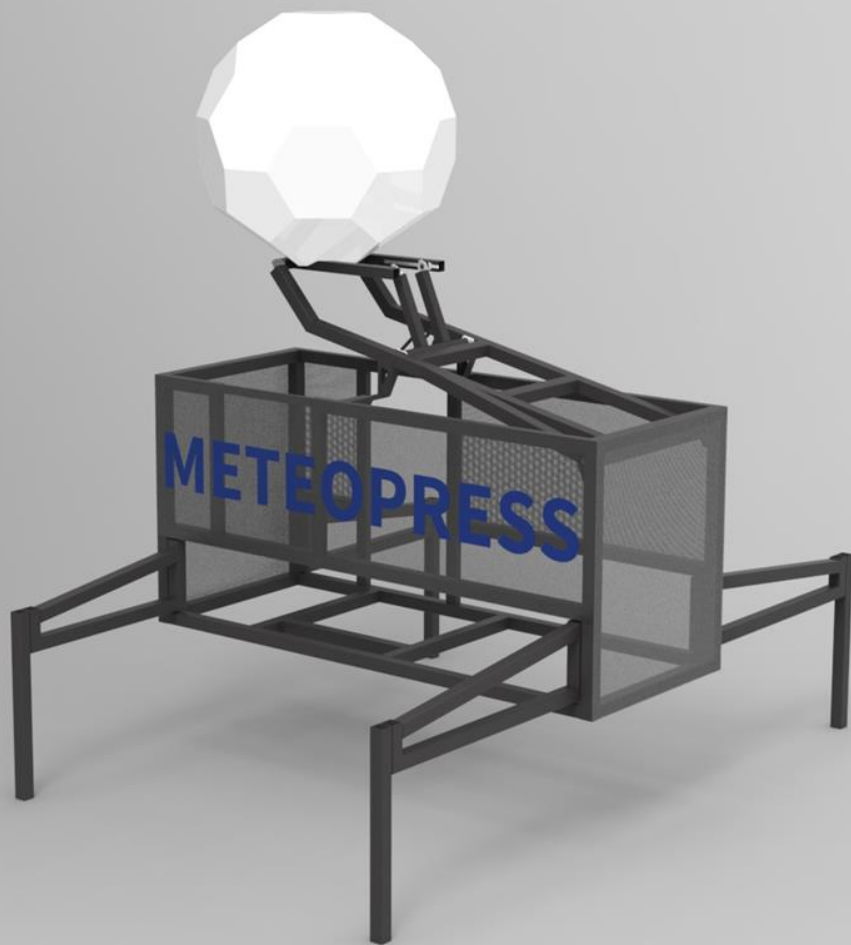
Prediction: position + probability





## **Next Stage - RadarCrate**

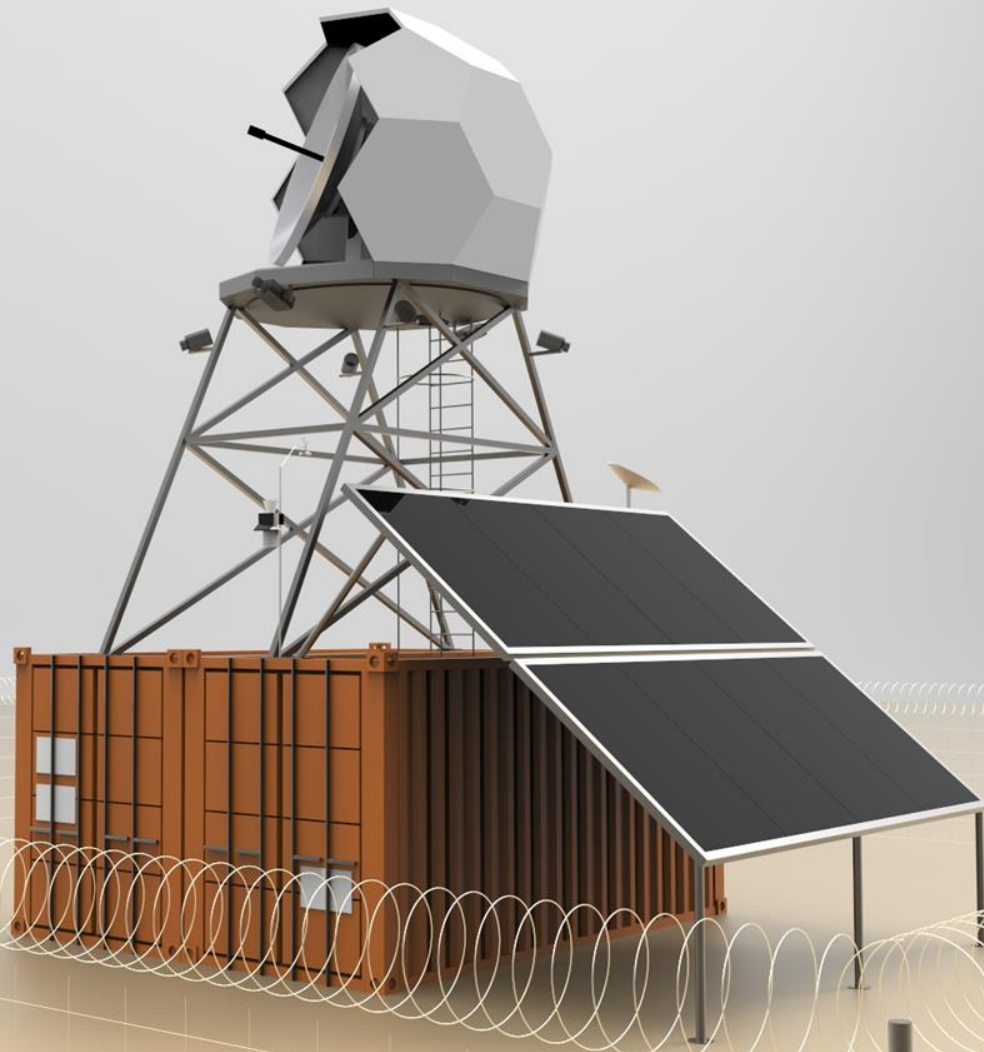






# Meteopress RadarCrate v1.0

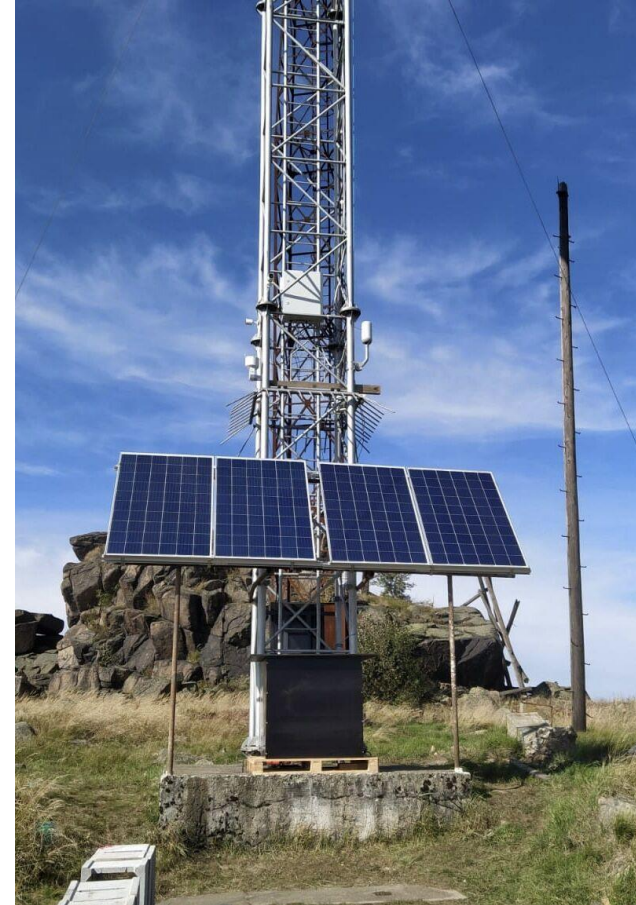
- fully integrated solution
- no dependency on local energy or internet providers
- 2 standard shipping containers contain full radar solution including tower, security fence & cameras, power source, internet.
- operationable within 1 week from delivery





# Island Electricity System

- Low Power Consumption = independency on local power supply
- Solar and wind power system fully capable of running the radar system
- Back-up batteries (UPS) - possible to run the radar for up to 30 days without source of power
- Cost-effective and reliable under any condition
- Easy installation (3 day install)
- Low maintenance
- Sustainable solution with minimal ecological impact





# Extras





# Harsh realities of the radar business

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- real tenders do not exist
  - ok, some might, but they are very very rare
- you pay double or triple the prices you should
  - innovation saves costs
- dissuasion of smart & brave state employees
  - better safe than sorry
  - demotivation
- adversity to innovation:
  - robust outdated technology preferred
  - dinosaurs are dug in their trenches and kill competition & innovation with relationships
- barriers to business entry
  - references
  - experience



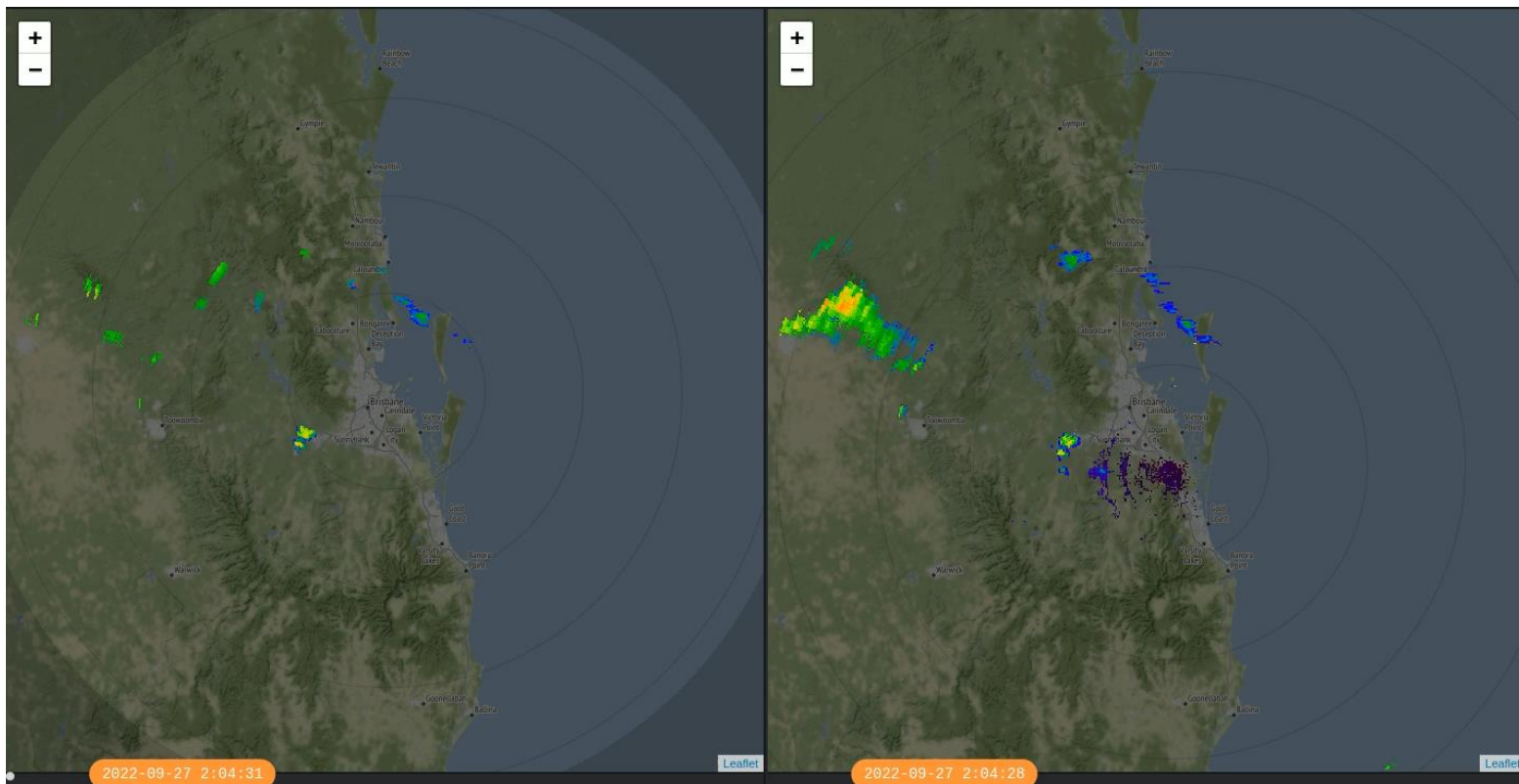
Result: Fewer RADARS - Less SAFETY - Lots of people left behind

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# Bureau of Meteorology Australia: Solid-State C-band



# BOM Australia: Comparison of Cappi 1500m:



**Meteopress Solid-State C-band (2.5kW, 2.4m ant.)**

**Leonardo Meteor 1500 S-band (1000kW, 8.5m ant.)**

Where is the UTOPIA - define the ideal of PPE

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# Be the Role Model



**Only you can:**

**Enable innovation**

**Encourage people**

**Partner with Private**

*(find strengths and help the world together)*



# Be the Role Model

**Be like Michael & Andreas (ZAMG) ♥**





# **METEOPRESS**

**Radars & AI Nowcasting**

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