



Manaaki Whenua  
Landcare Research

# Our Land, Our Future

Tō tātou whenua, mō āpōpō



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# Streaming Geospatial Data into Virtual Reality

Alexander Herzig & Johannes Scholten



# Motivation

- Interoperable modelling
- Virtual Geographic Environments
- Web and VR as science service platform
- Free and open source software



# LUMASS

- low coding
- spatial system dynamics
- raster-based
- very large data support
- multi-core processing

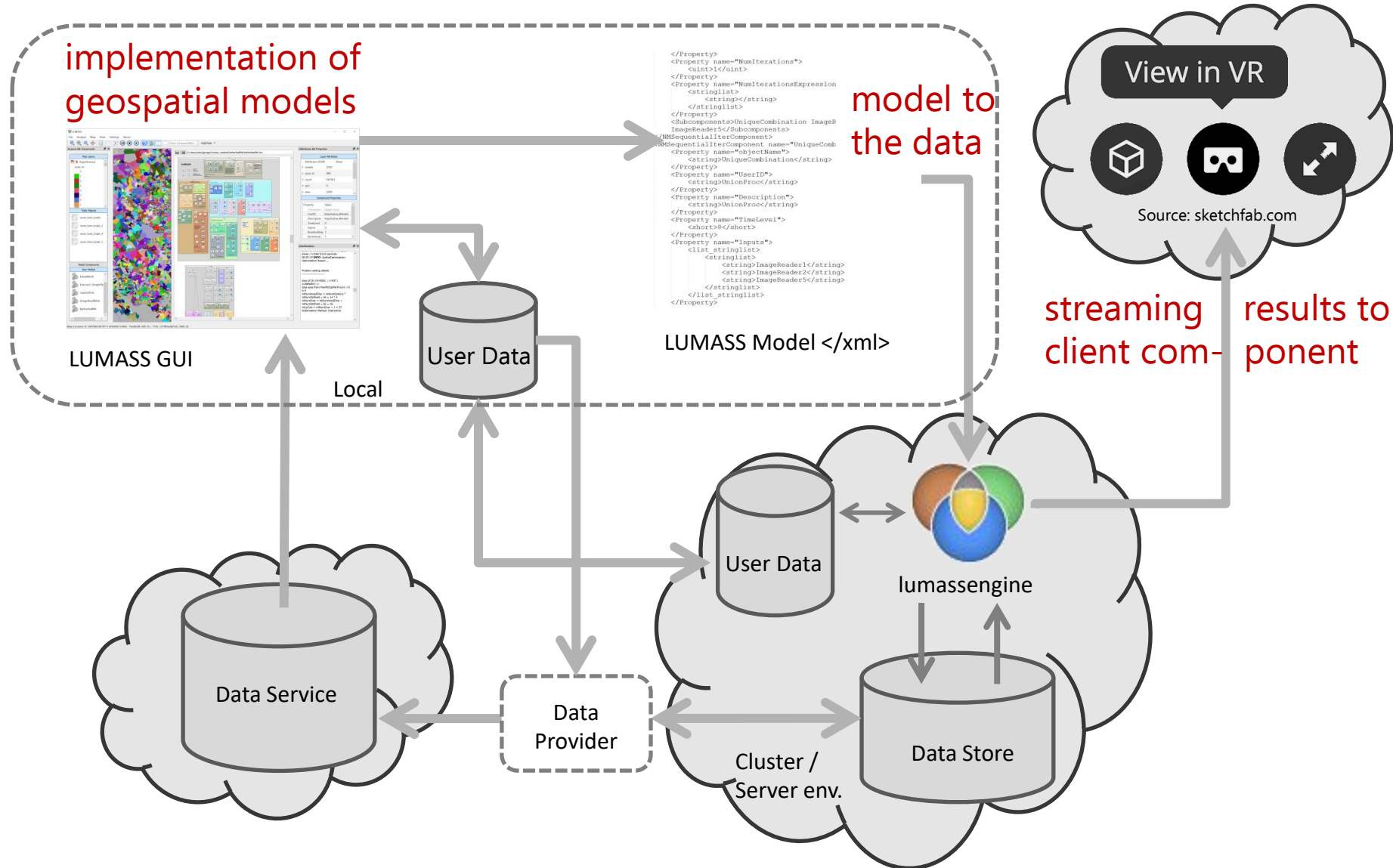
The screenshot displays the LUMASS software interface. The main window shows a map of a region with a color-coded overlay. A 'CarbonGain' component diagram is visible, showing a network of nodes and connections. A 'landuse2011\_100mv2\_1' data table is open, showing a grid of values. The 'Attributes and Properties' panel on the right shows the properties of the selected component.

Property	Value
Description	TotalIntercept
TimeLevel	28
Inputs	{{(MapAlgebra53){Ma...
IterationStep	1
NumIterations	1
NumIterationsExpression	{}
ProcessName	NMRATBandMathIma...
NMInputComponentType	float
NMOutputComponentT...	float
InputNumDimensions	2
OutputNumDimensions	2
InputNumBands	1
OutputNumBands	1
InputTables	{}
InputTableVarNames	{}
MapExpressions	{{PassedThrough * (1 ...
NumExpressions	{}
UseTableColumnCache	<input type="checkbox"/> False

rowidx	Histogram	Class_Names	Red	Green
1	0	1.25159e+08	0	
2	1	979406 AAA	255	25
3	2	993 ALA	192	19
4	3	1054 API	192	19



# LUMASS as a Service



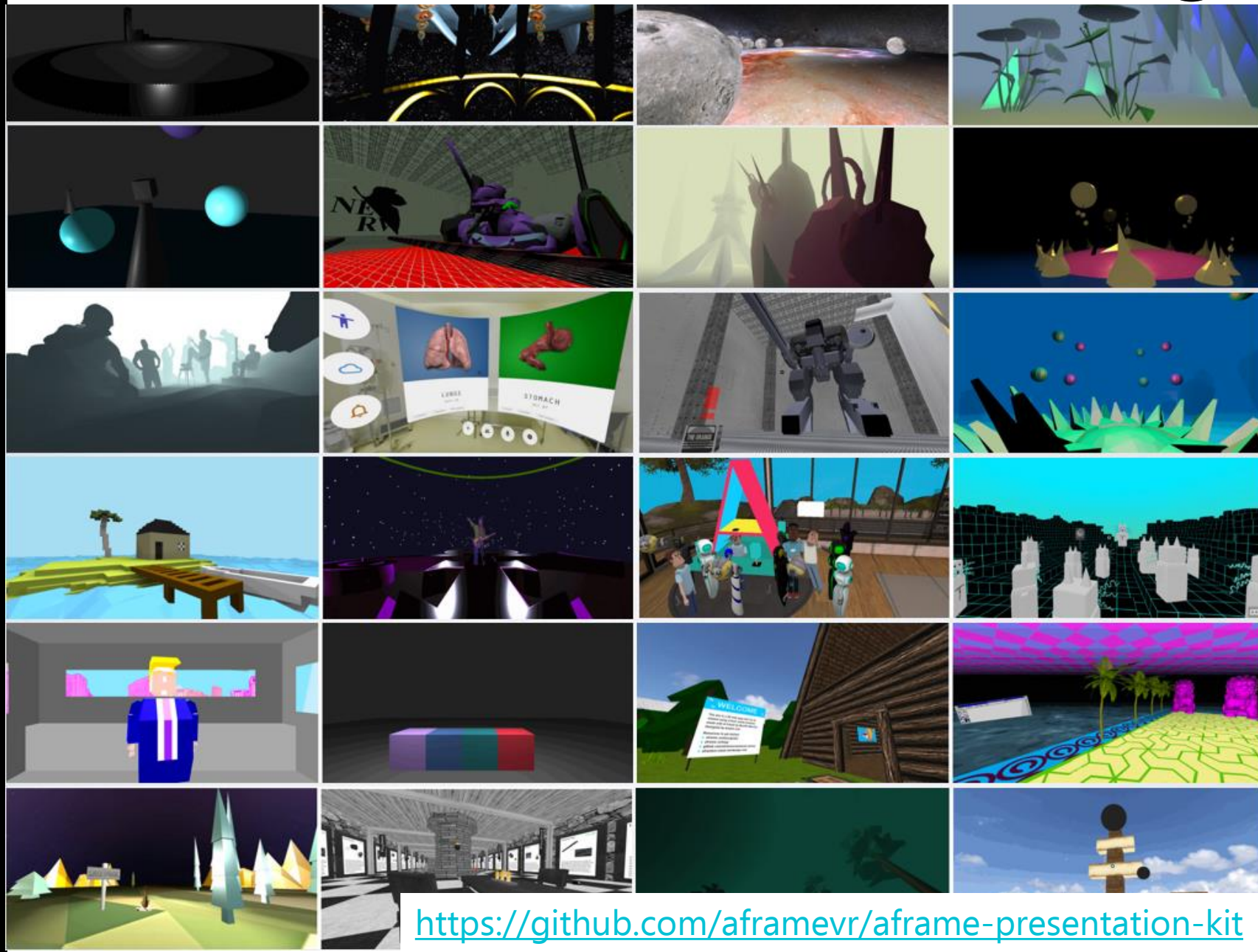


# A-Frame

- WebVR with HTML
- MIT licence
- JavaScript
- based on Three.js (WebGL)

[aframe.io](http://aframe.io)

developed by:  
Diego Marcos  
Don McCurdy  
Kevin Ngo

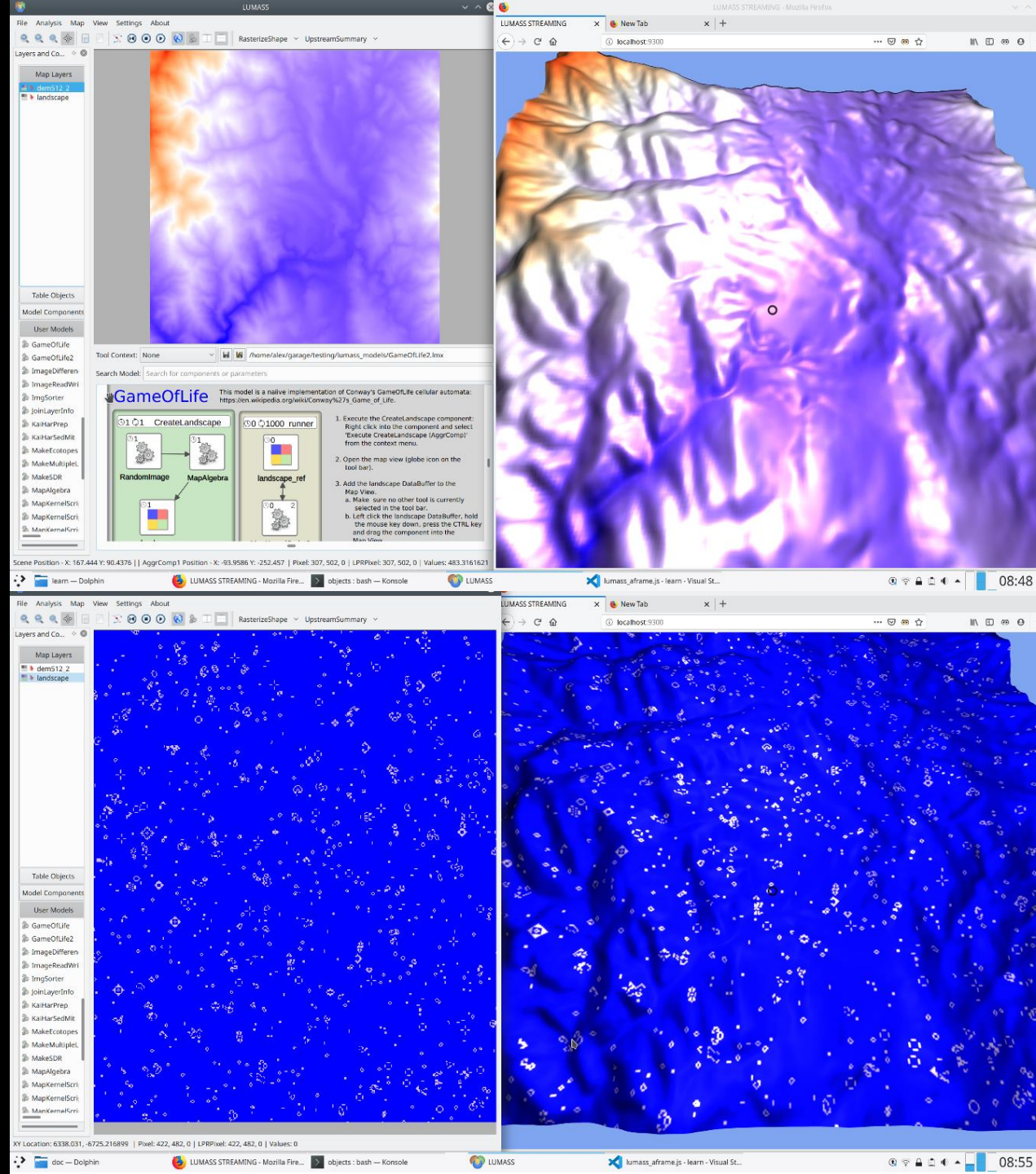


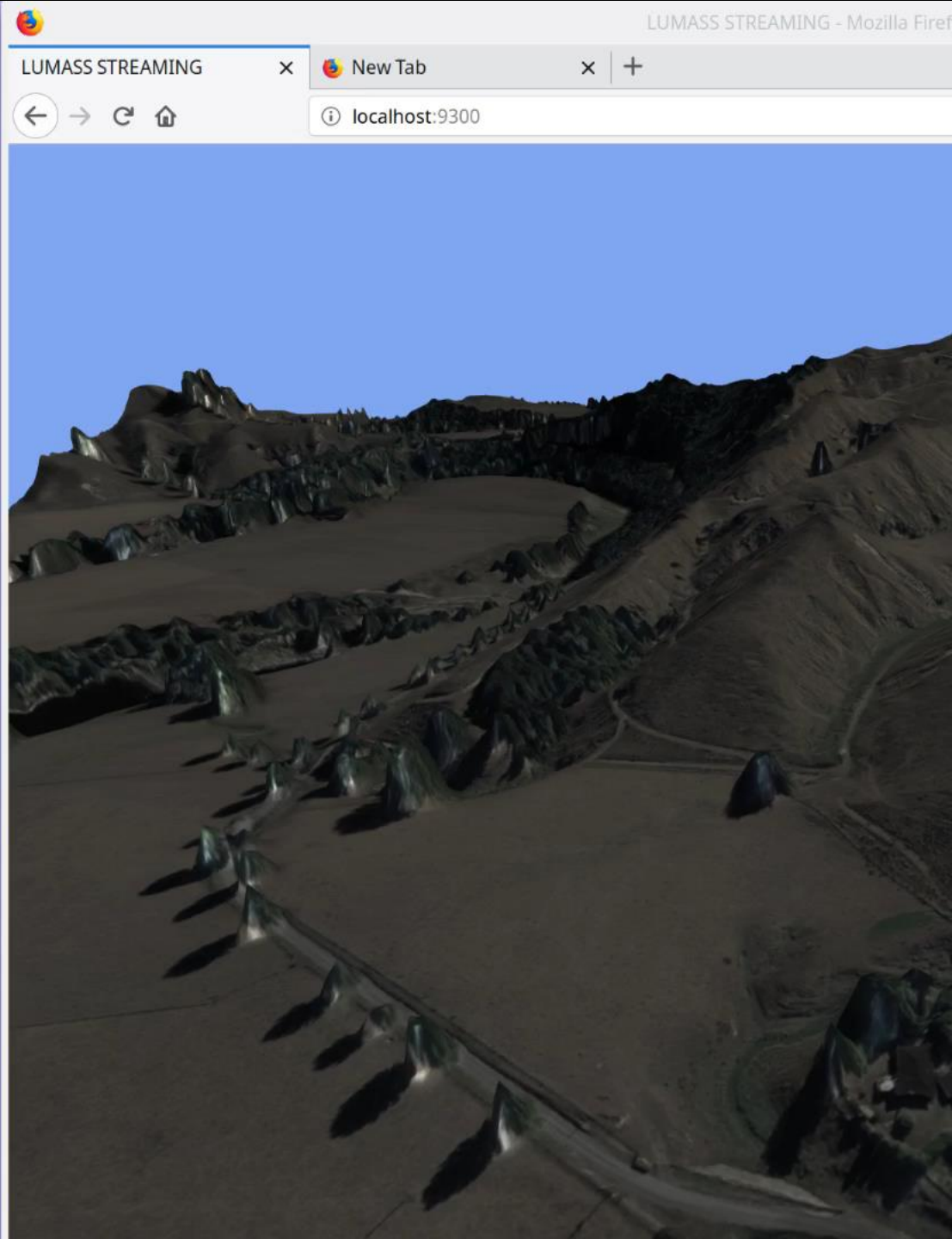
<https://github.com/aframevr/aframe-presentation-kit>



# Streaming Geodata into VR

- WebSocket API
- Qt C++ (server) and JavaScript (client)
- RGBA stream incl. small header







# Spatial Optimisation 101

Tues Nov 12

09:00 – 12:30

Beginner level

\$100 Registration Fee

- SO problems
- What data for SO
- Data preparation
- SO with LUMASS

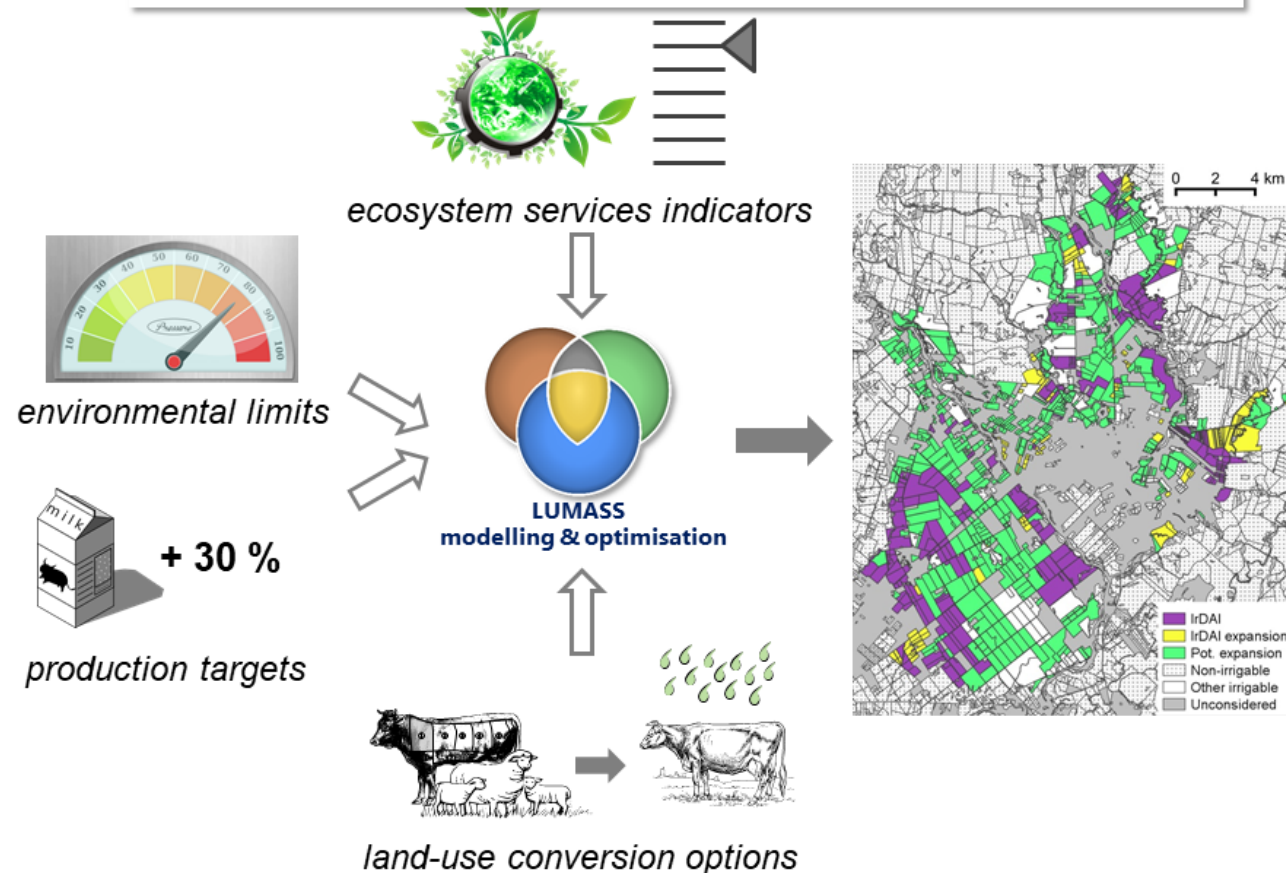
## HANDS ON!



# FOSS4G SOTM OCEANIA

WELLINGTON  
NEW ZEALAND  
NOV 12-15 2019

### Multi-Objective Spatial Optimisation Framework



➤ Exploring Limits

➤ Identifying trade-offs

➤ Discovering Potentials



# Next Steps

- Flexibility on server and client side
- User interaction
- Bi-directional communication (remote control)
- Streaming standards: OGC 3D Tiles based on GLTF

# Links



A-Frame <http://aframe.io>

<https://github.com/aframevr/aframe>

LUMASS <https://bitbucket.org/landcareresearch/lumass/wiki/Home>