Utilizing AI for Flood Risk Management

The value of domain knowledge

and quality data

Nelen & Schuurmans

13-7-2023

"In fact, the business plans of the next 10,000 startups are easy to forecast: *Take X and add AI.*" (2014)

Not AI but domain knowledge is what sets you apart from the rest

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Why it's time for 'data-centric artificial intelligence'

AI and Extreme Events

PRO:

› AI is scalable in size and speed, utalizes big data and new (IT) science.

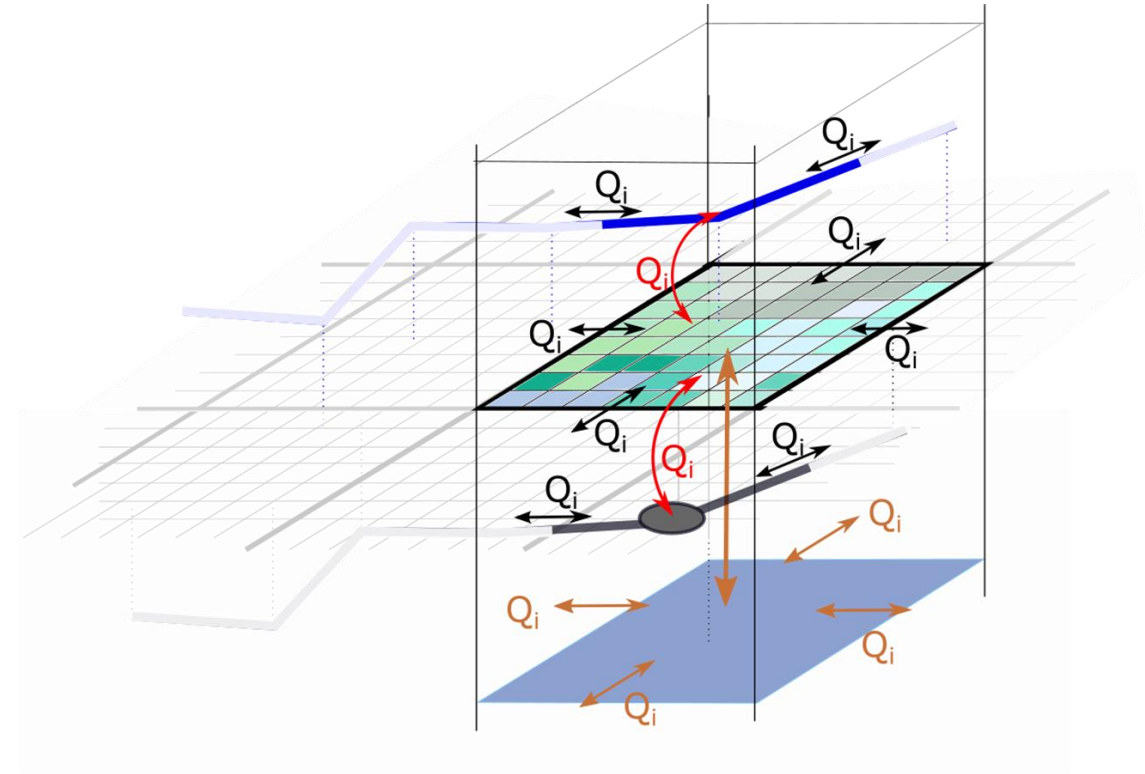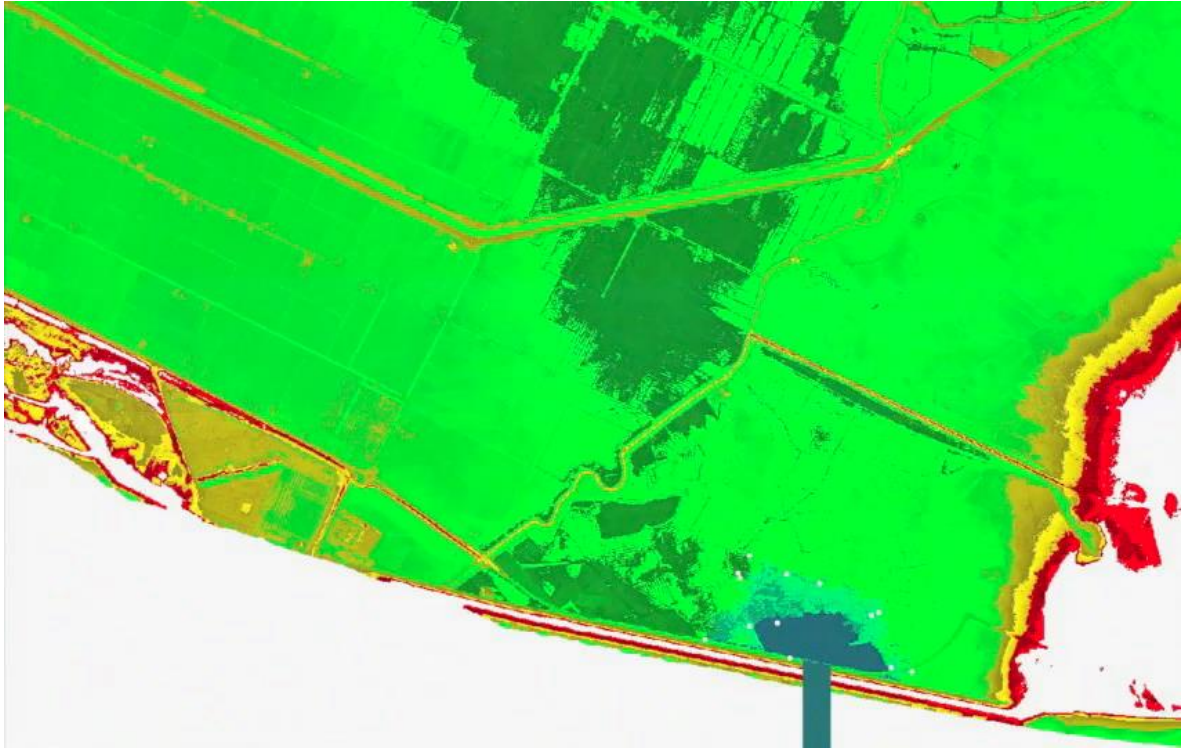Challenge:

› Extreme weather and climate change is uncertain by default.

# The behaviour of water = Physics

Physical based numerical models (cons)

› Are generally slow, offline and based on traditional computing concepts from 2nd half 20th century.
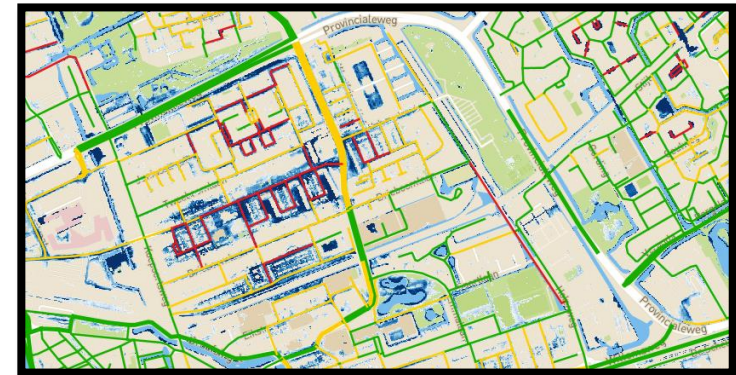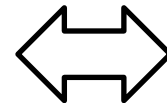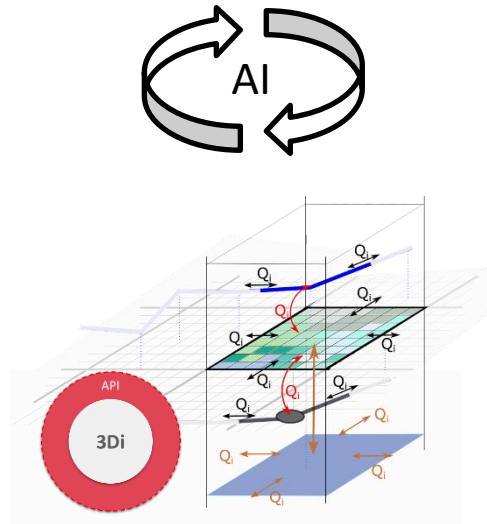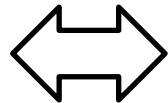
› Have complex parameterisation (calibration, validation)

AI – *Combining the best of both worlds*

› We solved the challenges and created numerical model instrument for 21st century.

  › We solved the **scalability, connectivity and interactivity**

    › **Connectivity to other applications <u>and</u> 21st century AI driven tools**
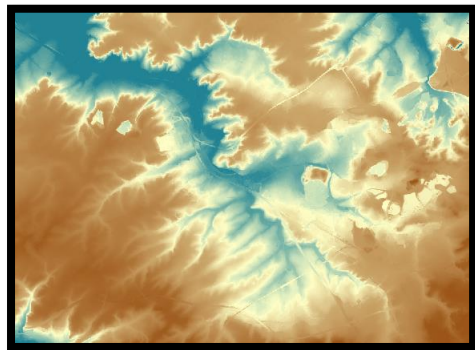
AI

AI

Example projects in Pakistan

› Climate Innovation Challenge: Slamdam

› Recharge Pakistan: Eco-system based adaptation
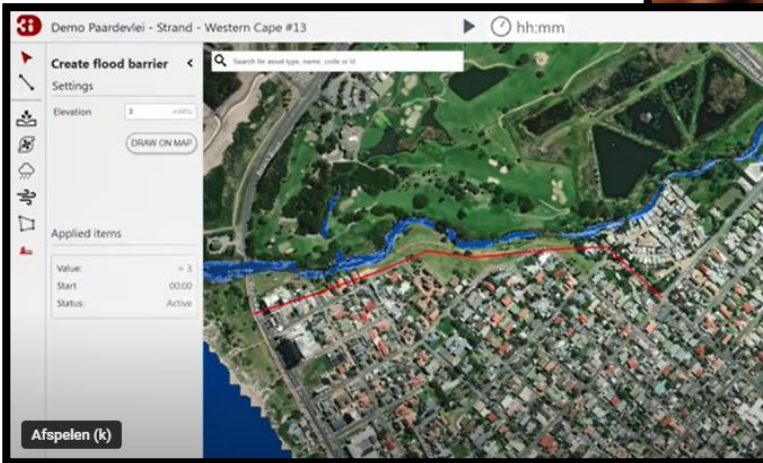
Climate Innovation Challenge in Gilgit Baltistan
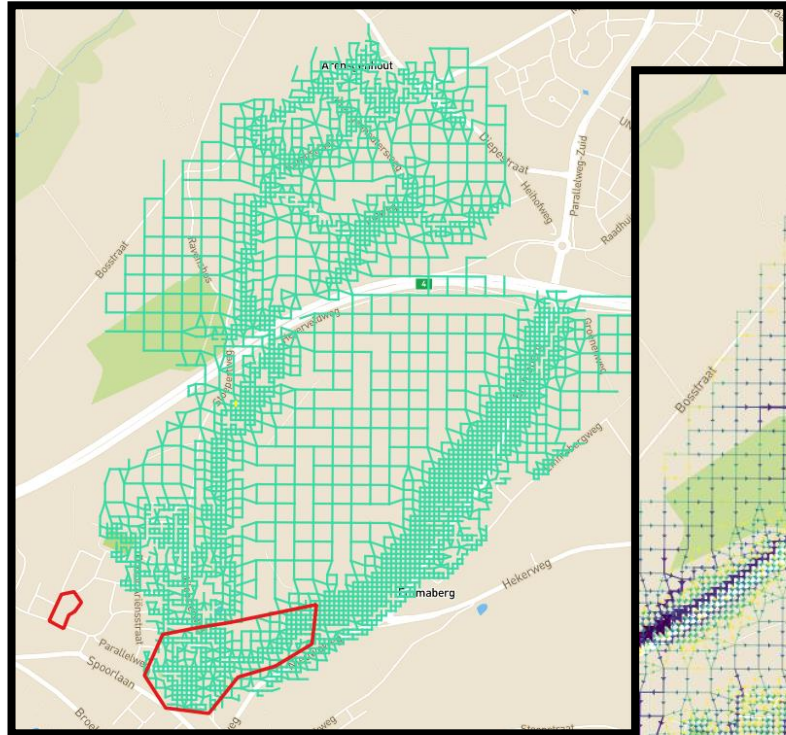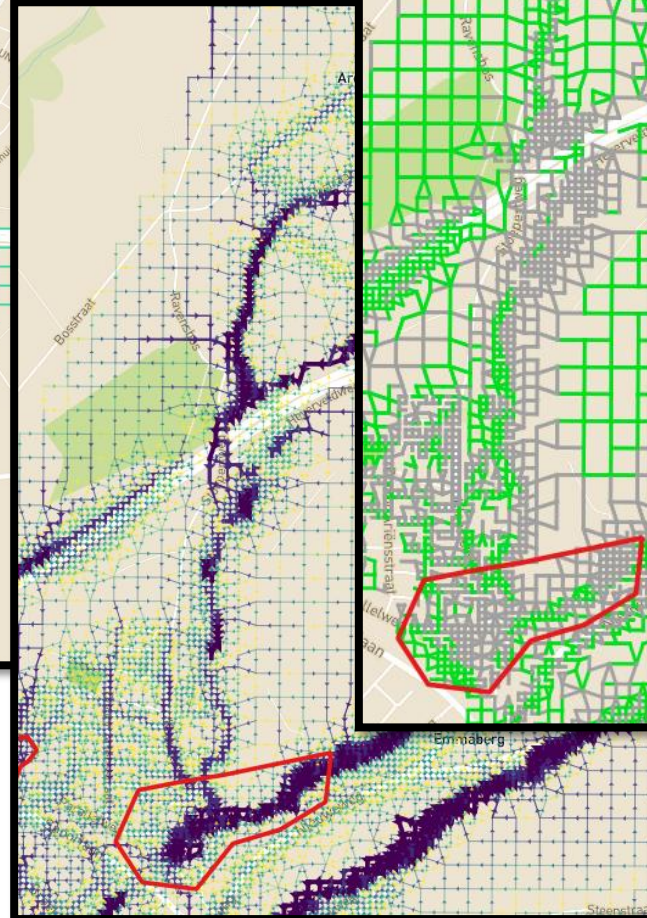
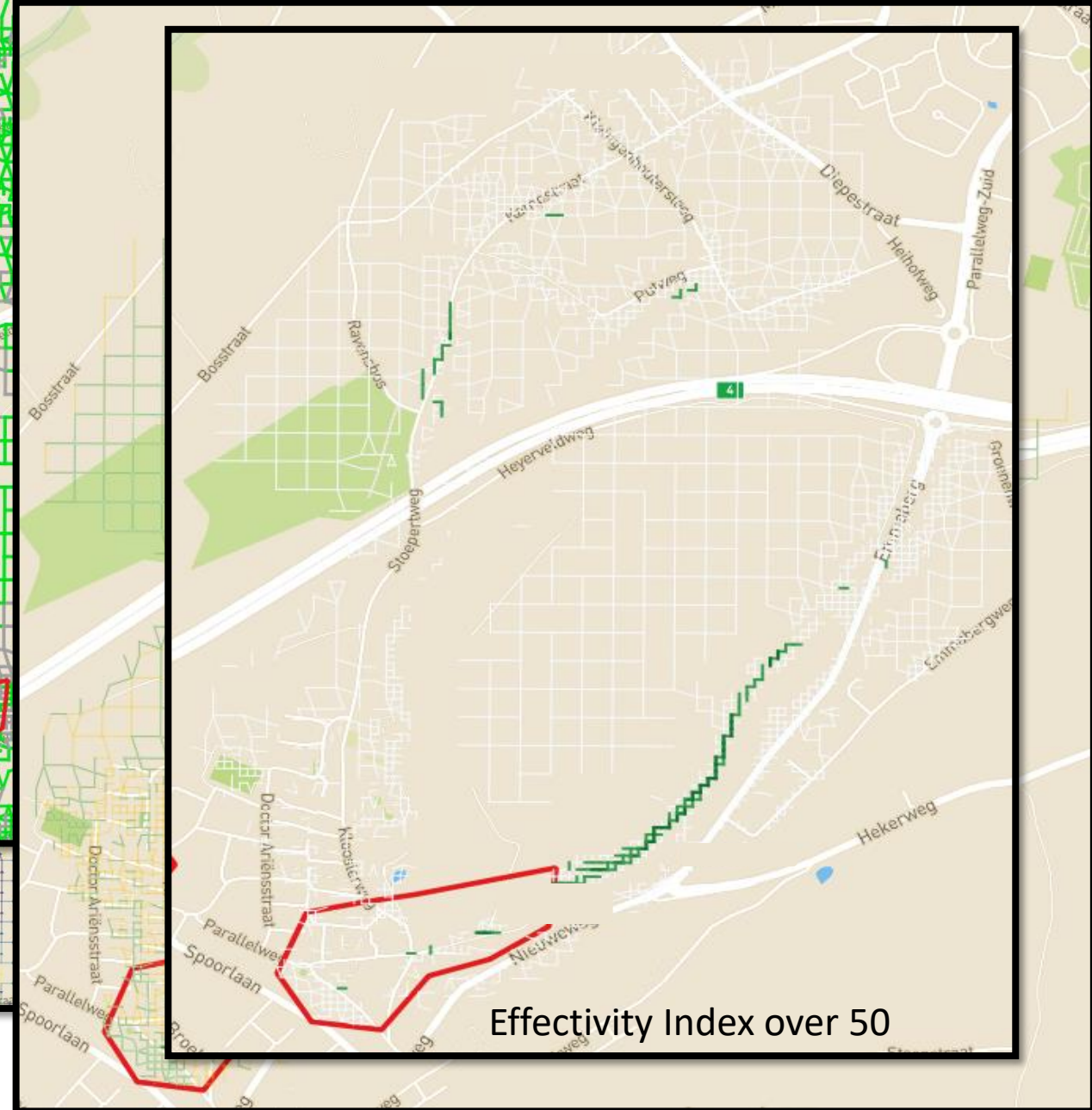# SLAMDAM Intelligence

Computer says ...

Suitability
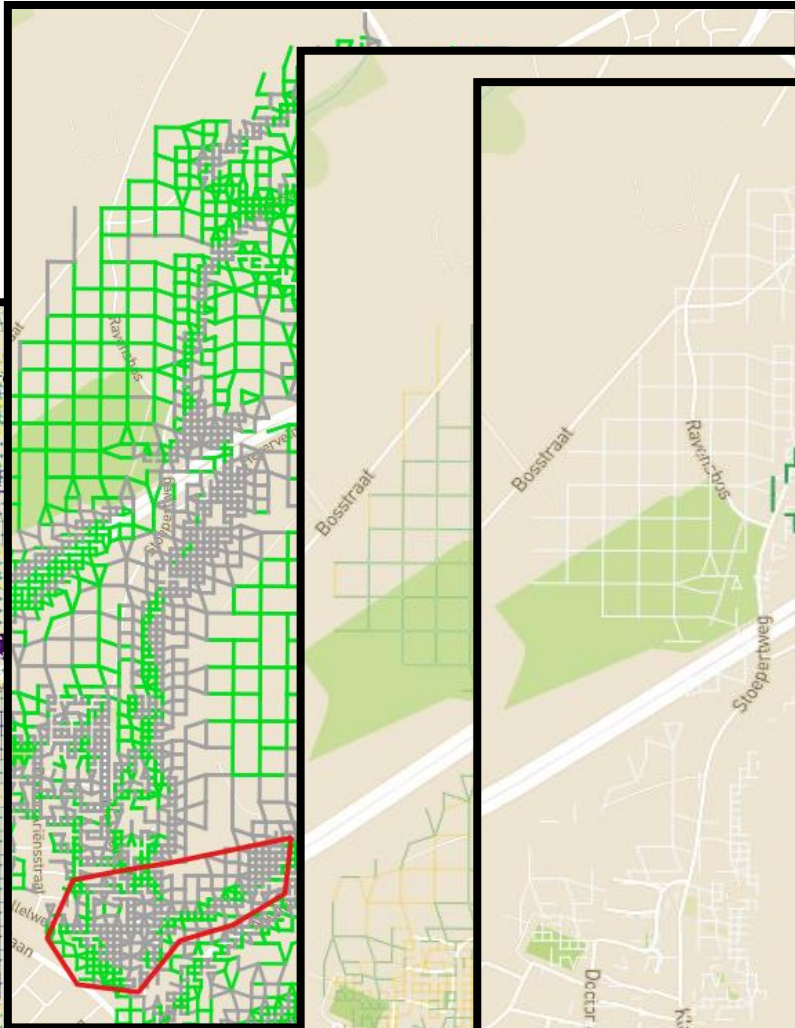
Effectivity Index

Upstream Watershed

Cumulative Discharge

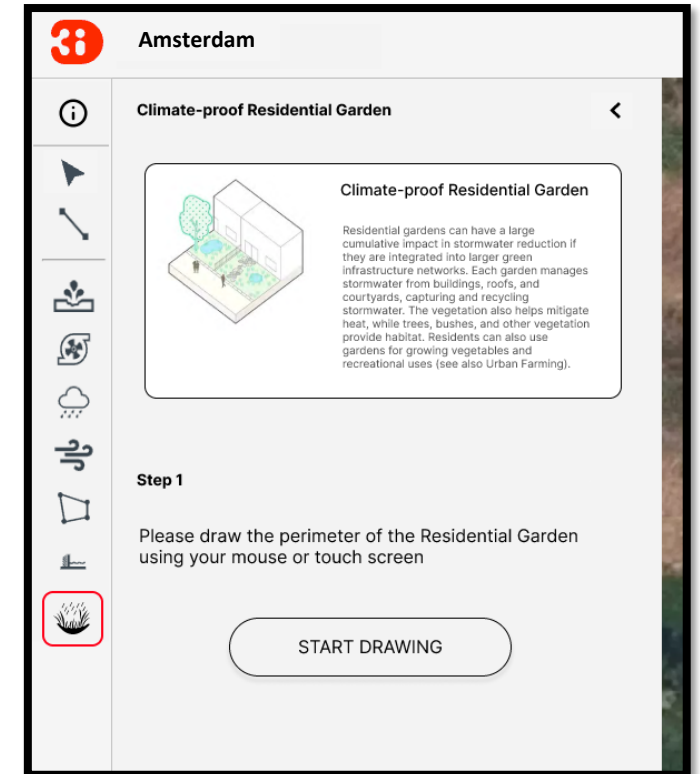Effectivity Index over 50
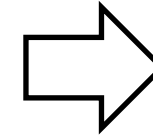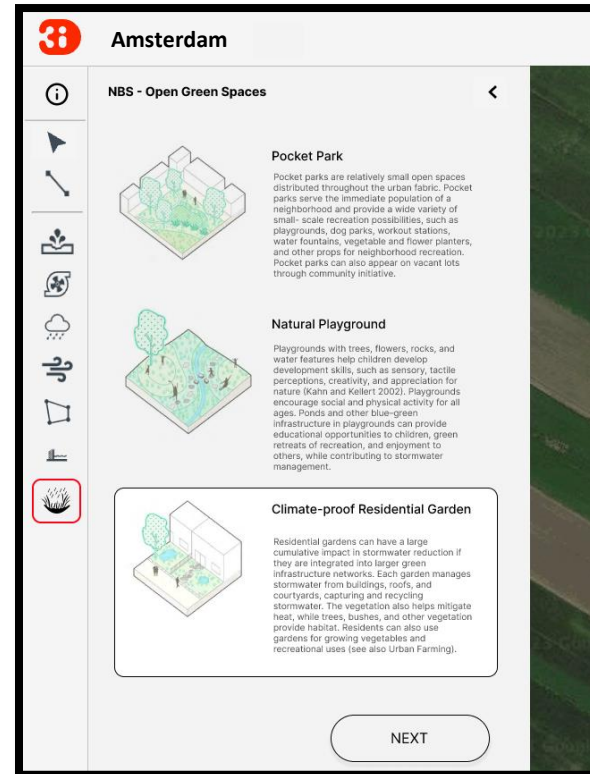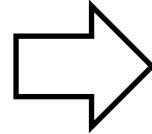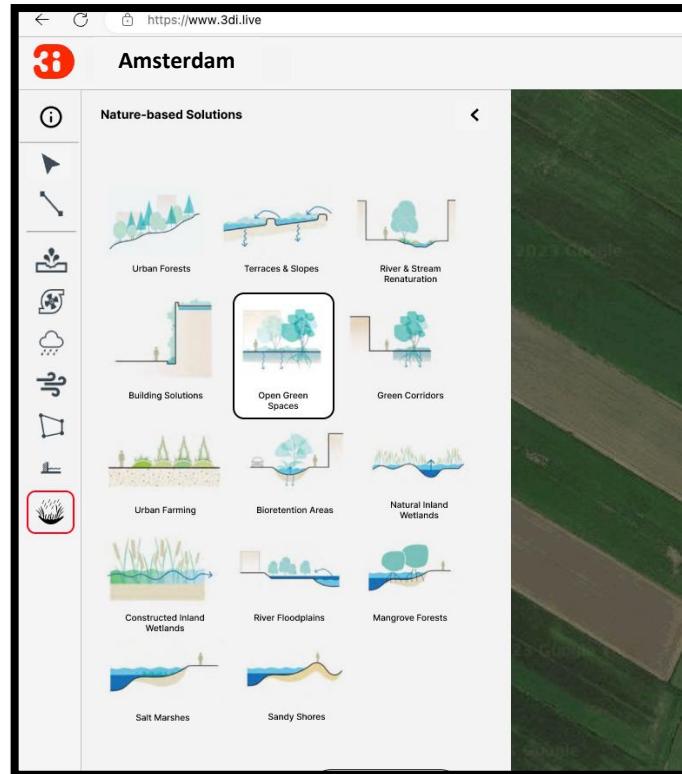
Recharge Pakistan – Nature-Based Solutions

"The hydrological modelling of Nelen & Schuurmans has shown us the impact that our intended Green Infrastructure (GI) interventions have on reducing climate induced flood risks throughout the Indus River Basin."

› Masood Arshad PhD, Senior Director, Footprint, WWF-Pakistan

Maximum water depth EbA scenario
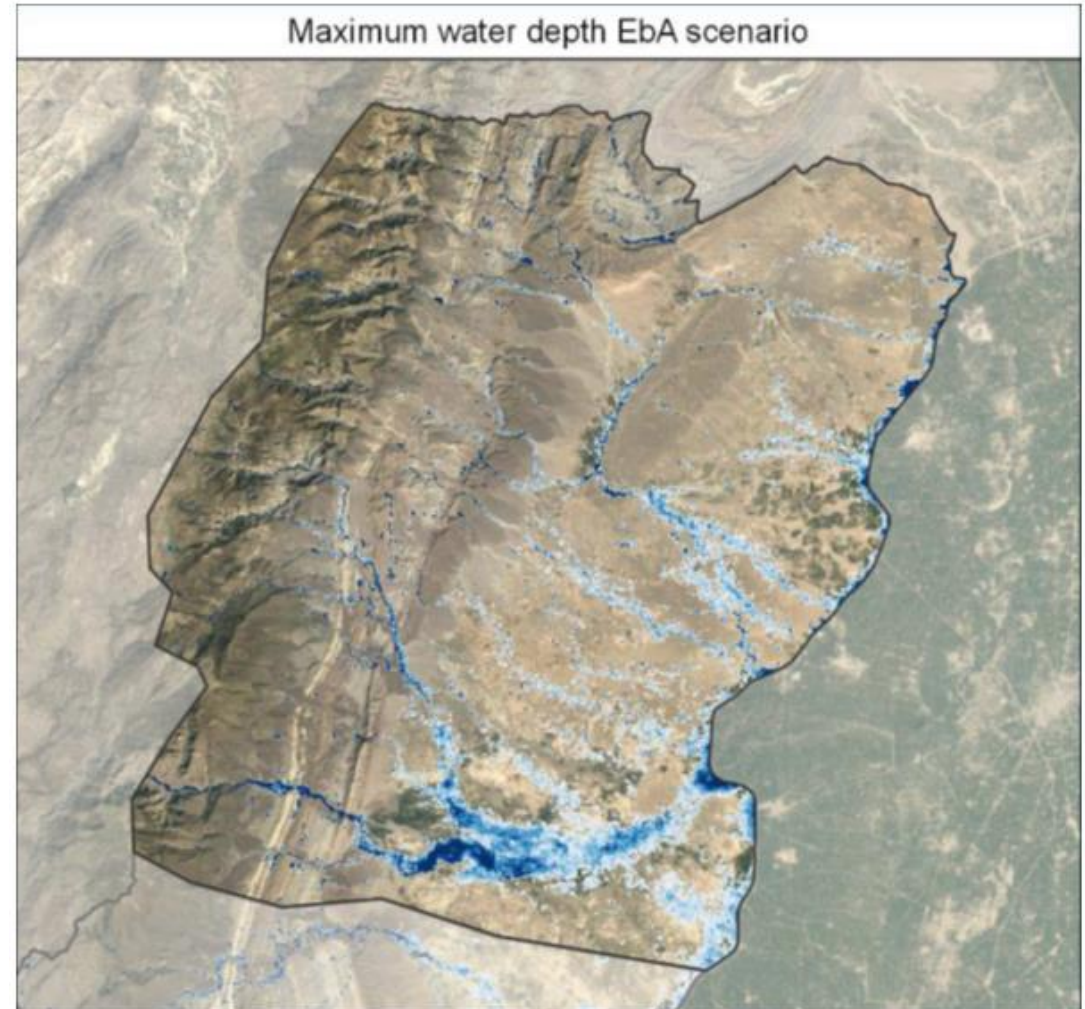
Nature-Based Solutions (1/2)

Based on: Catalogue of Nature-Based Solutions for Urban Resilience (World Bank)
https://openknowledge.worldbank.org/entities/publication/c33e226c-2fbb-5e11-8c21-7b711ecbc725

Nature-Based Solutions (2/2)
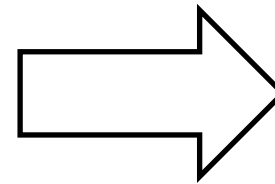
Run Hydrodynamic Scenario

AI driven optioneering and designing?

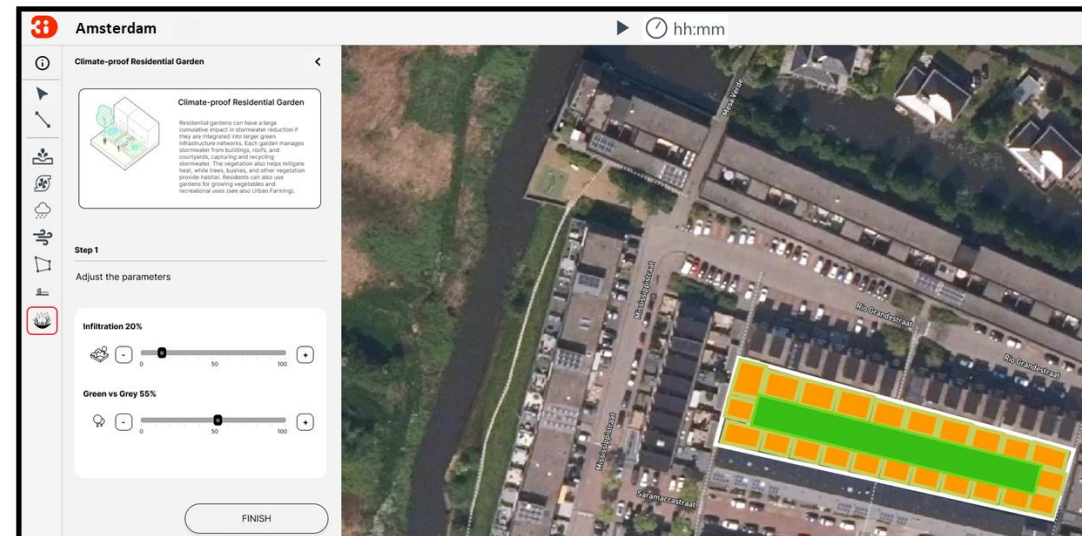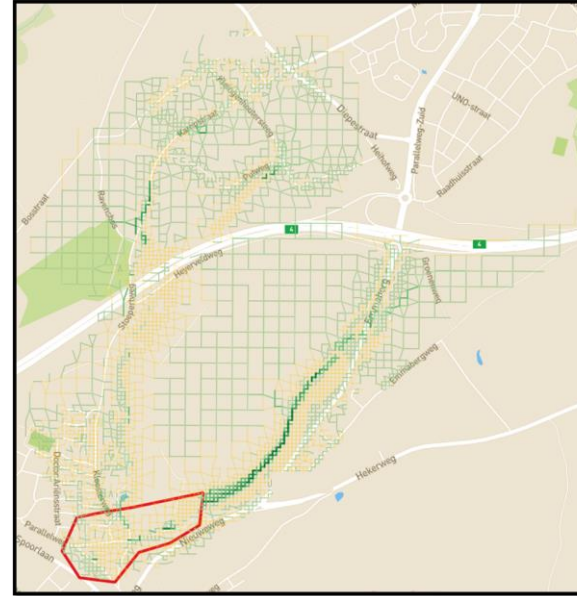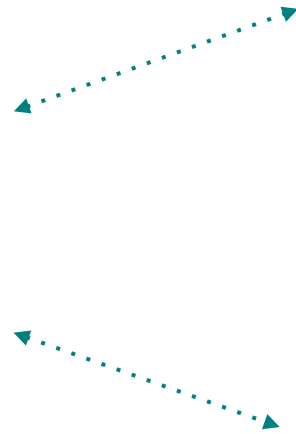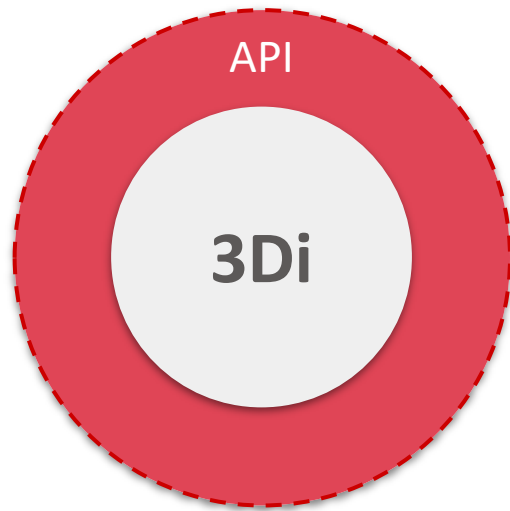Not AI but domain knowledge is what sets you apart from the rest

IDEAS MADE TO MATTER | ARTIFICIAL INTELLIGENCE

Why it's time for 'data-centric artificial intelligence'

Sources:
https://www.wevolver.com/article/not-ai-but-domain-knowledge-is-what-sets-you-apart-from-the-rest
https://mitsloan.mit.edu/ideas-made-to-matter/why-its-time-data-centric-artificial-intelligence

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