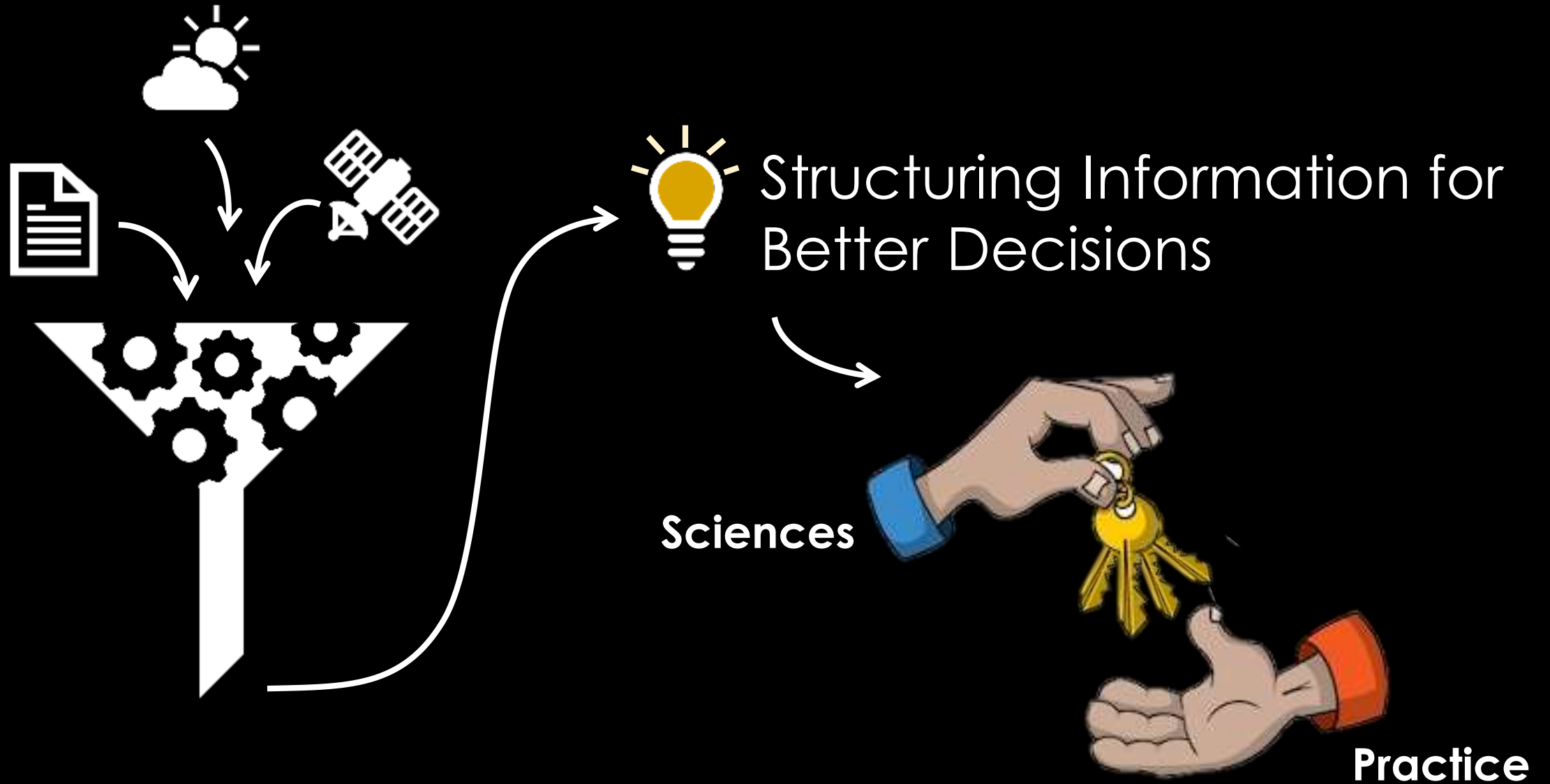# Leveraging Environmental Data and Models with Web-based Decision Support Systems (DSSs)

A case study of DSS application for groundwater management in Guantao, China

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Decision Support Systems

Structuring Information for Better Decisions

Sciences

Practice

Study Region

Hebei Province

China

Handan City

Guantao County

Over pumping problem
caused by double cropping

Water Consumption:

400 – 450 mm

300 – 400 mm

—

Average annual rainfall:

450 – 550 mm
(mainly in summer)

Average irrigation required:

200 – 400 mm
(mainly for winter wheat)

Design Guideline

Target User
(local water manager)

- main jobs in water planning and water fee collections;
- little experience in using GIS, modeling software;

Friendly UI

- Few buttons
- Intuitive visualization

Easy Maintainability

- Open-source packages
- Module design
- Portability and scalability

Simplified Workflow

- Automated data processing
- Automated assessment
- Decision support
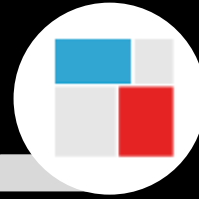
Free and Open Source Based Approach
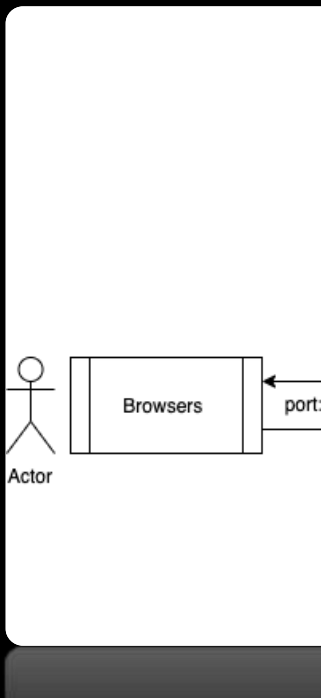

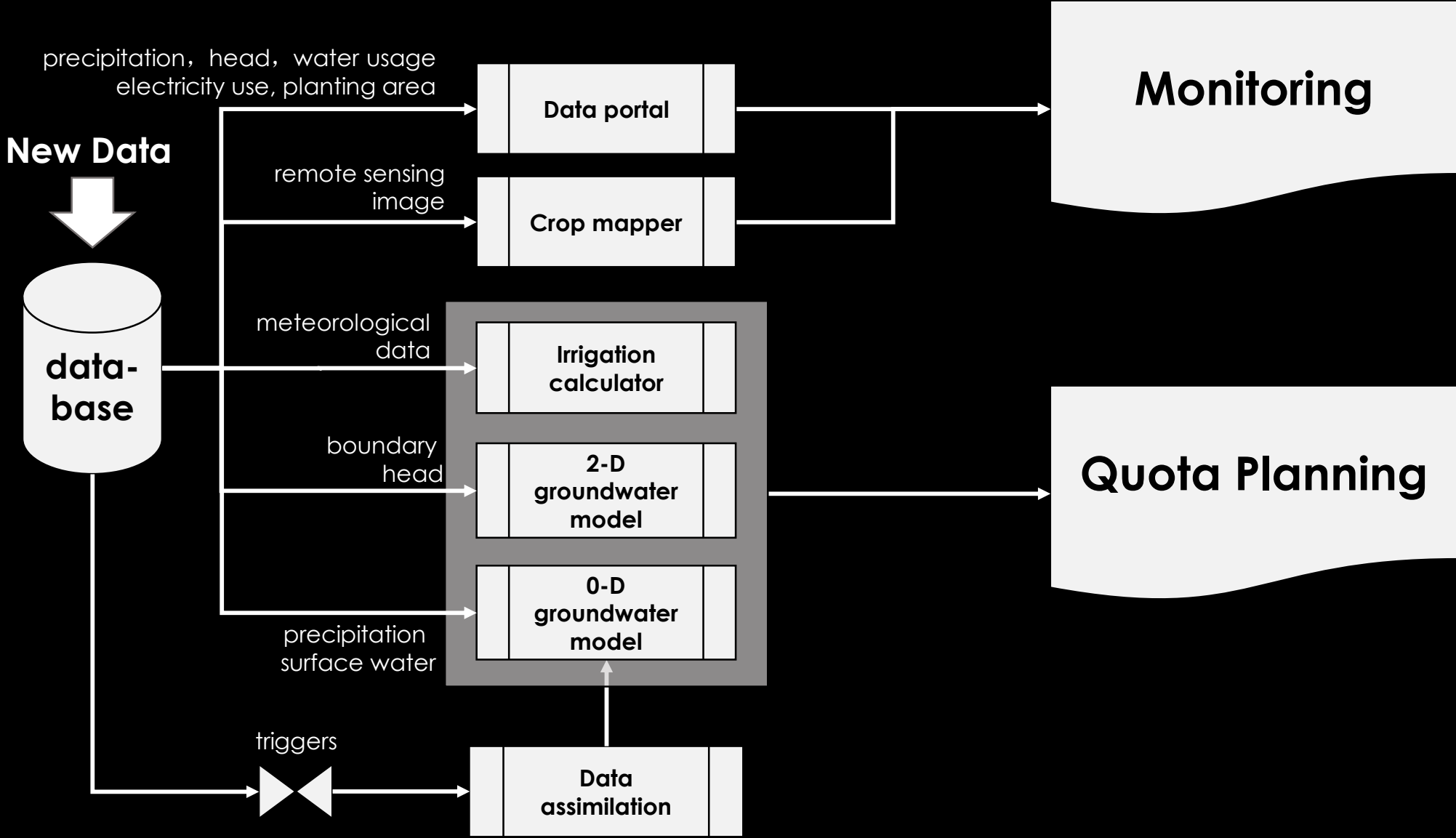R Shiny   Docker   D3.js   shinyproxy   nginx

all-in-one pack

- **Development**

- **Deployment**

Li, Y., 2020. Towards fast prototyping of cloud-based environmental decision support systems for environmental scientists using R Shiny and Docker. Environmental Modelling & Software 132, 104797. https://doi.org/10.1016/j.envsoft.2020.104797
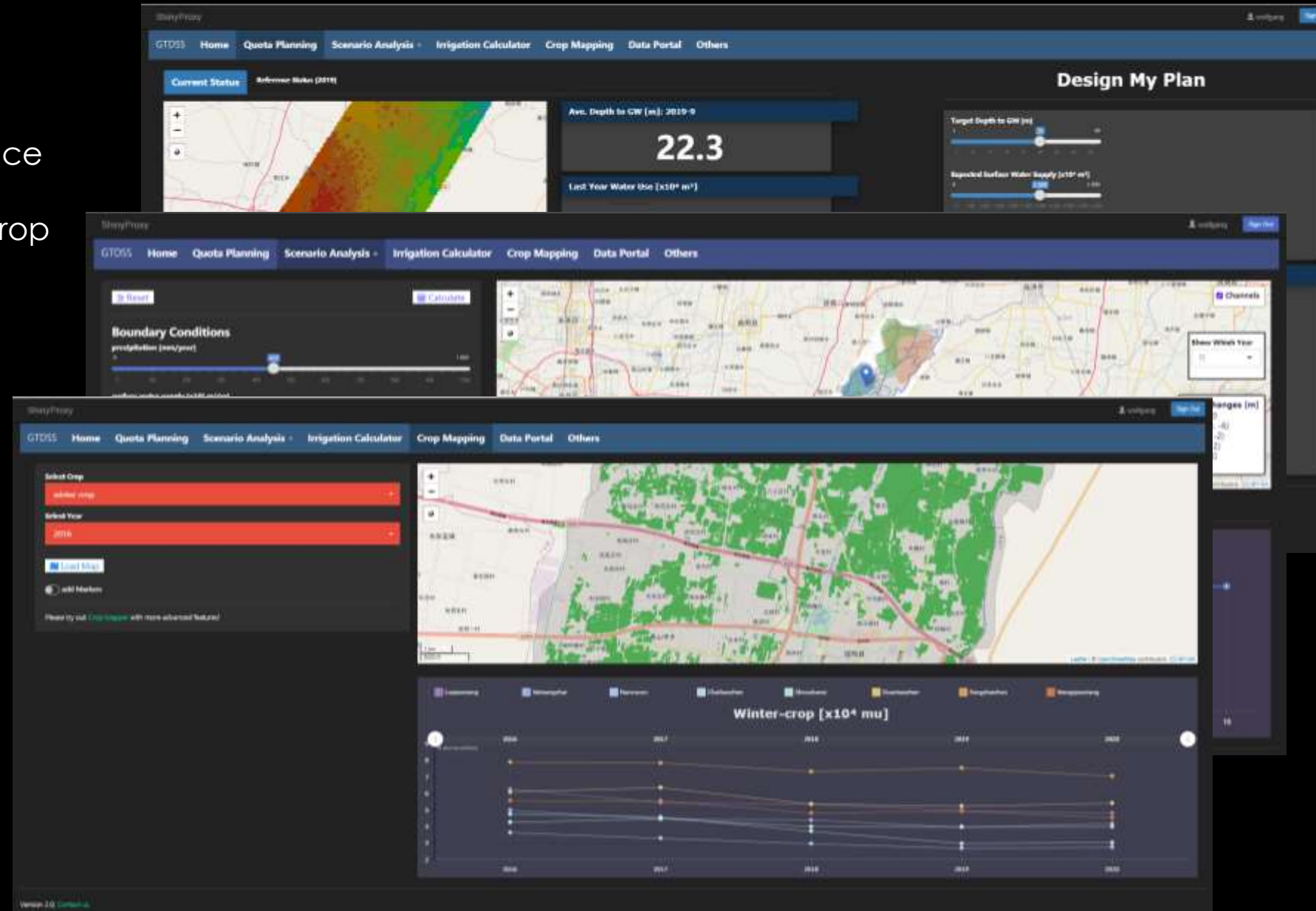
Integration of Different Modules

Annual Water Allocation Planning with the DSS

Iteratively:

- Set GW-level goal;
- Set probable import of surface water;
- Obtain fallowing of winter crop needed;

- Obtain GW-balance;
- See probable outcome for next season;

- Check whether subsidized fallowing was carried out last season;

Conclusions

- A DSS is useful for consolidating research tools and facilitating water resources management. Examples can be seen from our Guantao DSS.

- Co-designing with target users is important to achieve a DSS that can balance usability and technicality.

- Free and open source software nowadays allows researchers to achieve a full-fledged web application with much less effort than before and ready for cloud context.

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