

Meeting the Challenges of Operational Flood Forecasting in Alberta



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Environment and Parks
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Outline

Background

Challenges Data
Forecast production
Effective forecasts
Administration

Looking Forward

Discussion

Background

Challenges of Operational River Forecasting

Thomas C. Pagano, et. al.

Journal of Hydrometeorology, Volume 15, August 2014

Pagano – Four Challenges

- Making the most of data
- Getting the numbers right
- Turning forecasts into effective numbers
- Administering an operational service



Challenge 1 – Making the most of the data

Hydrological data are sensitive and not freely distributed.

<https://rivers.alberta.ca/>

Transparency creates it's own issues

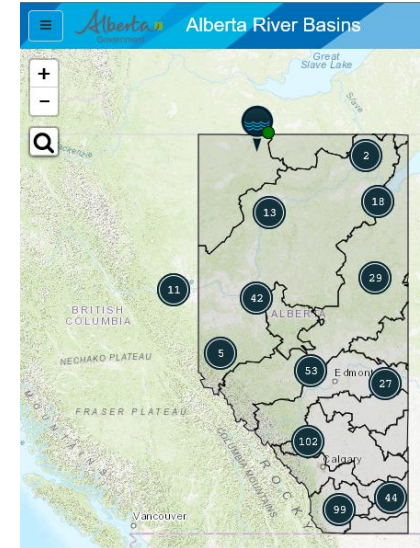
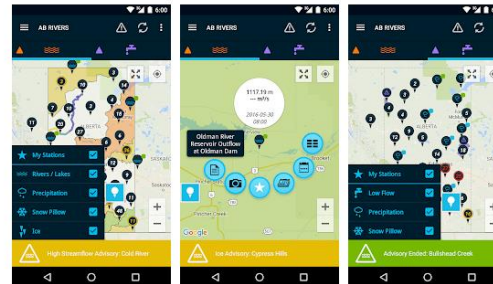


Alberta Rivers

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Everyone

This app is compatible with your device.



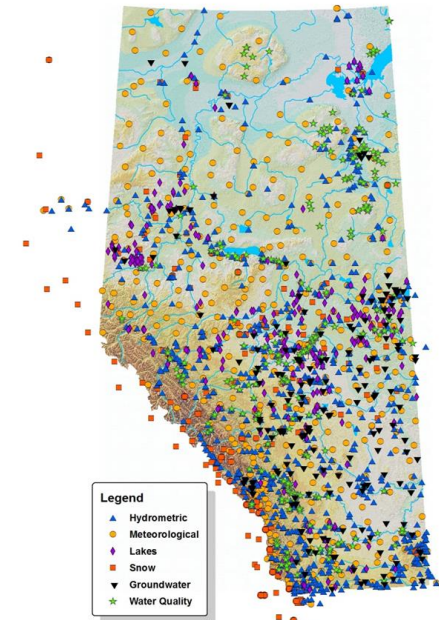
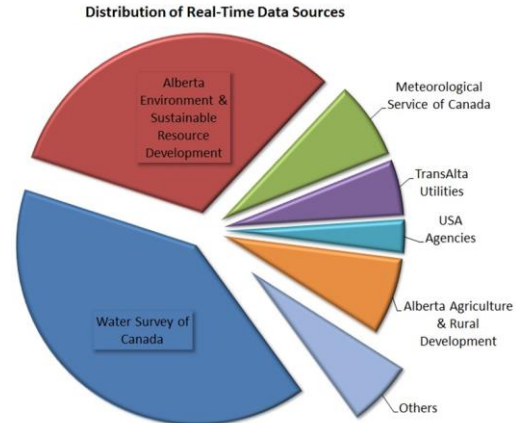
Challenge 1 – Making the most of the data

Data collection is fragmented across many agencies.

AMERA, EMSD, WSC, MSC, NOAA, TAU

Monitoring Management Team (MMT)

Good relations and technology



Challenge 1 – Making the most of the data

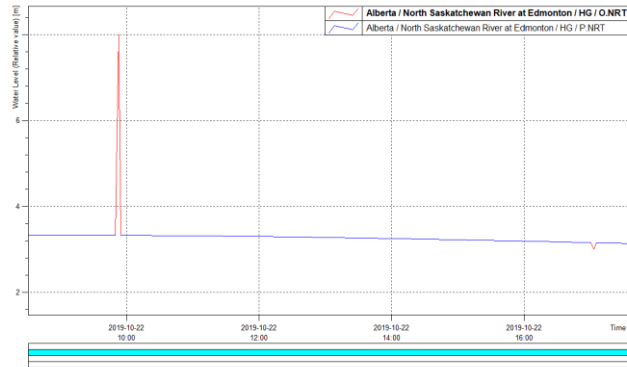
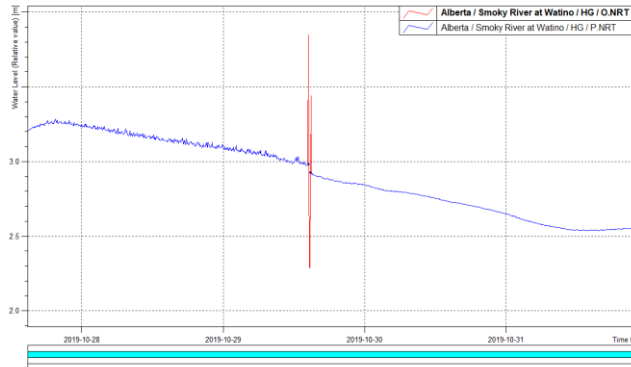
Quality control is a time-consuming manual process.

Daily full time task

Seasonal startup and shutdown

Users are data junkies: they have withdrawal

Open water vs ice



Challenge 1 – Making the most of the data

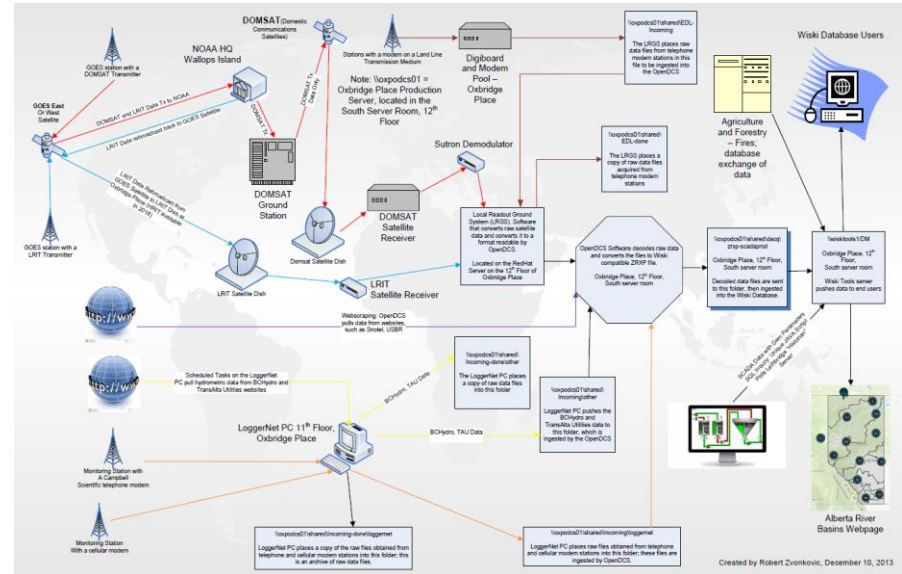
Automated data assimilation is underutilized.

Implementation is not simple

WISKI database

Delft-FEWS platform

WSC CDP early 2020



Challenge 1 – Making the most of the data

In situ data networks are deteriorating.

Agreement on Hydrometric Monitoring

Financial pressure

Cableway issue: high discharge measurements

Capacity of WSC Engineering Services



Challenge 2 – Getting the numbers right

Rainfall-runoff models are simple and decades old.

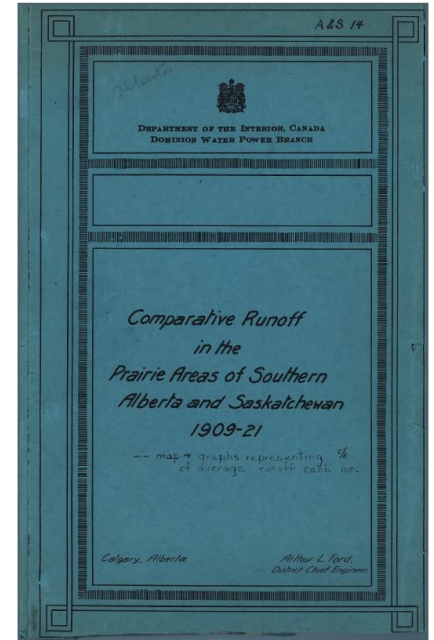
AEP uses SSARR

IBM360/50 (1964 - 1977) era

Has been modified

SSARR is fast!

So simple can be good



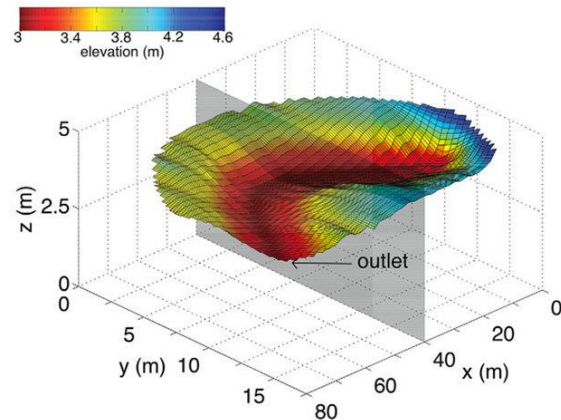
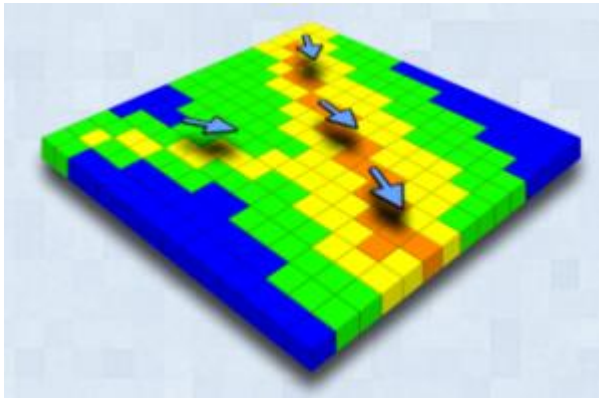
Challenge 2 – Getting the numbers right

Model development has not been significant.

Everybody has a model

RFC review compiled 47 – 16 – 8 models

40 to 5 years of maturity

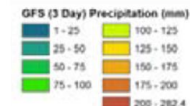
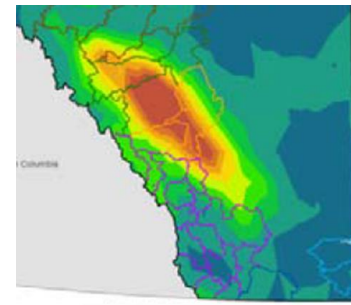
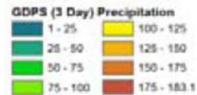
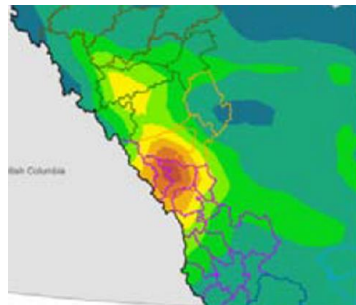
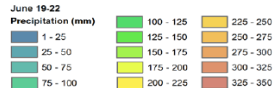
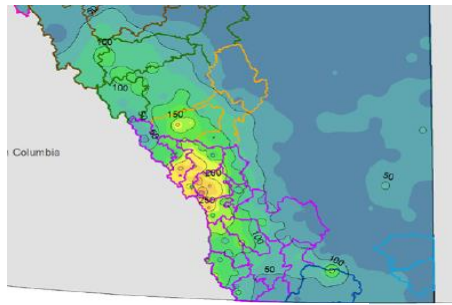


Challenge 2 – Getting the numbers right

Skill depends strongly on adequate precipitation forecasts.

Precipitation forecast is everything!

Lead time & agreement, model runs

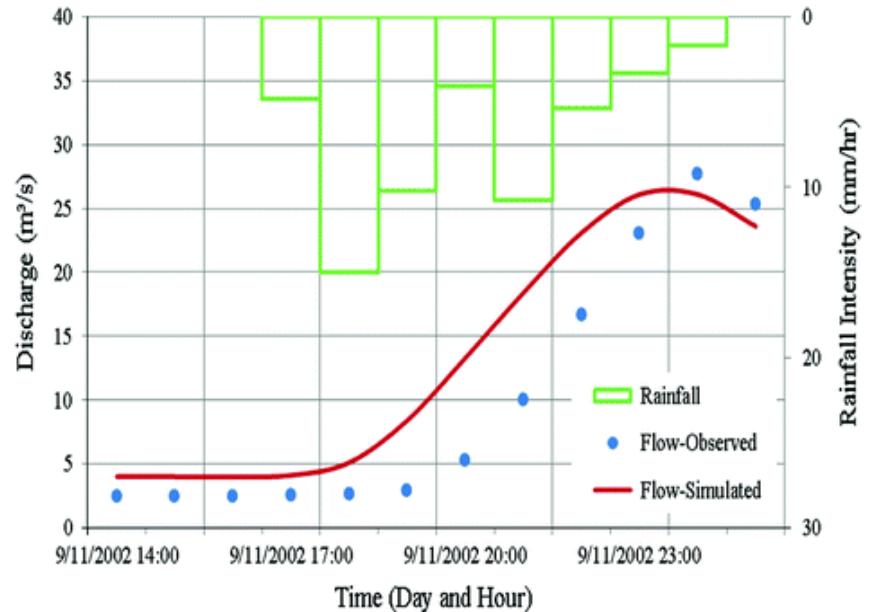


Challenge 2 – Getting the numbers right

Many important processes are not modeled or are unmodelable.

Precipitation is not continuous

How detailed do we need to be?



Challenge 3 – Turning forecasts into effective numbers

In less-developed countries, warning distribution is slow and difficult.

Pre 2014/2016

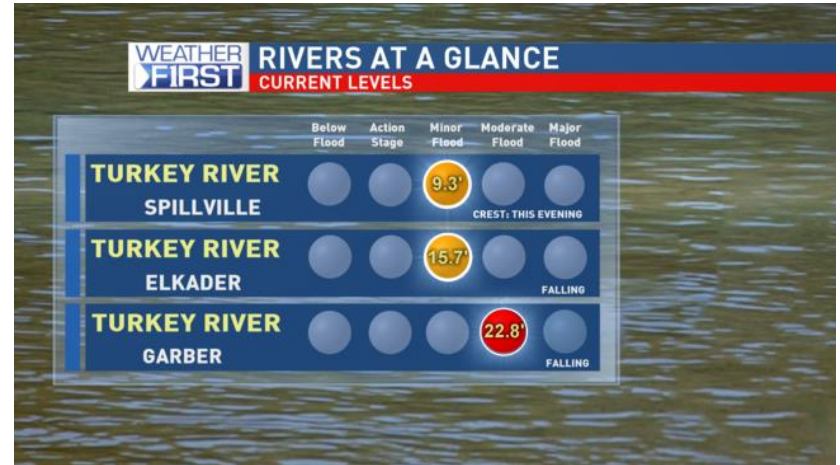
Faxes, phone calls

2014/2016

Apps

Emergency manager portal

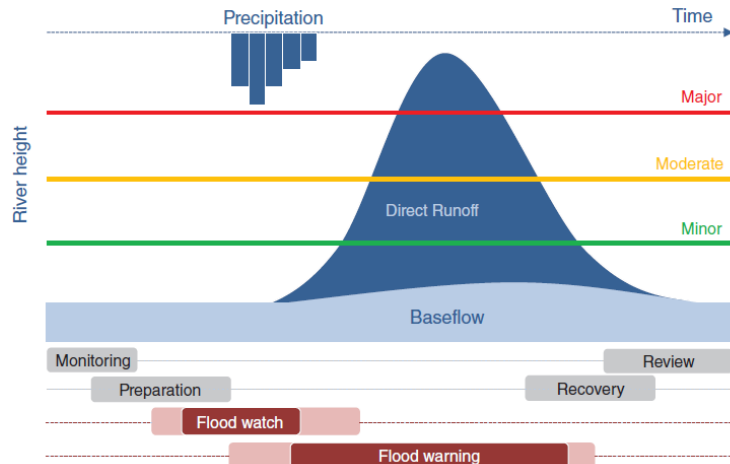
Media does not want press releases



Challenge 3 – Turning forecasts into effective numbers

Relevant warnings require local context and knowledge of community vulnerability.

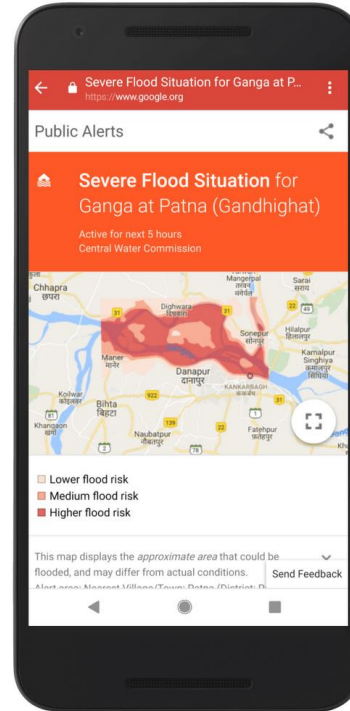
Flood Notification Manual
Community Information Sheets



Challenge 3 – Turning forecasts into effective numbers

Users have diverse needs and technical sophistication.

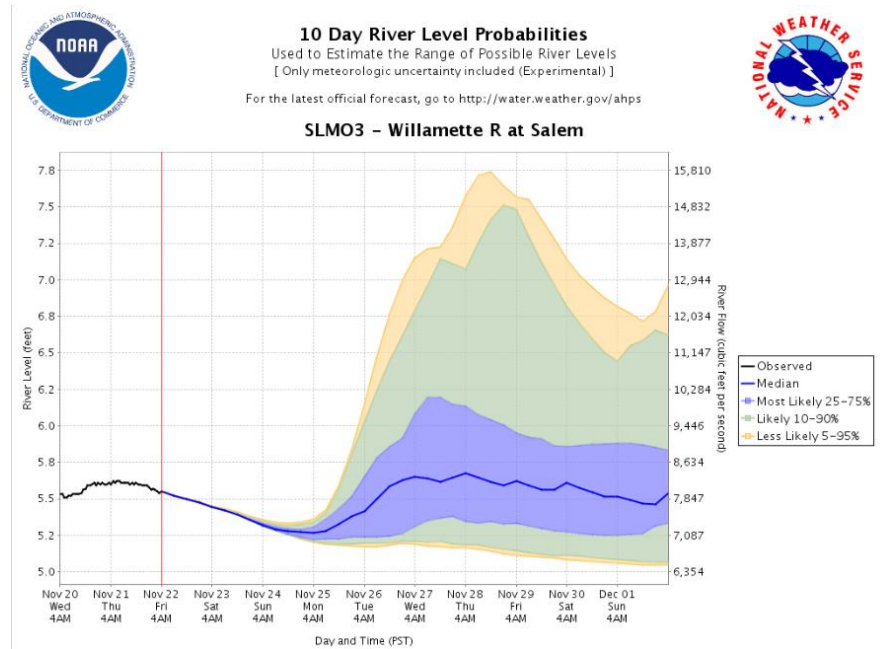
They will find products
that meet their needs
Is the RFC the only source?



Challenge 3 – Turning forecasts into effective numbers

Users are unfamiliar with probabilistic and ensemble forecasts.

Understand a “likely range”
Context is RFC’s job



Challenge 4 – Administering an operational service

Forecasters are reluctant to take risks for fear of liability.

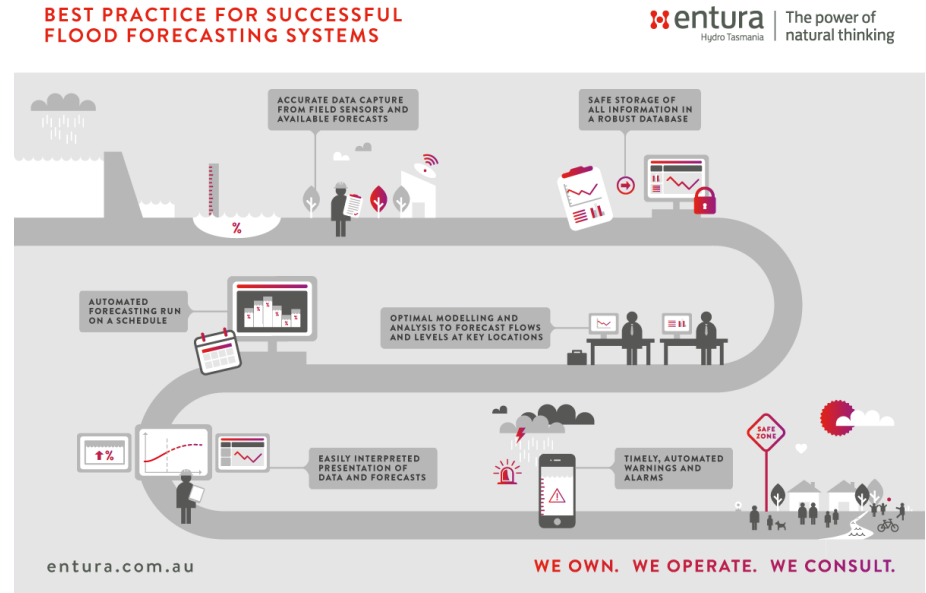
Liability

What is the risk?

Wanting to get it right

Actionable information out

Time is of the essence



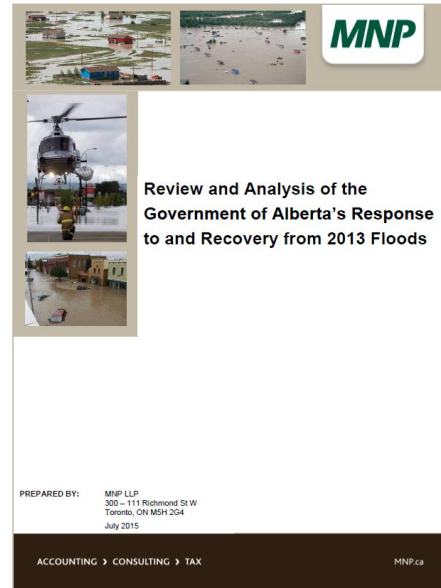
Challenge 4 – Administering an operational service

Floods can be controversial because rivers are managed by people.

Best data at the time

Loss, emotion

Denial, anger, blame



Challenge 4 – Administering an operational service

Less-developed countries face brain drain.

True at a few levels

Public service vs private sector

Desirable locations

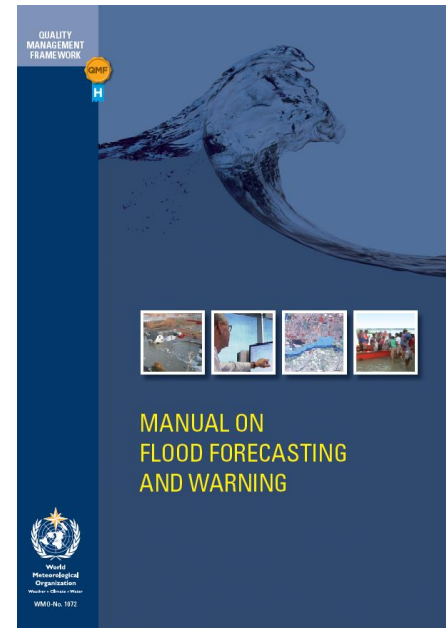
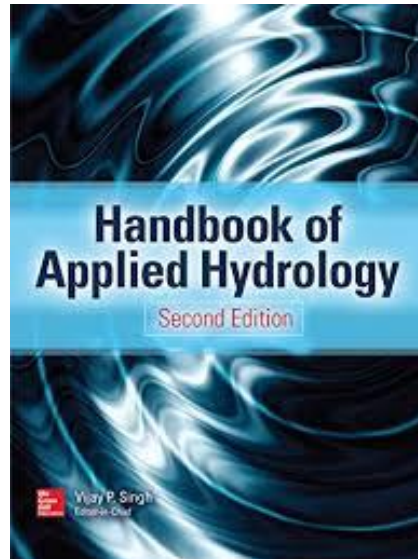
Personal reasons



Challenge 4 – Administering an operational service

There is a lack of standards in training hydrologists.

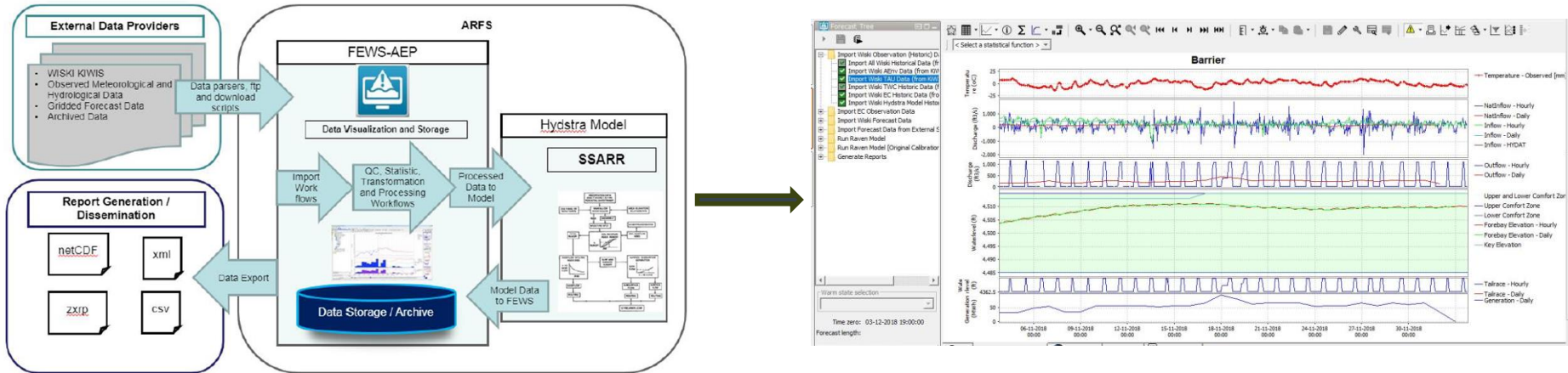
Engineering vs.
Geography
& Earth Science



Challenge 4 – Administering an operational service

With increasing automation, the role of human forecasters is evolving.

Control automation to a comfortable level



Challenge 4 – Administering an operational service

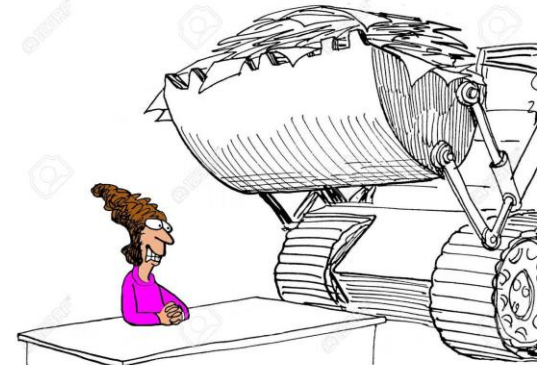
Institutional inertia and processes stifle innovation and response.

Additional to Pagano's challenges

Corporate IT

Financial & procurement requirements

Shifts off-season work



Time for more paperwork.

Looking Forward

Delft-FEWS operational

WSC CDP

MIKE-SHE & UBCWMM builds

Comparison of hydrological models

Discussion

