

Deltares

The Future of Hydrological Forecasting a scenario analysis

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Brief introduction: Nadine Slootjes

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2

Table of contents

- Enabling better real-time decision making
- Scenario analysis "The Future of Hydrological forecasting"
- Lessons learned and vision on the future





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The Future of Hydrological Forecasting

Enabling better real-time decision-making

EDDY M. @ 2012

Right information at the right time

Improving real-time decision-making

Key to success:

- Not just about data, software and hardware
- People, processes and organizational policies ۰ are just as important



6

Structuring data, running models, easy access



Delft-FEWS as platform for operational systems worldwide



- Delft-FEWS provides an open shell system for managing forecasting processes and/or handling time series data.
- Delft-FEWS incorporates a wide range of general data handling utilities, while
- The modular and highly configurable nature of Delft-FEWS allows it to be used effectively for data storage and retrieval tasks, simple forecasting systems and in highly complex systems utilising a full range of modelling techniques.

Community based approach

- International Community Strategy Board ٠
- Community of Practice (approx. 2500) ٠
- Knowledge sharing Delft-FEWS User Days ٠



News		FEWS-NEWS PROJECTS COURSES FAQ DOWNL
th Dataset Octobal Dataset	18 August 2020	27 July 2021
Global water data now easily accessible on the BlueEarth Data platform Read more >	Better precipitation forecasts up to several hours in advance Read more >	Delft-FEWS 2020.01 available Read more >

MANN delft-fews com





Dave Casson | 7 May 2020

2019.02 New Features Webinar Complete The 2019.02 New Features Webinar was an successful community event! We had 259 people from close to 50 countries attended the.



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Scenario Analysis Real-time Hydrological Forecasting

Flood

Scenario analysis report



Jan Verkade Micha Werner Femke Schasfoort Marc Philippart Robert Mureau Hans Stavleu Deltares Deltares, & IHE Delft Deltares Rijkswaterstaat Mureau Risico Weeradvies Curiozy

https://www.deltares.nl/en/blog/the-future-of-realtime-hydrological-forecasting/

Exploration of the future

Typical questions we'd like to see answered:

- Will governments still be forecasting <u>for the general</u> <u>public</u>?
- Will <u>governments</u> still be forecasting for the general public?
- Will forecasting still be based on process models such as rainfall-to-runoff, streamflow propagation, storm surge estimation, etc?
- Who will be the suppliers of forecasting systems?



The world is changing



COVID-19







FUTURE

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The Future of Hydrological Forecasting

The world is changing



Development of scenarios

- Five authors, five scenarios, five days of full-time writing
- Two "key variables" were chosen:
 - governmental focus
 - technology focus
- Storyline:
 - The path to 2025
 - "A day in the life of..."



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The Future of Hydrological Forecasting





The path to 2025

Caring Government

Collaboration between Rijkswaterstaat and the Water Boards has changed from information exchange to joint information provision. As a result the collaboration of one joint organisation of one joint organization for water reporting: a single contact point for clear, unequivocal information.

With a view to create greater efficiency and to avoid the duplification of work, political bodies pressed for a merger between Rijkswaterstaat and the Water Boards. However, a study revealed that there was almost no duplication (much of the same work was done but in different regions, involving different people) and that reorganization would cost more than it would yield. Increasing efficiency was, however, possible by combined water reporting, and it was found that extension of services with a joint approach would have added value for the users. To the satisfaction of those users and the political bodies, this change was implemented in a relatively short time.

The zeitgeist in which products were developed and offered top-down has almost concerning the contraction is now part and parcel of the normal functioning of the market. By bringing the right expertise and openness into the contacts with citizens (and other stakeholders in the provision of water

information), better to tailored products hich are used in a arty that provides the information is seen as increasingly valuable and reliable, an image which is also sustained in politics.

Thanks to the economic optimism of the 2020s, people no longer question People no longer question investments in public services

Characteristics



- Forecasting is organised in one central government organisation
- Government is responsible for the forecasts also producing the forecasts
- Focus on end-user needs additional products (farmers, navigation, ...)
- More or less "business as usual"



The path to 2025

Regulatory Facilitator

Government policy between 2017 and 2025 emphatically states that the number of civil servants should be reduced. Vigorous implementation

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...government has no longer executive tasks...

...new small business in the field of hydro forecasting...

universities and applied research to commercial organizations.

Another trigger for change was the elimination of the 'safety divide', which had hitherto existed. No agreement had ever been reached on

...provision of safety in the field of hydrology and meteorology could be left to other parties than government...

concerned would keep to the specifications drawn up and monitored by KNMI and Rijkswaterstaat.

Although there is concern about the dependency on commercial parties (a

...many opportunities for innovation

wants to encourage the formation of small businesses. Thanks to this new policy, many such companies have emerged.

The disentanglement process in the field of research took time. Technological developments, such as improving and developing models and researching ...technological developments were transferred to other organisations...

research and operational tasks. This process was finally completed in 2023. In 2024, the production of water and weather forecasts (including alerts) was transferred to the commercial party that came with the best offer.

The Royal Netherlands

Meteorological Institute (KNMI)

and Rijkswaterstaat outsource not

only tasks such as measuring and

predicting but also research.

Characteristics

Regulatory Facilitator

- Cost efficient government
- Government no longer has executive tasks, but responsible; hydrological forecasts are made by commercial companies
- Research at universities, applied research at private sector
- Impuls forecasting as a service
- Strict requirements (data, production process) (Moat)
- Data property of the producer, certification (Moat)



The path to 2025



... citizens have turned their backs on the government...

which had one of the most trusted governments in the world, citizens had turned their backs on the government. As a result, various social initiatives emerged, taking advantage of the revolution in information and communication technology, such as health, energy and security

...various social initiatives; regaining control over their own lives...

Over the years, that technological progress continued. More and more data became available to more and more people, and also became more easy to use thanks to new devices. Surprisingly enough, the government no longer functions as a major data supplier and other parties are also taking over its role of user and translator of data. Multinationals in particular but also a multitude of small businesses are taking advantage of the large amount of data that is made available. The nature of the reauired information has also changes. For example, hudrologists noticed

...more and more data become available, opportunity for new services...

are therefore increasingly focused on involving all groups in society. Sustainable initiatives also remain popular, and are increasingly needed because of developments such as increasing population growth, economic growth and climate change.



The decrease in the amount of rules and the favourable tax environment created a breeding ground for small businesses and new initiatives from around the world

The path to 2025



By 2021, the government decided to decrease public services. In recent years, it was found that there are enough suitable parties to take over

...weather services are shut down, knowledge institutes no longer funded...

this decision was taken, more and more services were hived off with the idea that "essential services will be taken care of by the market." The Royal Netherlands Meteorological Institute (KNMI) was closed down, the ministries became at least 50% smaller, and the funding of a large number of knowledge parties was stopped. Tens of thousands of employees were made redundant.

The decrease in the amount of rules and the favourable tax environment created a breeding ground for small businesses and new initiatives from around the world. One example is the multitude of courses that have

...successful capabilities: translating technology into practice, communication to the general public ...

Previously flourishing professions, such as those of hydrologists and civil engineers, appear to have become less attractive. Part of their work is being taken over by clever staff who can process large amounts of data and people who can translate the results of water system analyses for the general public.

Communication tools such as flashu infoaranhics, augmented reality and ... IMPACT is the magic word...

long term. The international networks in which the start-ups operate also prove to be a breeding ground for new innovations. As far as hydrological forecasting systems are concerned, the players that can make the translation to the actual impact of forecasts are the most successful. They are able to answer all kinds of queries from customers (including more and more civil cooperatives) satisfactorily.

Characteristics



- The start-up society is a society formed by citizens, start-ups and multinationals without strong government.
- Innovation flourishes and technological development is faster than ever, mainly driven by the growing amount of available data.
- Strong focus on end user: forecast <u>use</u>. Services in which information is translated into impact, i.e. impact on themselves and impact on society.

→ Attention to *impact forecasting*, and *effective use*



35

The path to 2025

In social policy the years from 2015 to early 2017 were a period in which global thinking, which had rapidly evolved in the previous years, was called to a halt. With emerging protectionism in the United States and Europe, it was as if someone had suddenly stepped on the brake.

Sharing data en open source are the new normal...

benina. But the West could not hold the brake down for very long. Society came to the conclusion that protectionism was counterproductive. The route back to the open data and open source world was quickly found. The new worldwide sense of openness was at its peak in the period 2020-2025. The Chinese and the Russians could also not go back. It seemed a masterly strategy of the West, but it had not been planned like that.

These political developments undermined the public perception and any remaining image of the integrity of politicians gues more. The lack of

Trust in the government never so low

government as the defender of their interests had been dented. Government was seen as the extension of the failed political order.

Technology had not stood still in the meantime. Big Data, the rising concept in 2015, had become commonplace in 2025. Concerns about privacy and misuse had been replaced by visions of the unprecedented opportunities all

...technology push...

own interests. Society had surrendered to the rapidly globalizing and openly accessible data and information. Galloping at full speed on the public digital racecourse, but with the reins firmly in hand.

Therefore, large investments were made in technology. Citizens clearly realized that by combining forces at the local, national and international levels, they would locally be able to make full use of what was alobally.

...global hydrological models have been brought down to a very detailed scale...

specifically aimed at the city and its citizens was the most urgent. The increasing occurrence of weather extremes, such as storms, flooding and drought, which climate scientists had forecast, increased people's awareness of climate change.

...High-resolution global hydrological forecasts had become a reality, offered by companies such as Google...

world. Global hydrological models had quickly been brought down to a scale at which hudrological information about one's house or the ditch

...the weather service stopped making hydrological forecasts mid 2022. The distance between the global scale of Google Forecasting and the reliability and relevance at the local scale are very short in 2025.... Google

Forecasts

Characteristics

- (Big) Data everywhere, no protection
- Global hydrological predictions based on highresolution models, improved by the research community
- No predictions from government agencies
 anymore
- Glocal: Innovative businesses and citizen initiatives will combine <u>global</u> predictions providing multitude of services aiming at satisfying <u>local</u> information needs



Our vision of the future

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Deltares

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The Future of Hydrological Forecasting

Big data - Al

Digital connections





Forecasting as a Service

25.005

25.005



Our vision of the future

- Related to Delft-FEWS software: modular, data handling, easy connection: an ecosystem
- Important research topics:
 - Global modelling
 - Impact forecasting
 - Now-casting
 - New types of data and information, e.g. mining online data
 - Communication technology
 - Machine learning



The Future of Hydrological Forecasting

43

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