The Digital Delta

Integrated Operations for Intelligent Water Management

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1 Introduction & background

2 Program approach and setup of the partnership

3 Results

The Netherlands

Optimization needed cross multiple disciplines

- Flood safety
- Fresh water availability
- More crop per drop
- Logistics (Harbor Rotterdam supplies 75% of Western Europe within 2 days)
- Ecology
- Energy efficiency
- Adaptive
- Affordable

Netherlands water management cost 7B/yr, expected increase 1-2B by 2020

Ref: Bestuursakkoord Water / Resolution of the National Water Committee, April 2011

From this...

...to this

While saving costs and driving innovation

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Feasibility study Digital Delta

Ministerie van Infrastructuur en Milieu

TU Delft Technische Universiteit Delft

IBM

- 4 months study
- 90 people from 60 organizations interviewed
- Cross water sector:
  - Smarter Cities
  - Food/agriculture
  - Water & energy utilities
  - Maritime/logistics
  - Investors

Research question:

How can a better use of data Information Technology help address the water challenges and strenghten research and business activities?

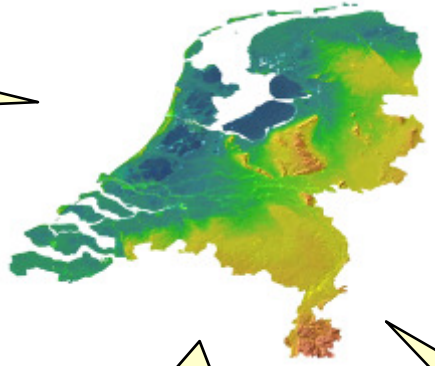
23 use cases proposed by companies and researchers

We believe we can predict when tunnels will flood and improve the maintenance schedule

Sewers have enough capacity if we can predict where blockages will occur postponing complete overhaul

We can save 700k on the annual energy bill of 1 installation by discharging water at sea at the right moment

Underground storage basins are often placed in the wrong location, data analysis can tell where they should be



We can analyse which ground bodies like levees or buildings are subsiding using satellite data

Leveraging cross regional data can greatly improve the water forecasting and control

We can monitor the depths of rivers continuously using commercial shipping data saving costs

Airborne geophysics can provide the data for sustainable ground water management in coastal zones much faster

What's keeping them?

1. **Too much time lost on non-core activities**
   - *30 - 60% time or resources lost on searching, collecting, getting access to, validating data*
   - *Setup and maintenance of the IT environment*
   - *Long time to market*
2. **Unaware of existing tools & solutions**
   - *Broad duplication of data, tool development*
3. **Unable to compare data**
   - *Lack of standards*
4. **Large number of research and business development opportunities**
   - *If the barriers and costs to engage would be lower*

Inefficient and expensive

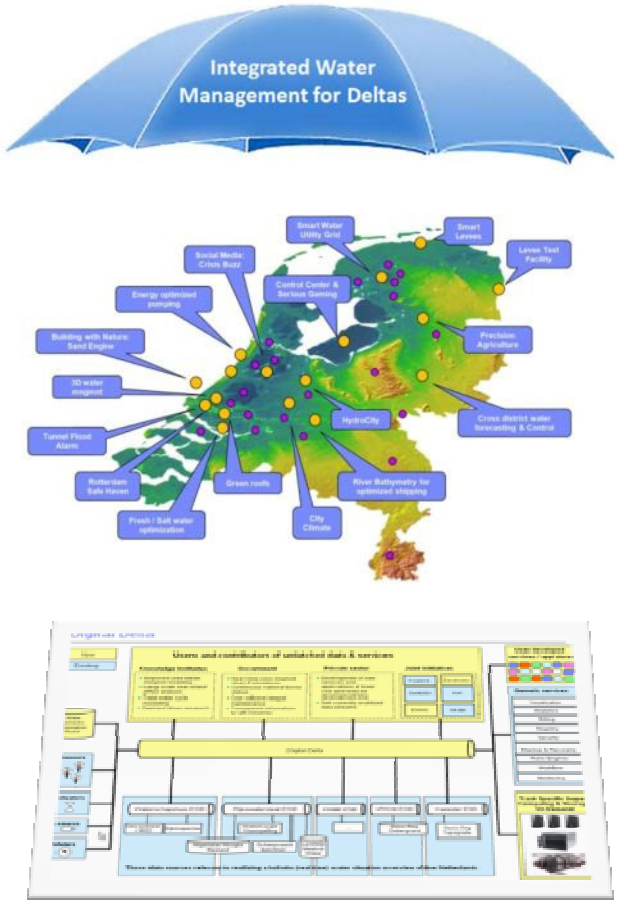
Program and Partnership Setup

A Public-Private R&D Initiative of:

- *Rijkswaterstaat (Ministry of Infrastructure & Environment)*
- *Local Water Authority Delfland (District of the cities of Rotterdam, Delft and the Hague)*
- *University of Delft*
- *Applied Sciences Institute Deltares*
- *IBM*

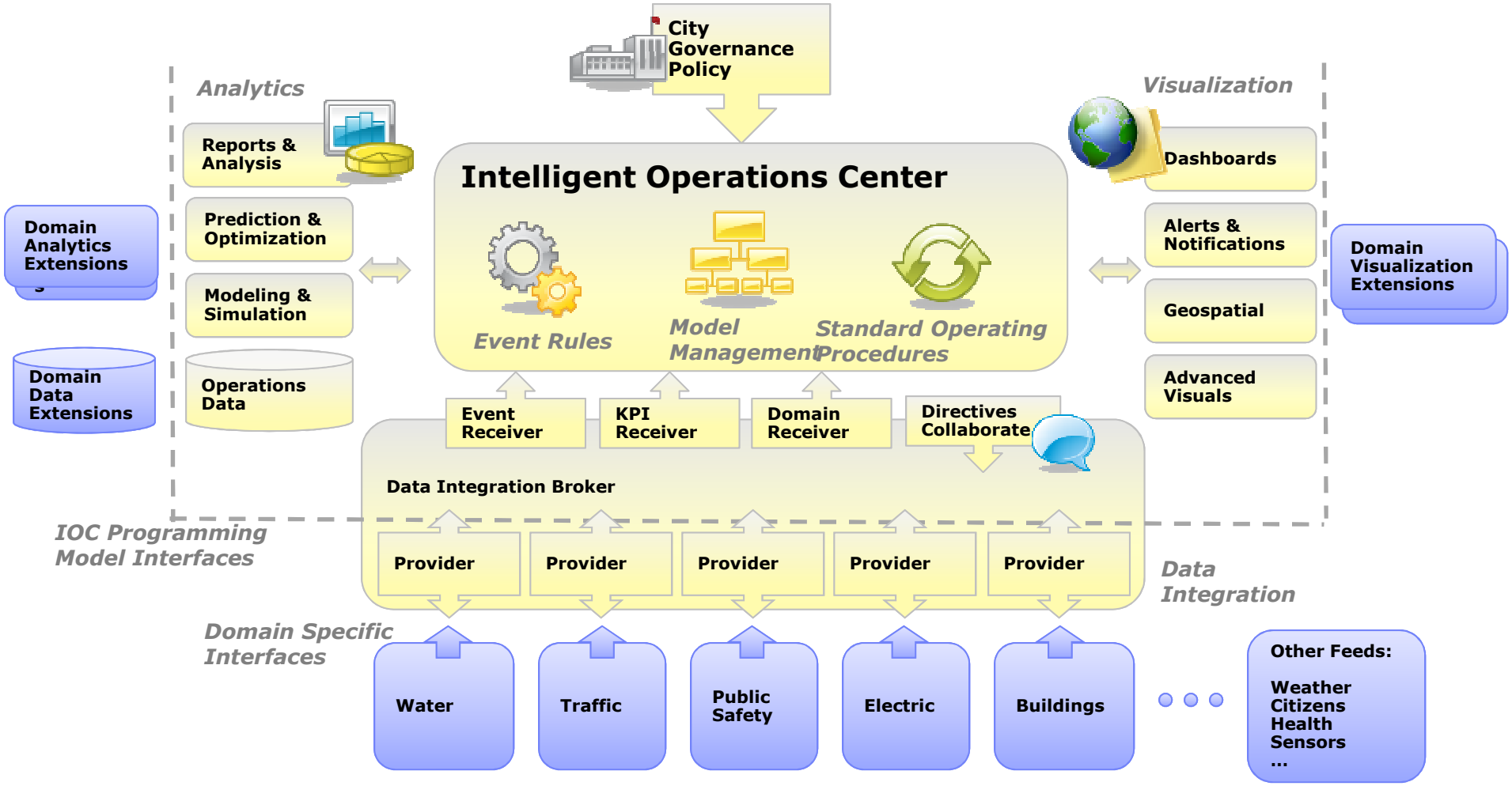
Scope & Duration:

- *Initially 12 months €5.5M budget while exploring (inter)national collaboration*
- *Started 19th June 2013*
- *Public partners provided business challenges and access to data for scientists, high tech starters, SMBs and industry*
- *Focus on 6 use cases that each by itself will improve the efficiency and effectiveness of the Dutch Water System*



IBM Intelligent Operations for Water provided as a Software as a Service

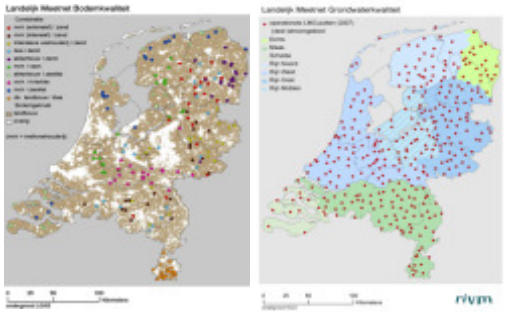
IBM Intelligent Operations Center Architecture

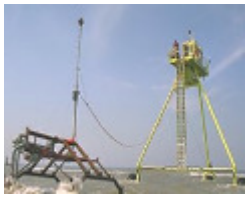


National Monitoring Network

Nation wide monitoring stations:

- *Surface water (450)*
- *Ground water (350)*
- *Soil quality (40)*
- *Air quality (60)*
- *Monitoring of hundreds of variables e.g. temperature, quality, levels, salinity, wave heights, speed, direction, pressure, clouds*
- ***2 million data points / day***





Developments:

- *Integration of separate sensor networks and standardization*
- *Government Open Data Policy*
- *IoT...*

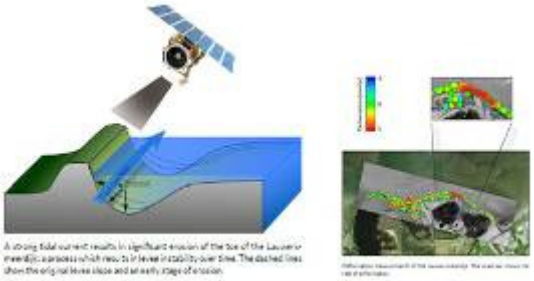
In the process of becoming smart...

Smart Levees

Deltares Hansje Brinker Infrastructure Monitoring alert solutions

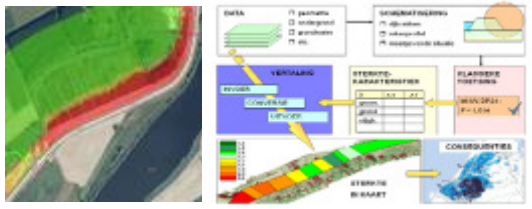
The Netherlands:

- *Over 16.000 km of levees protect the Dutch economy and international business*
- *Levee inspection mandated **every 5 years** by law (~200M euro)*
- *Levee maintenance is expensive (550M euro/year)*
- *Climate change results in more extreme weather (dry/wet)*



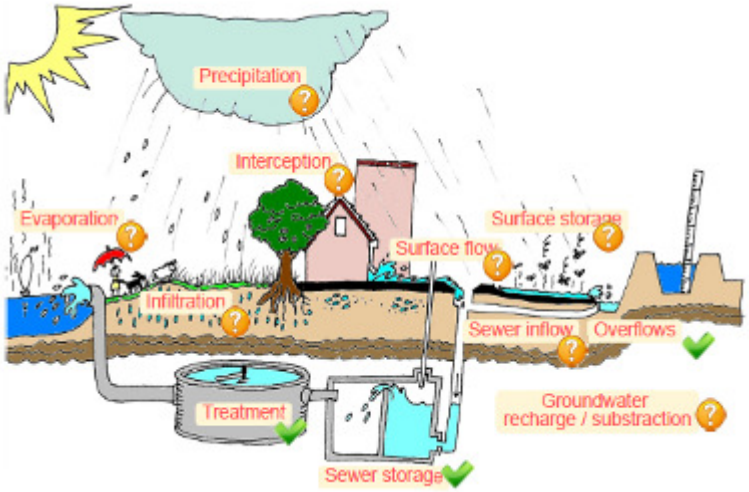
Smart Levees:

- *Satellite observation enables monitoring of large stretches*
- *Pin points areas requiring more detailed analysis*
- *Geobeads: geotechnical sensor strings enabling **real-time continuous infrastructure monitoring***
- *Real-time levee integrity modelling takes geobeads data as input*
- *Up to 48 hours advanced warning of levee instability*



Lower inspection & maintenance costs, higher safety

HydroCity



Urban water cycle not well understood:

- *Expensive catchment basins not working properly*
- *Sewer overflow, tunnel and city flooding*

Project focus:

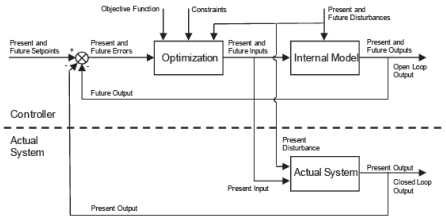
- *Radar data enrichment*
- *Calibration with rain and storage sensor networks in the cities*
- *High resolutin spatial rain fall distribution per km^2*
- *Satellite observation and automatic detection of change in city surface use*
- *End to end integration of precipitation, infiltration, runoff, and storage data*

Better use of existing storage capacity, substantial cost savings, less city flooding

Dynamic Water Management

From Integrated Water Management 1.0 to 2.0:

- *National (or mega city) water system is an **interconnected system of systems***
- *Optimalisation of water distribution needed depending on social and economic needs*
- *Current single purpose, binary system is energy inefficient and room for faster and more accurate decision making*



Needs:

- ***Multipurpose constructions** and 'taps': pumping stations, sluices, locks, dams*
- ***Multi dimension optimized control systems** able to process large amounts of data from heterogeneous sensors and equipment*
- *Collaboration between national, regional and local water managers*

Further minimalization of flood & drought impact on shipping, agriculture, power & water production

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Leveraging existing and future data can drive 10 – 20% savings in physical infrastructure spending and speed up innovation 4x

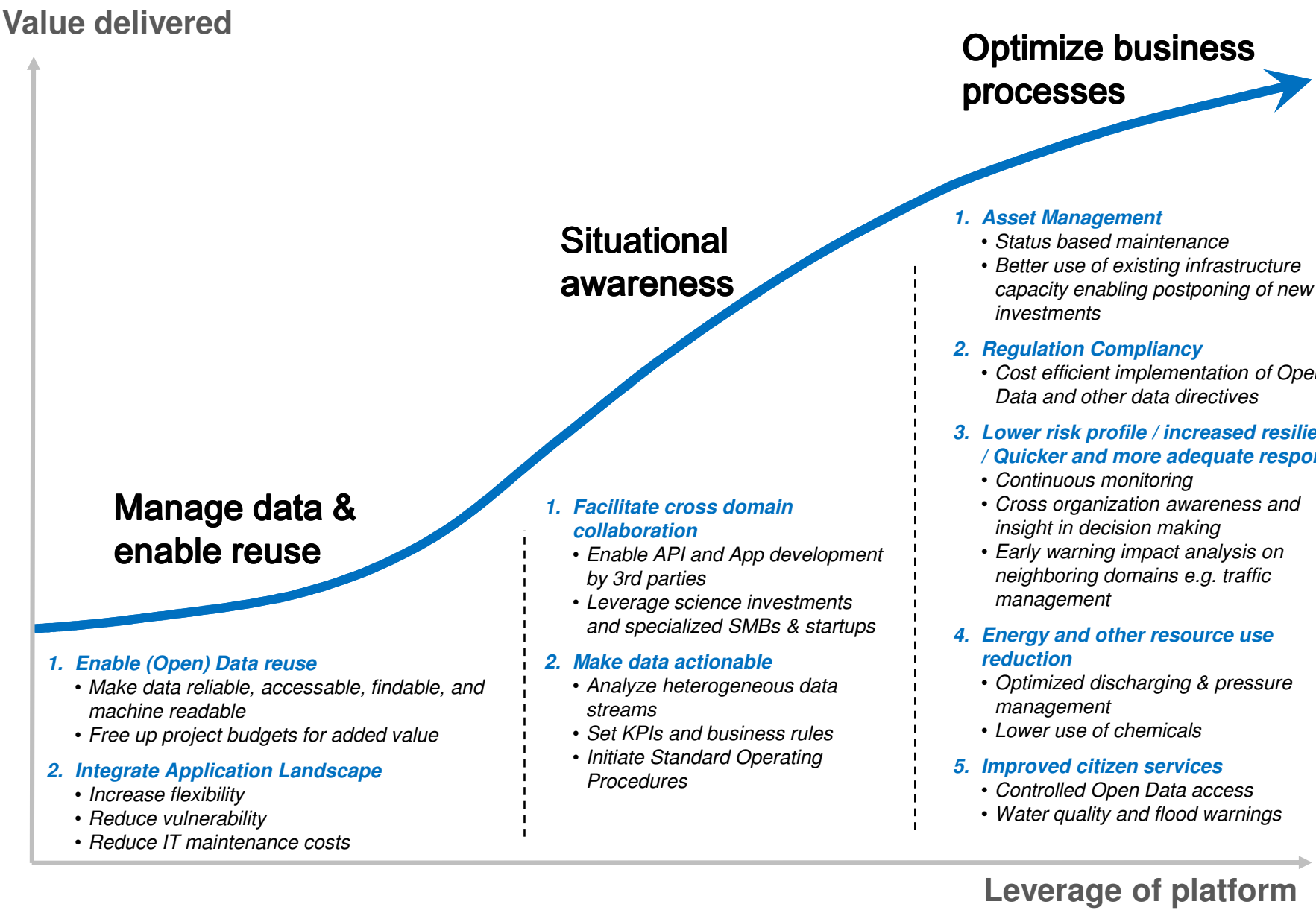
Lessons Learned

1. Social and organization cultural challenges

2. Current open data is not so open and standards not so usable

3. Demands business case driven implementation, not just open data for open data sake

4. Infrastructure dilemma: Government initiative in startup-phase is needed



International Interest

"The recently launched "Digital Delta Initiative" is a step in the right direction. This innovative programme aims to harness and collate vast and currently dispersed datasets to support better management of flood control and water resources in the country"

Nominations / Finalist in various awards:

CIO
Business, technologie, leiderschap

United Nations Public Service Awards

smart city expo WORLD CONGRESS
SMART CITIES CHANGE THE WORLD
Barcelona 19-21 Nov. 2013
Fira Barcelona

CLOUD INNOVATION WORLD CUP

Yesterday

Government defines required solution and tenders

Today

Provide data for the applications vendors and scientists develop

Tomorrow?

Government as a Platform: give us the proven solution as a service through our platform

Thank you

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