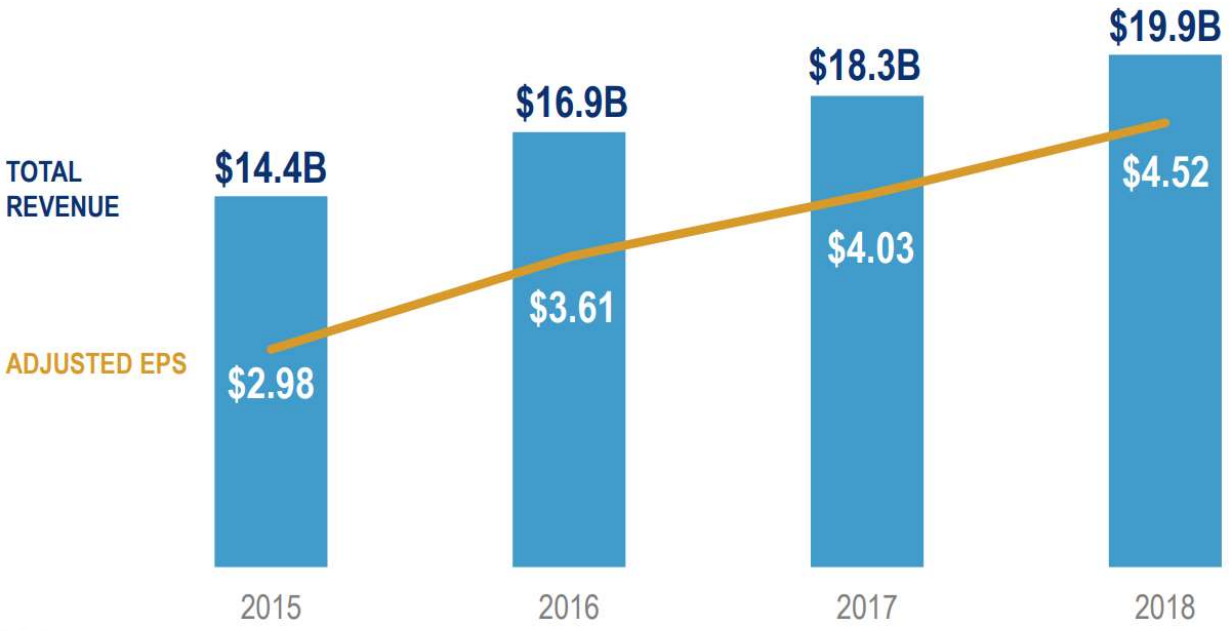
Executing Large Hydromet Networks Successfully - Lessons Learned

About Your Speaker

- Ashish Raval
- Vice President Global Sales with OTT Hydromet
- 25+ Years of International Knowledge
- Specialization in providing Instrumentation, Communications & Software systems for Environmental & Industrial Applications
- MS in Electrical Engineering with Control Systems Back ground.
- Last 22 years spent primarily in Implementing Large Hydromet Systems in over 90 countries
- Over $150M in Large Internationally projects executed over the past 20+ years
- Experience with The WorldBank, ADB, UNDP, FAO, UNESCO, AFB, USAID, USTDA, AFB, CAF, etc
- HMEI Executive Council Member for Membership and Recruitment Oversight – 2018 -Present
- Member - ETTAC 2018-2020 Chapter Environmental Technologies Trade Advisory Committee)
- HMEI Executive Council Member for Website Development/Oversight – 2012- 2015

Danaher Corporation — Overview

- **Fortune 150** ranked company
- **$20B** annual revenue across four strategic platforms
- Renowned for acquiring and building **strong growth** businesses worldwide
  - - 400 companies acquired since 1984

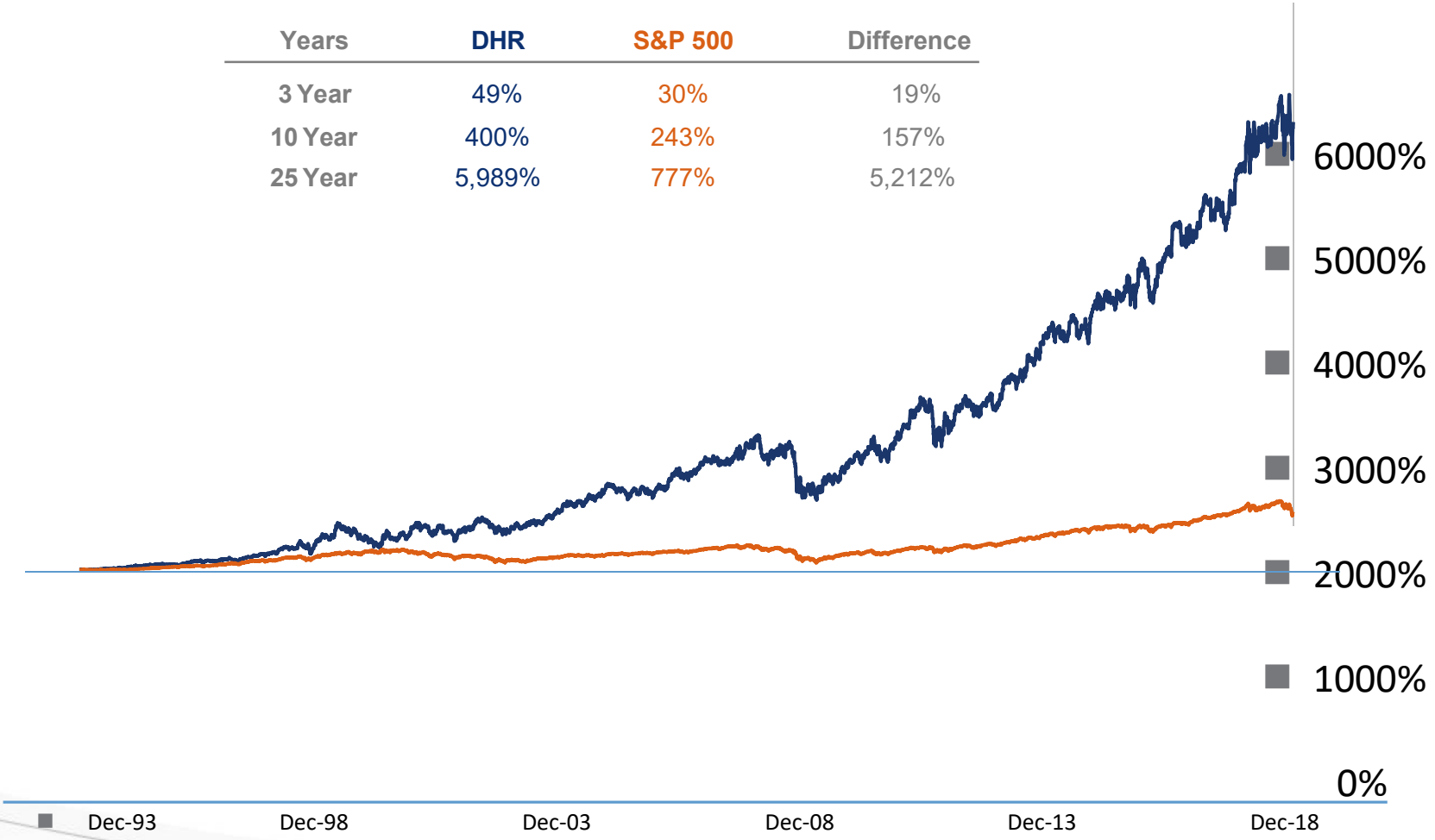


Consistent, Significant Year-over-Year Growth

25 Year Total Shareholder Return: DHR vs S&P 500

Outperforming over the long term

Years	DHR	S&P 500	Difference
3 Year	49%	30%	19%
10 Year	400%	243%	157%
25 Year	5,989%	777%	5,212%



Source: FactSet

Danaher — Water Quality Platform

LIFE SCIENCES ~$6.5B

- Beckman Coulter Life Sciences
- SCIEX
- Molecular Devices
- Leica Microsystems
- Pall
- phenomenex
- IDT Integrated DNA Technologies

DIAGNOSTICS ~$6.3B

- Beckman Coulter
- Leica Biosystems
- Radiometer
- Cepheid

ENVIRONMENTAL & APPLIED SOLUTIONS ~$4.3B

WATER QUALITY

- HACH
- TROJAN technologies
- ChemTreat
- McCrometer
- OTT HydroMet

PRODUCT ID

- Videojet
- Esko
- x-rite PANTONE

DENTAL ~$2.8B

- Kavo Kerr
- Nobel Biocare
- Ormco

All financial metrics reflect FY 2018 revenue

OTT Hydromet – About Us

Danaher

» Danaher Water Quality Group

» >$ 2.0 B revenues

HACH LANGE
UNITED FOR WATER QUALITY

OTT HydroMet

TROJAN technologies™

ChemTreat

SBE

WET Labs

SATLANTIC

Danaher –
A Sustainable Partner
- *Financial Stability*
- *Defined Processes*
- *Strict Compliance Regulations*
- *Worldwide representation*

OTT Hydromet

Serving all fields of hydrometry, meteorology,
drinking water & wastewater to provide tailored solutions for every customer

- Over 572 years of experience
- Worldwide representation
- 550+ associates worldwide
- $125 M revenues

Active worldwide – Think Global – Act Local

Ott Hydromet Brands

Hydro

HYDROLAB

Loveland USA

Water Quality Instrumentation

39 years of multi-parameter water quality instruments

OTT

Kempten Germany

Water Quantity Instrumentation, Global Headquarters

144 years of hydrological instruments and systems

SUTRON

Integrated in Jul, 2015

Sterling USA

Water Quantity Telemetry Meteorology Air Quality Instrumentation

42 years of real-time data collection and control products, systems, software and services

ADCON TELEMETRY

Vienna Austria

Agro-Met Telemetry Instrumentation

24 years of smart wireless communication

Met Science and Operation

Lufft

Integrated in Jan, 2016

Fellbach Germany

Meteorology Instrumentation

136 years of meteorological instruments and sensors

KIPP & ZONEN SINCE 1830

Integrated in Dec, 2017

Delft Netherlands

Meteorology Instrumentation

187 years of meteorological instruments and sensors

The common link of all companies in a rich history of providing the highest quality of innovative products

Global Projects

- **Specializes in providing turn-key systems and projects globally.**
- **Truly *International* with worldwide & nationwide flood-warning systems**

- Romania
- Sri Lanka
- India
- Caribbean
- Poland
- China
- Thailand
- Romania
- Singapore
- Africa

- Taiwan
- Australia
- South America (Brazil, Venezuela, Peru, Chile, Ecuador, Colombia)
- Central America
- Mexico
- Canada
- Vietnam
- Afghanistan

OTT Hydromet Group – International Funding Agencies

World Meteorological Organization (WMO)

UN Food & Agriculture Organization (FAO)

UN Industrial Development Organization (UNIDO)

Inter-American Development Bank

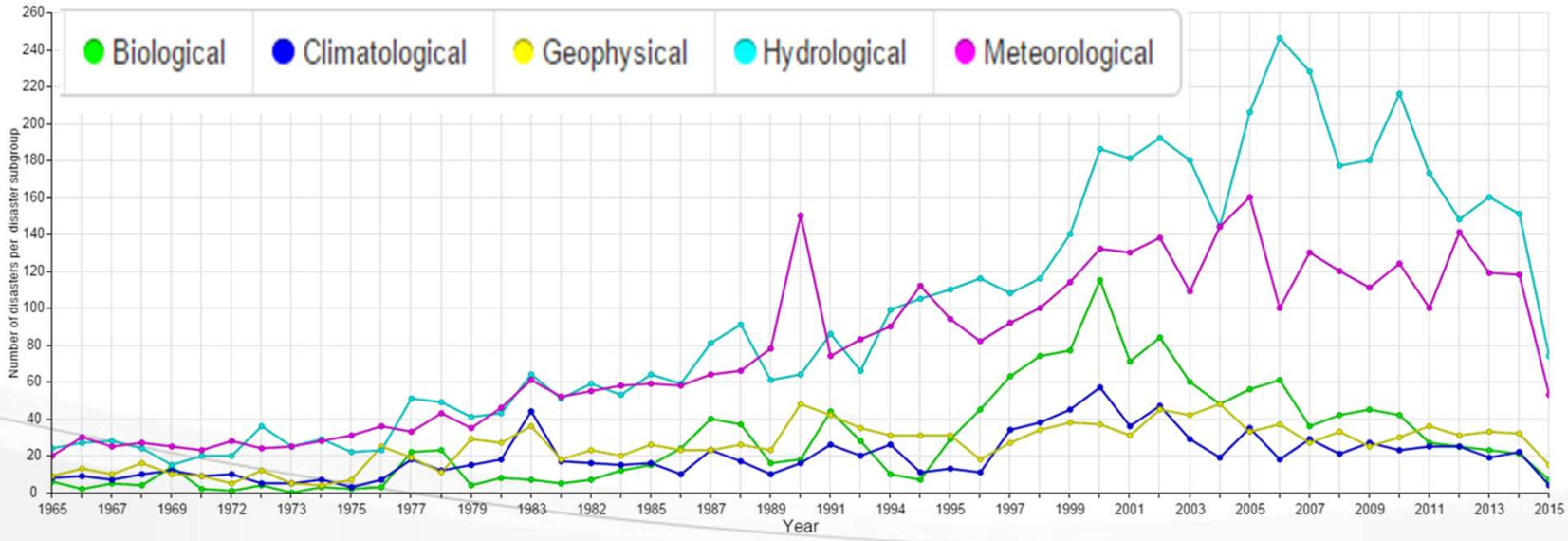
Outline

- What's the problem?
- What is an End to End (E2E) Hydromet EWS?
- Why Large network are so hard to sustain?
- How can we improve? Lessons Learned?
  - View of Private Sector
- Conclusions and recommendations

What is the problem?

What is the Problem?

- Populations growth
- Settlement in high risk areas
- Environmental and natural resource degradation
- Governance, Resources, financial and human
- Sustainability
- Poverty
- Climate change (Last year in US alone damages were ~$330B)
- 2017 was the costliest Hurricane Season on Record in the US

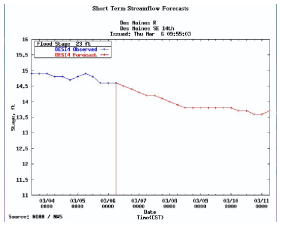


What is an End-to-End Solution?

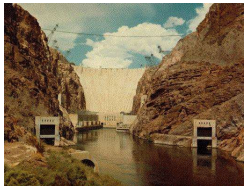
Multi Hazard forecast, warnings and Decision making

Data

Communication



River/Flood Forecast

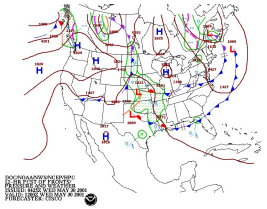


Decision Support

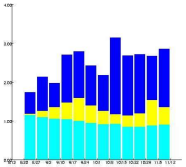
Disseminate

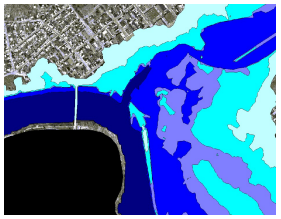
Coordinate

Action



Forecast





Why are E2E Hydromet projects not successful?

- Project timeline not realistic or defined properly
- No Clear requirements defined upfront
- No strategy or vision for the end-goal
- Limited capacity building at NMHSs
- Lack of technical champion (PM)
- Short-term political will/interest
- Lack of incentives to keep qualified staff
- Limited funds to maintain, repair and operate the systems
- Lack of donor coordination
- Lack of data integration
- Sustainability of the systems Chevy versus cadillac

Failing to Plan is nothing but Planning to Fail

Some Observations from Recent Tenders (Caribbean, Asia Pacific)

- ALERT- Protocol for MET tenders without GTS requirements
- No Synoptic/Climatic – 10M Tower requirements
- Qualification Criteria – Not Suitable for local companies, JVs not preferred and local companies do not qualify
- Regulatory/Compliance, FCPA - Screenings
- Finding a local partner in Dominica to provide warehousing, insurance, civil works, installation of equipment, and maintenance after deployment. Although many companies were contacted, none were able to provide a detailed quotation of the services requested and this lack of definition added risk and uncertainty.
- Wind Sensor from a very small company (Taylor Scientific) that was hard to get a response from.

Some Observations from Recent Tenders (Caribbean, Asia Pacific)

- Maintenance Warranty of 1 full year where a full time Sutron engineer will be responsible for providing preventative maintenance to the stations, and its understood that the contractor would be responsible for replacing vandalized equipment during this period
- 200 MPH requirements were specified but then Booms were required for Radar. We really do not see how without a huge structural study one can install 10M booms on rivers that withstand 200MPH. Past experience showed that booms were broken by flying objects, trees etc.
- 5 year warranty on all equipment with shipment back and forth. Without provision of enough spares.

Some Observations from Recent Tenders (Caribbean, Asia Pacific)

- One year Full time support and O&M was required without mentioning who will be responsible for theft, vandalism or other natural calamities. Also, clear transfer of ownership was not defined. Once installed; who is responsible for the site for one year against any damages, theft or vandalism?
- No detailed drawings on Civil works were provided to properly assess the construction costs.
- Mast were quoted for 200MPH but it is hard to get free standing masts.
- Delivery time was very tight – 6 Months which was not really feasible keeping all of the above constraints in mind.

Some Observations from Recent Tenders (Caribbean, Asia Pacific)

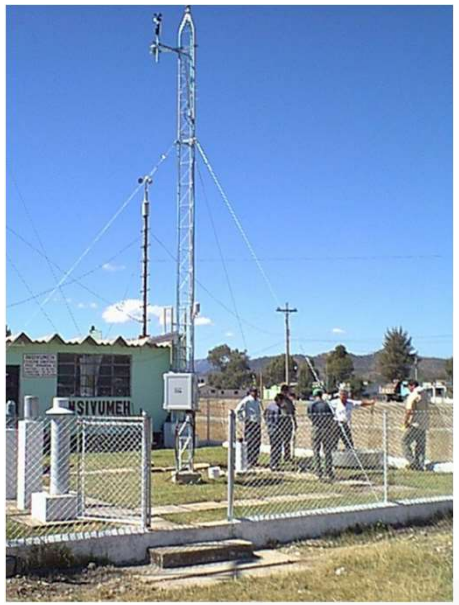
- Development of a Hydrological Web Portal with software products not under the umbrella of software created by Sutron Corporation. Role of MCH software and Mobile App and Vendor supplied software and maintenance software was not really defined. (very detailed hardware specs, only 3-4 pages on Software)
- Lowest responsive bidder wins. No criteria specified for evaluation but only compliance on paper.

Elements of Success

- Do “more” with less – Sustainable
- Take ownership and feel responsible for the system
- Hydromet Champion assures maintenance and operational system
- Public-Private Partnership between Govt, WB and supplier
- Strong Political Will
- Technical support by NOAA/USGS or reputed agency
- Complied with WMO Hydro-Met standards
- Users active in demanding forecast service

CONCLUSIONS

- Need for a new approach for Hydro-Meteorological modernization efforts
- Find a way to incorporate valuable lessons learned that can serve to re-define how projects are implemented to improve sustainability of E2E EWS
- Better donor engagement at early-phase, UN, development banks, and host country coordination to assure no duplication and proper integration
- Need for WMO to develop best practices guidelines to and advice donors, banks and NMHS's
- Critical need to build capacity of NMHSs
- Invest in locally sustainable systems



Thank you very much for your time

Questions??