



# ENTERPRISE GIS STABILIZE AND EXPAND YOUR ESRI INVESTMENT/TECHNOLOGY

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# WHEN YOU KNOW IT'S GOING TO BE A BAD DAY...



*MARCH 16, 2015, Detroit Free Press*

## **Detroit Firefighters battle fires in extreme cold**

**“City officials say all of its fireplugs will be inspected to find the ones that froze this winter. The precise number of those in need of repair is unclear because of inadequate record-keeping.”**

# FROZEN HYDRANTS, HOSES AND FIREMEN

30,000+ HYDRANTS IN DETROIT



HOUSES ARE BURNING AND THERE'S **NO** WATER

**“IF WE HAD WATER, THESE HOUSES WOULDN’T HAVE BURNED DOWN.” — DETROIT MAYOR MIKE DUGGAN**

*Mayor calls 9:30 a.m. mandatory meeting for all parties involved*



- Included Fire Chief and his staff, DWSD Field and M&R, IT and Technical Reps, LEAN staff, and others

*Mayor asked what we were doing, how did we get here?*

- Multiple organizations working separately trying to do the same thing, get the fire hydrants working
- No one doing a good job

# CONDITIONS FOR FAILURE

- Fire hydrants reportedly inspected monthly (no evidence of this)
- Reliant on paper-based processes with numerous people involved in entire workflow from different departments, organizations, etc. (8 different hand-offs)
- Manual process for data entry into spreadsheets
- Long time to update information that was available
- Hydrant location information out of date
- Hydrant conditions unknown / not visible
- Reliant on visual queues to tell if a Hydrant was operational, but unreliable method
- Years of neglect, lack of resources and staffing
- Everyone using different terminology, inspection processes, lack of training

# SOLUTION ARCHITECTURE



esri  
ArcGIS Online



ORACLE  
UTILITIES  
WAM

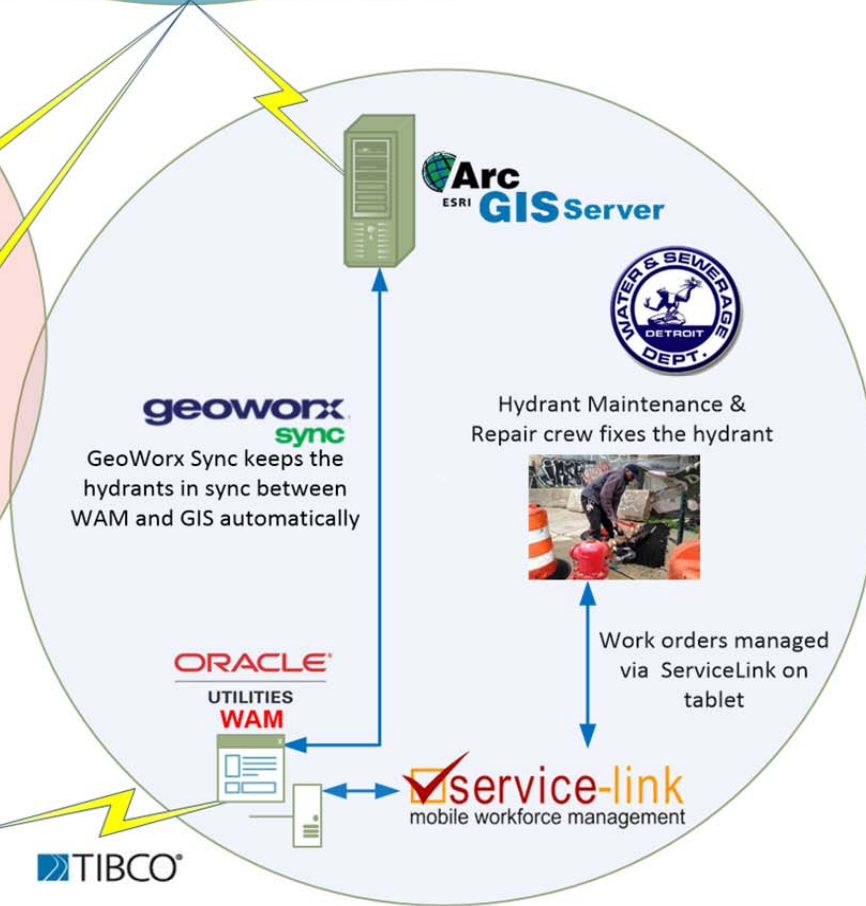
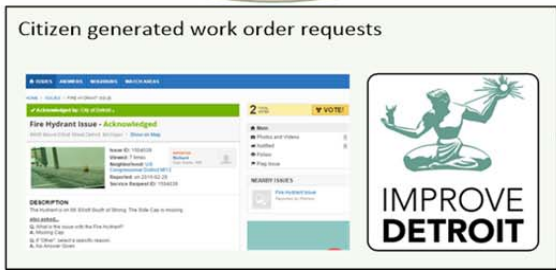
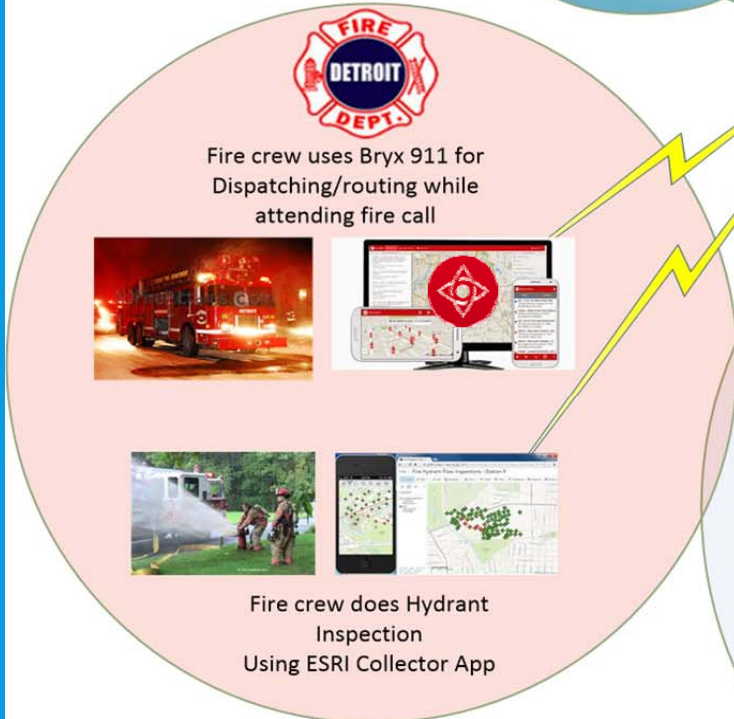
geoworx  
sync

service-link  
mobile workforce management





amazon  
web services

Hewlett Packard  
Enterprise



# WHAT HAPPENS AFTER FIRE DEPARTMENT INSPECTION

## 1. Using ESRI Collector App

- ✓ Fire Dept Crew reports current conditions for a specific Hydrant
- ✓ e.g. Operable – NO, Leaking – YES, Missing Caps – YES
- ✓ Inspection Date – 05/15/2015, etc.
- ✓ Color of the Hydrant icon changes from  → 



Operable Hydrant



Inoperable Hydrant

## 2. DWSD GIS

- ✓ In real time, the inspection data is updated for that Hydrant

## 3. GeoNexus Sync

- ✓ Daily Sync process updates Hydrant record in DWSD Asset Management System (WAM)

# CONTINUED....

## 4. DWSD WAM

- ✓ WAM Creates a Inspection History Work Order containing the Inspection Data
- ✓ WAM sends this Inspection Work Order to DWSD TIBCO

## 5. DWSD TIBCO

- ✓ Interrogates the Inspection History Work Order Data to determine if Follow-up Task(s) are needed
- ✓ Creates new Work Order Task in WAM for the problem(s) identified
- ✓ Dispatches the new Work Order Task(s) to DWSD Service Link

## 6. DWSD Service Link Dispatcher

- ✓ Dispatcher from M&R Dept assigns the work order to a Hydrant repair crew





# WHAT HAPPENS AFTER DWSD COMPLETES HYDRANT REPAIR ?

## 1. DWSD Service Link Mobile

- ✓ Hydrant crew receives new work order automatically on their Tablet
- ✓ Hydrant Crew locates Hydrant and performs tasks to make Hydrant Operable
- ✓ Hydrant Crew determines if additional work is necessary
- ✓ Task are closed in Service Link and Sent to DWSD TIBCO

## 2. DWSD TIBCO

- ✓ Updates status of WAM Work Order Task and updates the Service History based on the repair data from Service Link



# CONTINUED...

## 3. DWSD WAM

- ✓ Creates follow-up Tasks if necessary and updates Hydrant Attributes

## 4. GeoNexus Sync

- ✓ The updated WAM Data is extracted and updates DWSD GIS Hydrant Information

## 5. ESRI Collector APP / Bryx

- ✓ Color of the Hydrant icon changes



+ - Home Layers Full Screen Print

Find address or place 🔍

### Legend

**Hydrant\_Maintenance\_Prioritization**

Emergency/Priority 1- Inoperable hydrant is within 500 feet of a critical facility (hospital, school, high rise building, etc.)

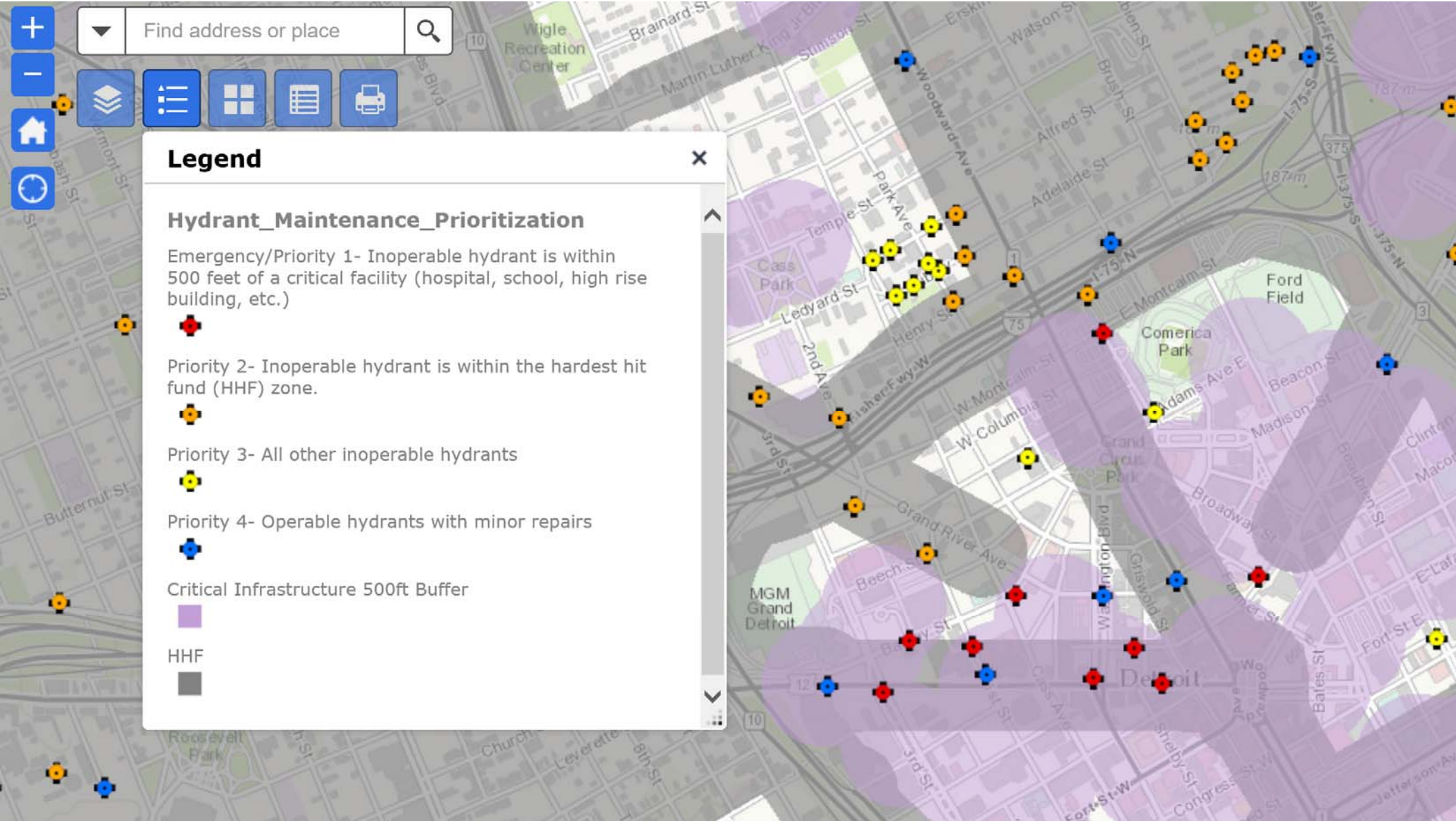
Priority 2- Inoperable hydrant is within the hardest hit fund (HHF) zone.

Priority 3- All other inoperable hydrants

Priority 4- Operable hydrants with minor repairs

Critical Infrastructure 500ft Buffer

HHF



- Broken
- Custompr
- Null
- Priority 1
- Priority 2
- Priority 3
- Priority 4

### FSR Progress Report

#### WO Aging - Days (Median, Average, Max)

Work Category (group) / Wo Status (group)

Metric	Rest		Operable		Inoperable		INVHYDT	
	OPEN	FINISH.	OPEN	FINISH.	OPEN	FINISH.	OPEN	FINISH.
Median Age	68.0	269.0	85.5	16.0	54.0	9.0	72.5	1.0
Average Age	108.8	269.0	108.7	33.5	101.6	20.9	72.5	0.9
Max Age	269	269	311	364	365	296	107	3
Min. Wo Age	15	269	0	0	0	0	38	0

#### Last Name

Martin	352
Carter	327
Dorch	295
<Paper>	206
Heade	167
Armstead	158
Coston	138
Barber	124
Stoudemire	113
Parker	83
Harris	56
jjenkins	51
Gee	27
<b>Grand Total</b>	<b>2,097</b>

**Task Status Date**  
5/1/2016 5/27/2016

Count of Completed Work Order Tasks

#### Hydrants Inspection

Task Status Date

Year	Distinct Hydrants
January	18,433
February	23,454
March	17,657
April	20,259
May	18,344

**Year of Task Status Date**  
 (All)  
 2015  
 2016

**Wo Status (group)**  
■ FINISHED

Undo

Undo Redo Reset

# GIS AT DETROIT WATER & SEWERAGE DEPARTMENT

- GIS was once a cornerstone service in Water Utility but not Wastewater
- Utilities combined in 2002 and GIS was centralized under engineering
- Over the next decade, GIS stagnated due to lack of executive leadership, vision and support. In 2013 GIS moved to ITS
- Engineering, planning, maintenance and repair, and customer service all suffered
- Without a functional GIS, DWSD continuously sourced modeling, planning, and asset management functions to disparate vendors who collectively developed a decentralized DWSD GIS among them.



# LONG-TERM CHANGE NEEDED: GOALS

1. GIS Assessment and Operational Work Plan
2. New Infrastructure with Full Redundancy in the Cloud
3. Updated Data from more sources/Data Integrity
4. Map and Integration Services for Visibility into Asset Data
5. Applications for Business Process Improvements



# ENTERPRISE ENVIRONMENT ARCHITECTURE

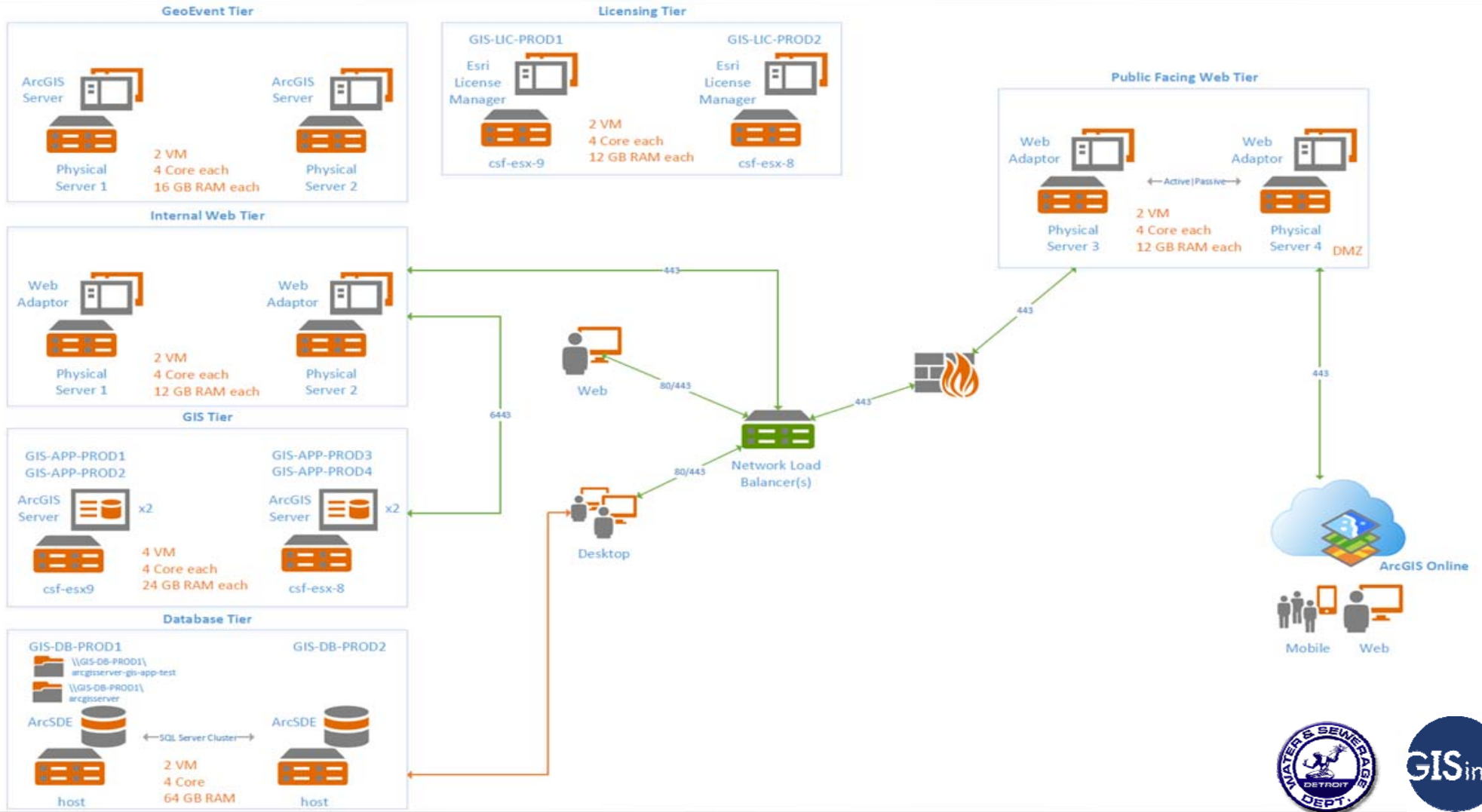
1. Dev, Test and Production Server environment on premise
2. Amazon Cloud Fail-over for catastrophic outages
3. ArcGIS Online Services, Collector Apps, Template-driven solutions
4. Staffing, resources and strategic planning
5. Sustainability

# REVISED GIS SYSTEM ARCHITECTURE

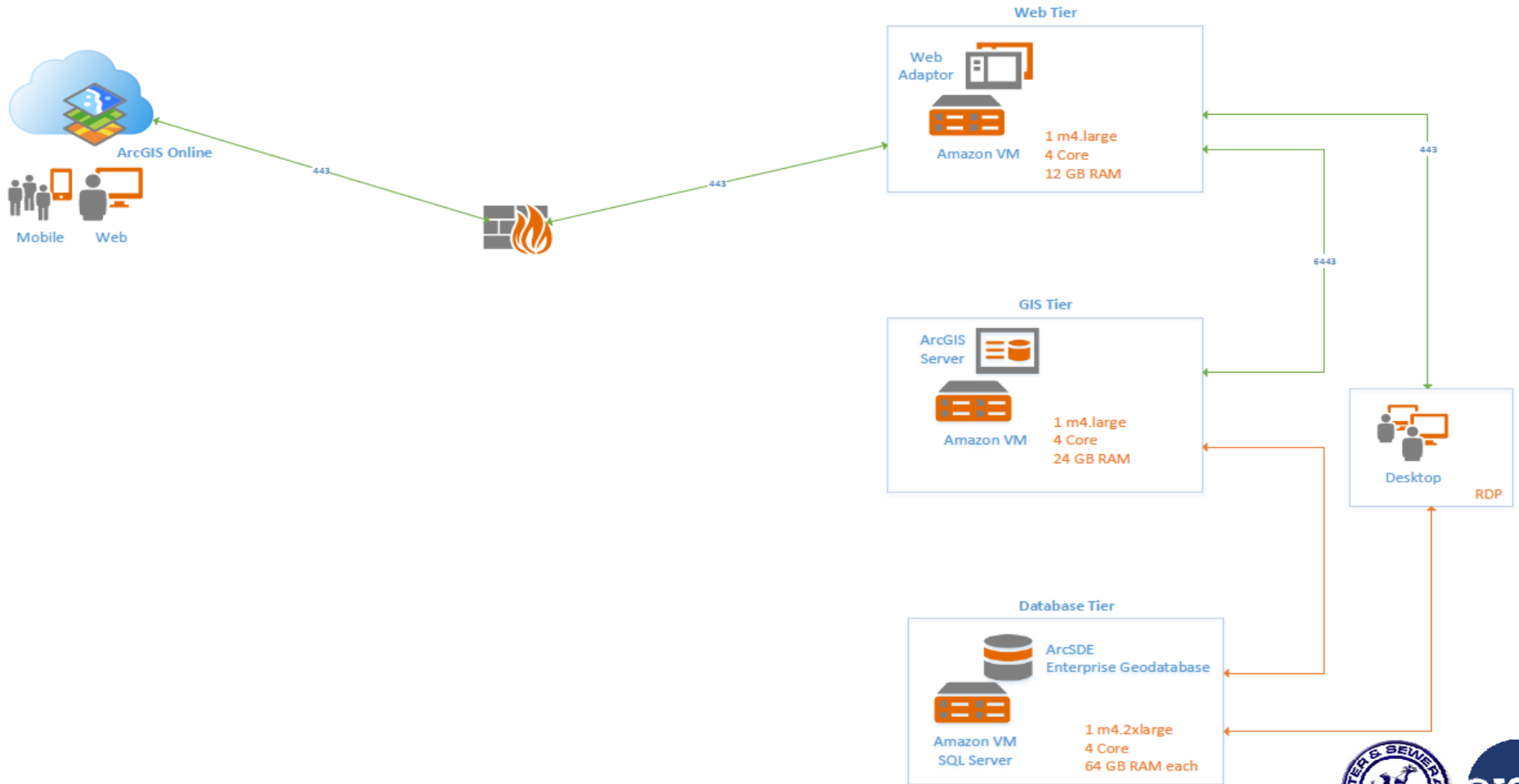
1. Multi-tiered/multi-environment
2. Fault tolerance & high availability
3. Hybrid implementation (on premise & cloud)
4. Functional tiering
5. Virtualized across physical servers
6. Internal & external access



# Production Active



# Production Passive Amazon



# QUESTIONS?

Thank you!