

Presenters

Paul Burris

- Utility Operations Manager for the City of Elmhurst
- Class 1 WW and Class “A” Potable Water Certifications
- Master Public Administration – Governors State University
- Licensed in 5 other states at highest levels (AZ, IN, MI, NJ, NV)
- Adjunct Teacher for SIUE/ERTC
- 2018 – National APWA Water Resource Manager of Year



Eider Alvarez-Puras

- Project engineer in Baxter & Woodman's wastewater department
- Primary area of expertise is the design of energy recovery and nutrient removal solutions for municipal water resources recovery facilities
- Master's degree in Environmental Engineering from the Illinois Institute of Technology and a Bachelor's Degree in Chemical Engineering from the University of the Basque Country in Spain
- Volunteer with the non-profit organization Global Water Stewardship and a member of IWEA's LIFT committee



Asset Management through CMMS

City of Elmhurst Case Study

Paul Burris and Eider Alvarez-Puras

May 10, 2019



IAWA Technical Committee Meeting

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CMMS

Computerized Maintenance Management System



CMMS

What is a CMMS Program?

Not only a database, it provides Management Tools:

CMMS is used for



Picture courtesy of MyTechLogy



CMMS

A CMMS program requires a significant investment of time and care to start and maintain, but provides invaluable insight into the finances of operating a Public Works.

Agenda

- City's CMMS Goals
- City's Public Works Department
- City's CMMS software
- Original CMMS Implementation
- Additional CMMS Implementation – Water Production & Wastewater Treatment Division
 - Step 1: Asset Inventory
 - Step 2: Preventive Maintenance Setup
 - Step 3: Workflow, Tablets, and Training
- Conclusions
- Future Steps

City's CMMS Goals

City's Public Works Goals

- Update asset attributes and O&Ms
- Paperless Work Requests and Work Orders
- Utilize mobile tablets to enhance productivity
- Consolidated Preventative Maintenance Tasks
- Data driven reports

City of Elmhurst

Background

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Elmhurst, IL 60126

City of Elmhurst



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Unlike Anything

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City of Elmhurst PW Operations – 2 Divisions

Water Production & Wastewater Treatment

- 20 MGD MDF Water Reclamation Facility
- 10 Sanitary Pumping Stations
- 12 Storm Pumping Stations
- 3 Reservoirs
- 3 Elevated Water Storage Tanks
- 3 Water Pumping Stations

Water Distribution & Sanitary Collection

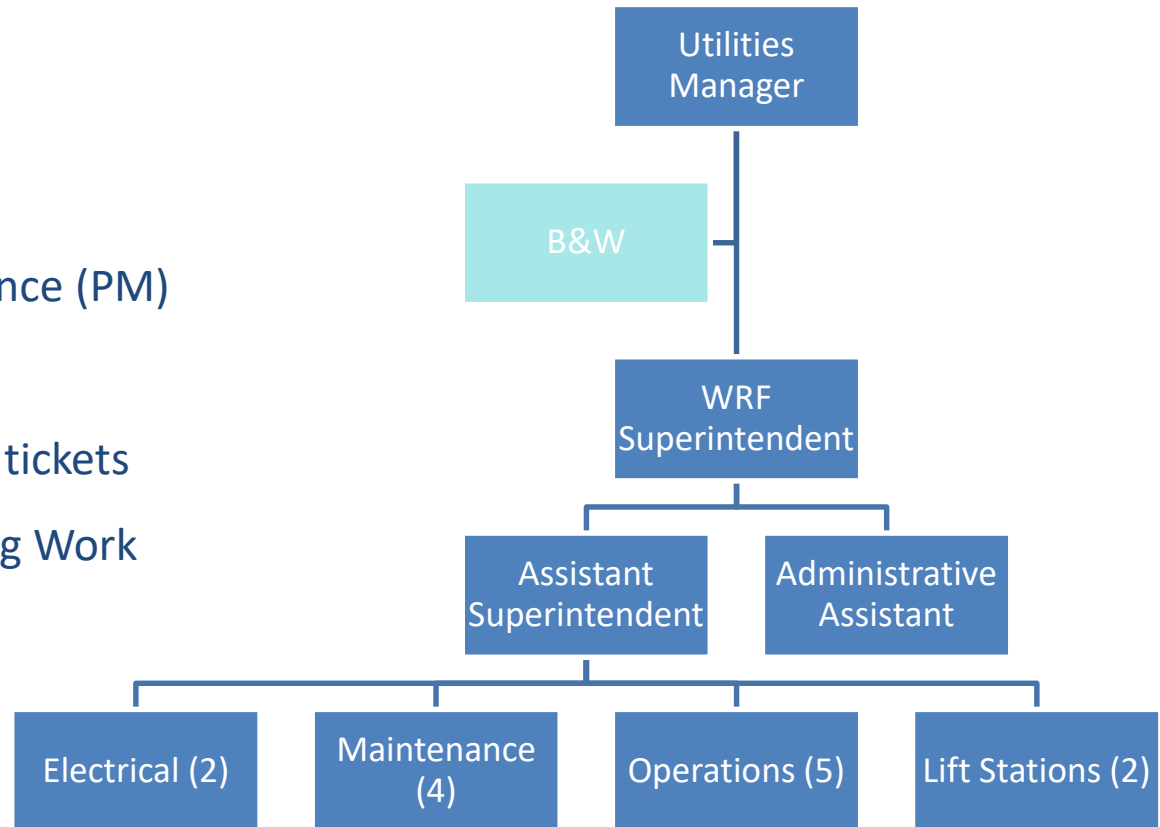
- 898,000 LF of Water Main
- 2,000 Hydrants
- 3,000 Valves
- 3 Interconnects with DuPage Water Commission
- 3,000 Sanitary Structures
- 765,000 LF of Sewer Pipe



Water Production & Wastewater Treatment

Current Operations

- 16 Staff Members
- Preventative Maintenance (PM) on over 900 assets
- No longer using paper tickets for assigning and tracking Work Orders

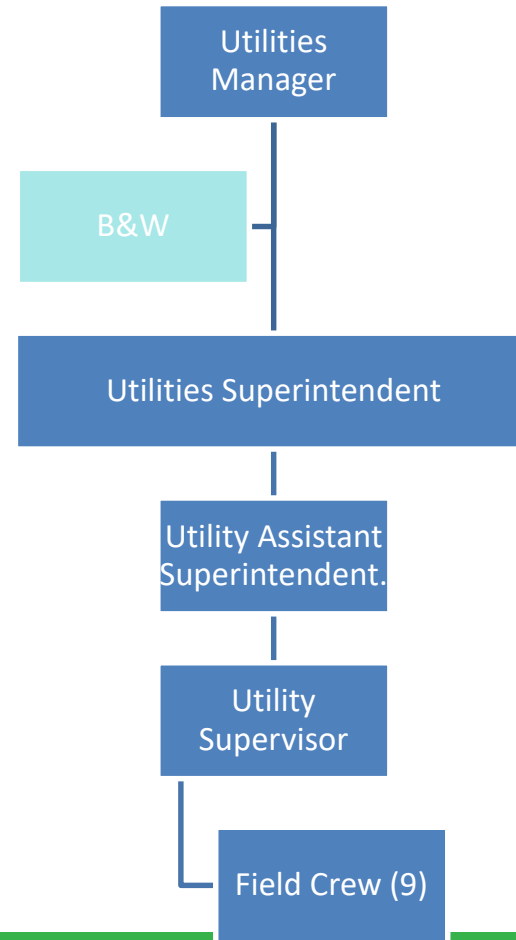


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Water Distribution & Sanitary Collection

Current Operations

- 18 Staff Members
- FOG Inspections
- MACP and PACP inspections
- Sewer Televising Videos
- GIS Integration
- AMRs
- Hydrant, Valve and Watermain Maintenance



City's CMMS Software

Many other
CMMS Software
options:



Lucity, Inc.

- Founded in 2000 as GBA Master Series, Inc.
- Based in Overland Park, Kansas
- Comprised of several modules tailored to Public Works CMMS Solutions
- Offers GIS Integration
- Android/iOS Mobile Support

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City's CMMS Software

Lucity, Inc. Modules:

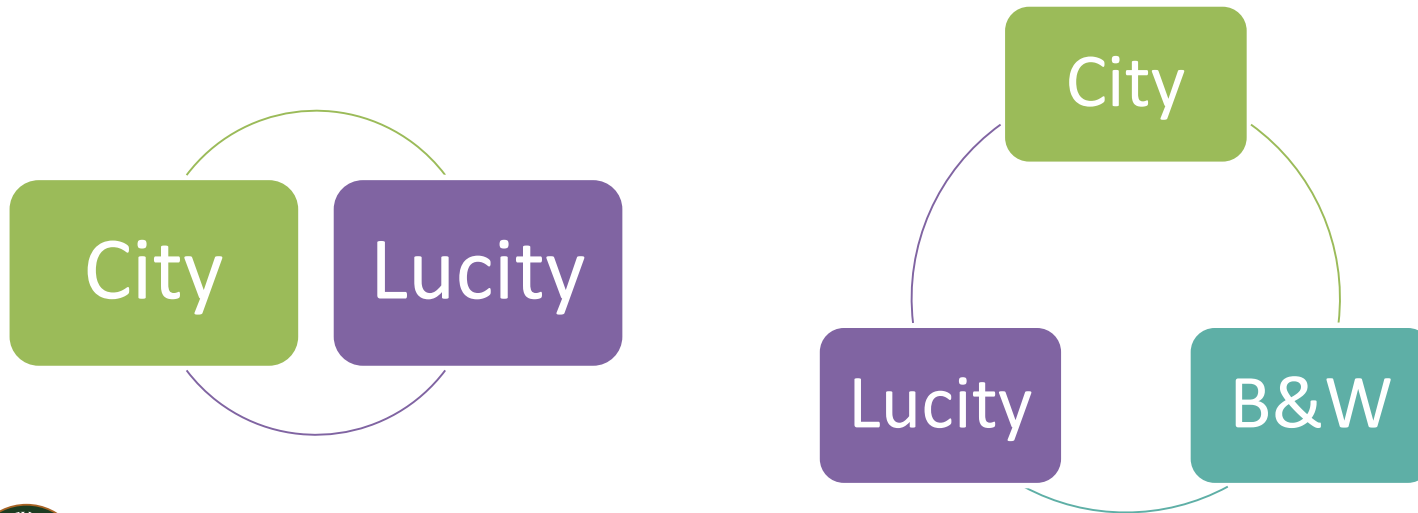
- Equipment (Fleet, Facility, Plants)
- Parks & Recreation (Trees, Inspections)
- Sewer (Structures, Pipes, Valves, MACP, PACP, etc)
- Environmental Compliance (FOG, Pre-treatment Programs)
- Storm (Structures, Pipes, Valves, BMPs, etc)
- Street (Roads, Right of Ways, Accidents, Bridges, etc)
- Water (Hydrants, Valves, Flushing, Raw Water, etc)
- Work (Inventory Management, Work Requests, Work Orders, PMs)



City's CMMS Software

CMMS at the City of Elmhurst

- Migrated into “Lucity” from “Maintenance View” in 2013
- Complications at initial implementation
- Baxter & Woodman has provided implementation support



Setup

Implementation and Startup for the Water Production & Wastewater Treatment Division

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Setup – WRF, Sanitary, Storm, and Water Production



Implementation Plan



Step 1: BONES

- Asset Inventory Collection



Step 2: MUSCLE

- Preventative Maintenance Setup



Step 3: BRAINS

- Internal Workflow, Tablets, and Training



Step 1: Asset Collection



Assets - Accurate and standardized data is key

Issues:

- Existing assets were not updated, decommissioned, or removed
- Existing information on assets was incorrect or incomplete
- There were no standards for naming, grouping, or consistent attribute collection
- New assets were not being entered



Step 1: Asset collection

Assets - Accurate and standardized data is key

Solution: Verifying existing assets and collecting new ones

- B&W worked with operators and supervisors to **collect and verify existing information for 1000 assets** using mobile tablets
- Supervisors provided input on **required attributes** and **established SOPs** for adding new assets
- **Standardized names** for the new assets.



Step 1: Asset collection

Progress Tracking Tools

Data Collection Status at WRF



- + Data Collection Status By Building/Structure (994)
 - Undefined (0)
 - For Supervisor's Review (0)
- + Operators to Re-check By Building (6)
 - For Lucy Admin to Check (8)
- + TMC/EAP/MJK - Assets addressed without MFR (493)

Data Collection Status at Lift Stations




- + Data Collection Status By Building/Structure (278)
 - Undefined (0)
 - For Supervisor's Review (0)
- + Operators to Re-check (0)
- Approved (276)



Step 1: Asset collection

Supervisor determines level of break-down

Operational Lift Station Equipment by Building/Structure - SAYLOR & JACKSON LIFT STATION (X) +							
							
	Equipment ID	Equipment Name	Status	Manufacturer	Model	Building/Structure	
+	LS-0108	CHANNEL MONSTER - MOTOR CONTROLLER	Operational	JWC	PC2200	SAYLOR & JACK	
+	LS-0113	CHANNEL MONSTER	Operational		CDD3210-XDS2.0	SAYLOR & JACK	
+	LS-0116	CHANNEL MONSTER - CONTROL PANEL	Operational	Allen-Bradley	pc2200	SAYLOR & JACK	
+	LS-0210	CHANNEL MONSTER - SCREEN	Operational	JWC	CDD3210-XDS2.0	SAYLOR & JACK	
+	LS-0211	CHANNEL MONSTER - REDUCER	Operational	JWC	cnvjs-6125y-29-182t	SAYLOR & JACK	
+	LS-0212	CHANNEL MONSTER - MOTOR	Operational	JWC	NEMA 6P IMMERSIBLE	SAYLOR & JACK	



Step 1: Asset collection

Equipment Form

1 of 26

Home Equipment Inventory X +

GEN Equipment Inventory Detail

General Equipment Form

Equipment ID*	Equipment ID Text*	Equip Rec #
A-052	PRIMARY SLUDGE PUMP #3 (SOUTH)	87
Department*	Operating Status*	
1 - WRF	1 - Operational	
Manufacturer	Building/Structure*	
KS - KOMLINE SANDERSON	STP-13 BLDG 13 (DIGESTER CONTROL)	
Vendor	Additional Location Details	
DE DRYDON EQUIP. INC.	DIGESTER BASEMENT	
Model	Installed Date	
KS-11-2		
Serial Number	Purchase Date	Purchase Amount
11SP-2-1374A	12/1/1999	
HP	Service Life	Replace Date
10		
Phase	Default WO Cat	
3 460V	9270 Production & Treatment - Equipm	
Hertz	General Comment	
60	60' TDH 250 GPM	
RPM	Comments for WO	
50		
<input type="checkbox"/> Document attached		
Data Collection Status*		
3 - Approved		



Step 2: Preventive Maintenance (PM) Setup



PM – Tracking work without impacting efficiency

Issues:

- Preventative Maintenance setup was inefficient.
- PM tickets were originally created to generate as many work orders as tasks, even for those tasks that should occur concurrently within the same work order.
- This would cause operators to have to revisit the equipment several days, as different tickets would generate, in order to complete all the PM tasks.
- Work orders were being printed and collected on paper.



Step 2: Preventive Maintenance (PM) Setup

PM – Tracking work without impacting efficiency

Solution:

- B&W worked with Operators and Supervisors to consolidate the PM tickets for over 1000 assets
- Maintenance crew provide key insight to distill O&Ms into the required steps.
- Like assets, establishing standardized PMs is critical
 - Creating PMs for weekly, monthly, annual tasks on the same asset
 - Utilizing weeks, PMs can be scheduled to fall on a Monday consistently
 - Tracking time on the overall Work Order vs the individual tasks
 - All the tasks due with the same frequency in a single ticket



Step 2: Preventative Maintenance (PM) Setup



Name of asset

Frequency

Workgroup

WRF - PM Creation - Single Work Order for Asset(s) View

PM/Template	PM/Template Text	Status Text	Category	Category Text
WRF-0060-01-OP	BELT FILTER PRES - WEEKLY P - OPERATIONS	Awaiting WO Generation	9270	Production & Tre

PM Checklists (2) PM Tasks (1) PM Assets (2) Work Orders (9)

Line Number	Checklist
1	Check oil level(s)
2	Grease pillow block bearings

All tasks on the SAME equipment, and with the SAME frequency and SAME workgroup on the SAME ticket



Step 3: Internal Workflow, Tablets, and Training



Work orders – Create simple yet customized dashboards

Issues:

- Originally the City staff was using paper tickets. It was up to the supervisor to transfer those hours and comments from the paper into the CMMS.
- There was no system in place other than the paper to track on-hold tickets or third party repairs
- It was hard to track employee workload and use performance metrics, such as aging of the work orders.
- There were “too many clicks” to access any information



Step 3: Internal Workflow, Tablets, and Training

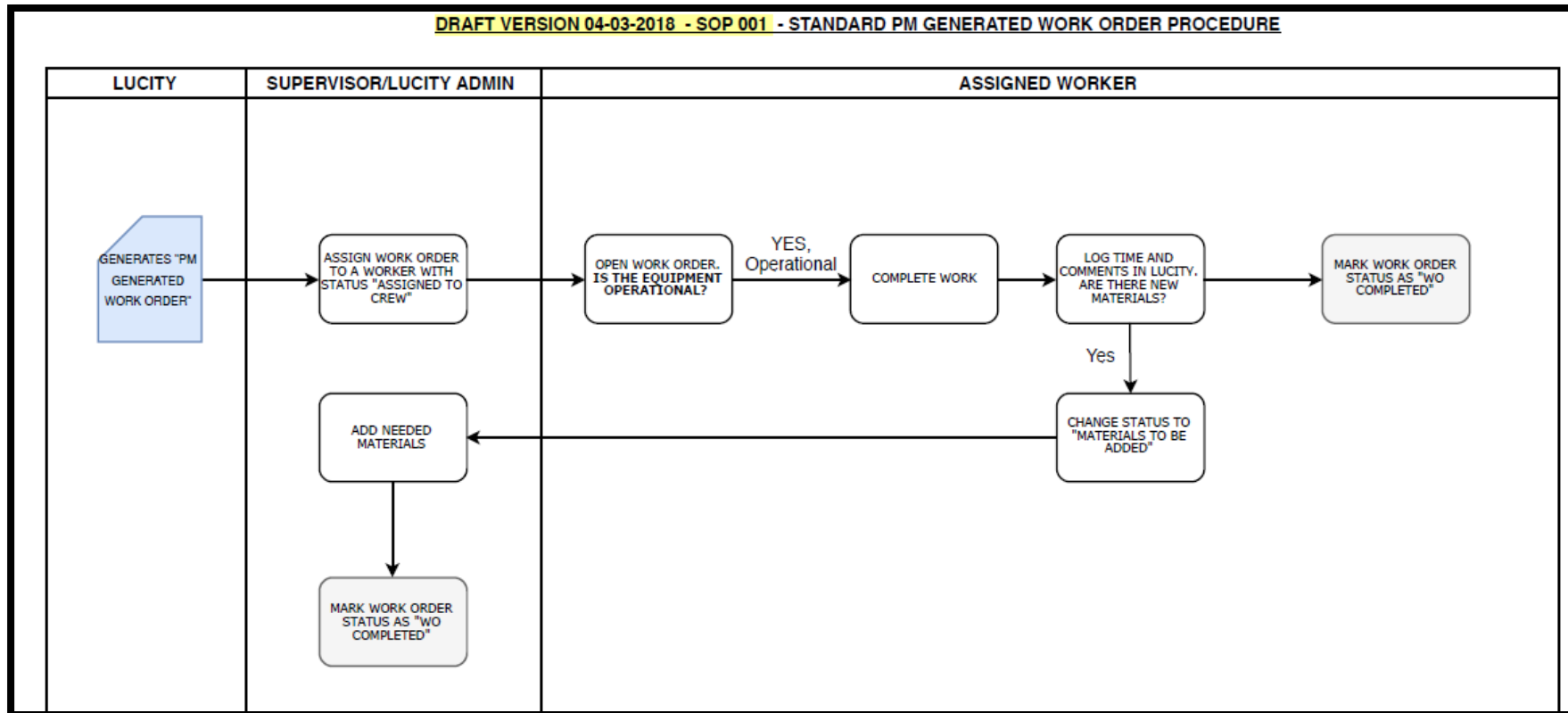
Work orders – Create simple yet customized dashboards

Solution:

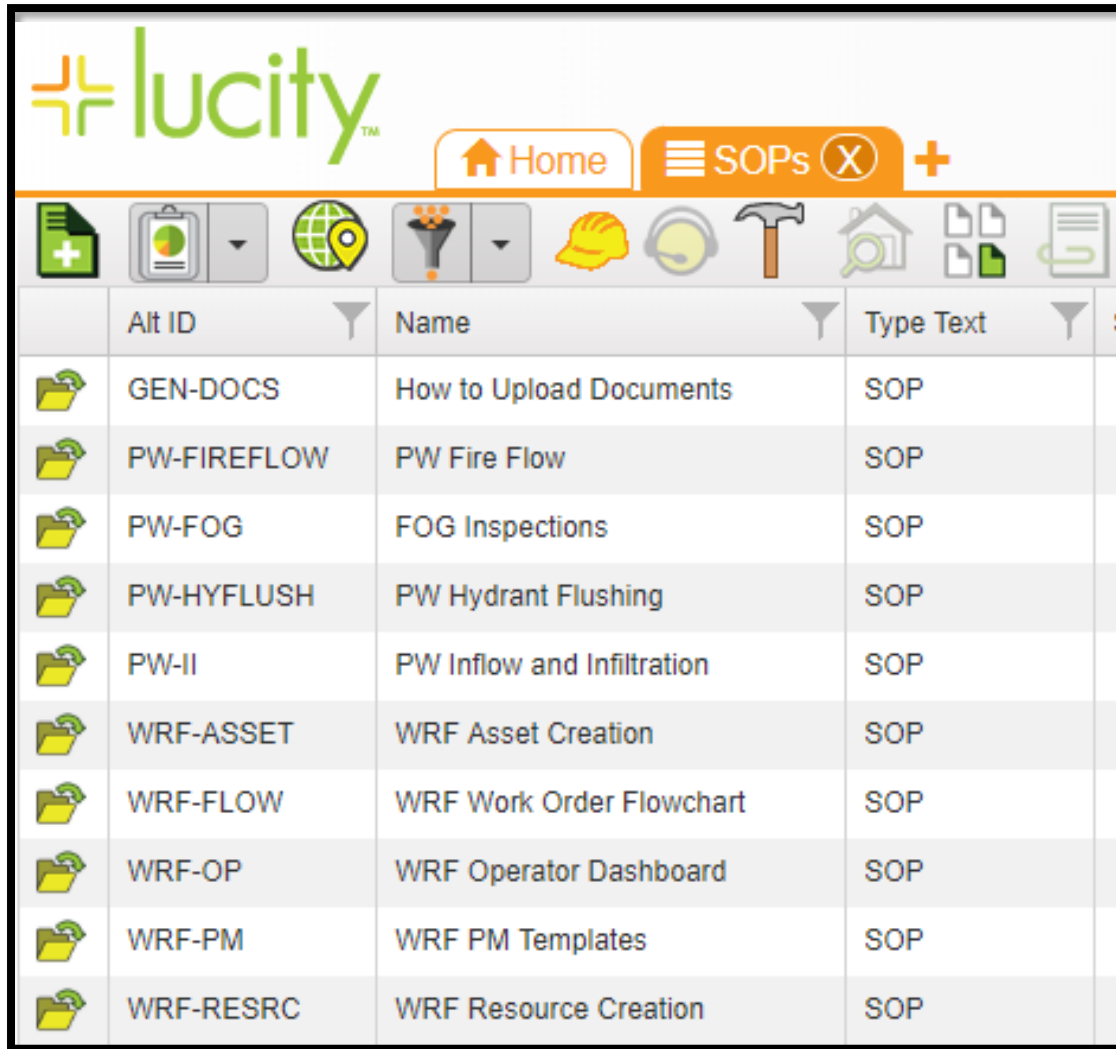
- Set up tablets with the Mobile CMMS app.
- Work with Supervisors to develop SOP on how to track different workflow situations (3rd party repairs, out-of-service equipment, parts missing...)
- Provide hands-on training for Supervisors and Operators
- Create customized interfaces for Supervisors with managerial and QA/QC tools
- Create a simplified “My Work” dashboard for Operators to streamline workflow
- Simplify tracking of PM tickets vs. Service Requests by Workgroup and Division













SOP Workflow Example



Access to CMMS Trainings and SOP

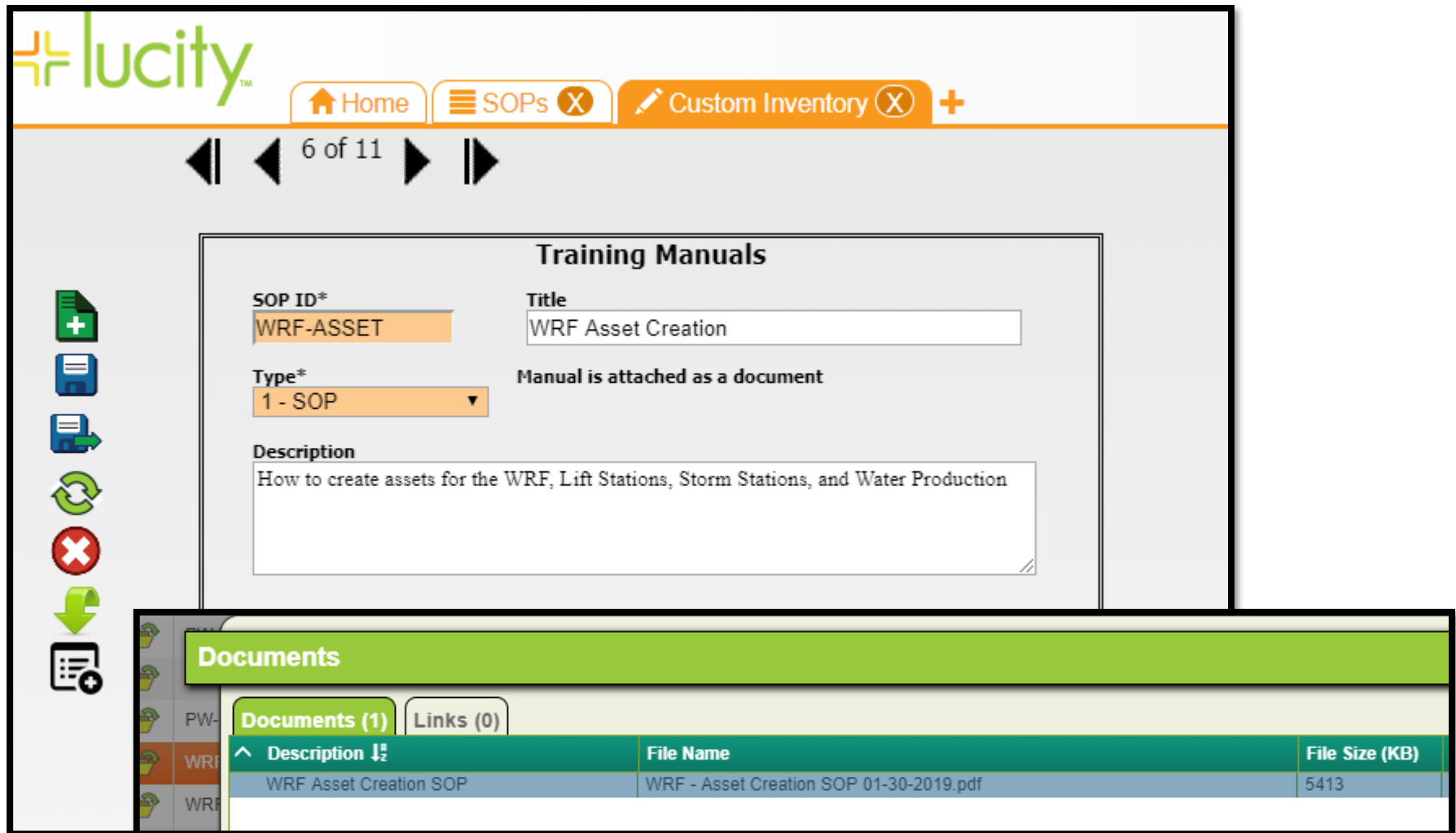


The screenshot shows the Lucity CMMS interface. At the top is the Lucity logo. Below it is a navigation bar with 'Home' and 'SOPs' (selected) buttons. A toolbar contains various icons for document management, location, filters, and actions. The main content area is a table listing SOPs.

	Alt ID	Name	Type	Text
	GEN-DOCS	How to Upload Documents	SOP	
	PW-FIREFLOW	PW Fire Flow	SOP	
	PW-FOG	FOG Inspections	SOP	
	PW-HYFLUSH	PW Hydrant Flushing	SOP	
	PW-II	PW Inflow and Infiltration	SOP	
	WRF-ASSET	WRF Asset Creation	SOP	
	WRF-FLOW	WRF Work Order Flowchart	SOP	
	WRF-OP	WRF Operator Dashboard	SOP	
	WRF-PM	WRF PM Templates	SOP	
	WRF-RESRC	WRF Resource Creation	SOP	



Access to CMMS Trainings and SOP



The screenshot shows the Lucity CMMS interface. At the top, there's a navigation bar with 'Home', 'SOPs', and 'Custom Inventory' buttons. Below this is a slide bar showing '6 of 11'. The main form is titled 'Training Manuals' and contains the following fields:

- SOP ID***: WRF-ASSET
- Title**: WRF Asset Creation
- Type***: 1 - SOP (dropdown menu)
- Description**: How to create assets for the WRF, Lift Stations, Storm Stations, and Water Production

Below the form, there's a 'Documents' section with a table showing the attached document:

Documents		
Documents (1) Links (0)		
Description	File Name	File Size (KB)
WRF Asset Creation SOP	WRF - Asset Creation SOP 01-30-2019.pdf	5413



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Access to CMMS Trainings and SOP

Documents		
<div>Documents (1) Links (0)</div>		
^ Description ↓	File Name	File Size (KB)
WRF Asset Creation SOP	WRF - Asset Creation SOP 01-30-2019.pdf	5413

Lucity How-To: Asset Creation

Contents

Glossary	
Lucity Web	
Asset Creation Dashboard	
Creating Equipment	
Creating a Pump Station	
Creating a Pump.....	
Attaching a Pump to a Pump Station	
Lucity Mobile.....	
Asset Creation Dashboard	
Creating Equipment	
Attaching a Child Asset to a Parent Asset	
Creating a Pump.....	
Creating a Pump Station	
Attaching a Pump to a Pump Station	



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Supervisor's Dashboard



Work Orders to Assign

- + Service Request Tickets to Assign (0)
- + PM Generated Work Orders to Assign (30)

Supervisor Action Required

Work Orders On Hold - Out of Service (2)
Work Orders On Hold - Waiting on Part (3)
Work Orders On Hold - Decommissioned (0)
Third Party Repair Work Orders (1)
In-House Repair Work Orders - Mark These Assets Operational (0)

Service Request Tracking

- + 0-1 Week Old Assigned Service Requests (1)
- + 1-2 Week Old Assigned Service Requests (3)
- + 2-3 Week Old Assigned Service Requests (0)
- + 3+ Week Old Assigned Service Requests (2)

PM Generated Work Order Tracking

- + 0-1 Week Old Assigned PM Generated Work Orders (32)
- + 1-2 Week Old Assigned PM Generated Work Orders (62)
- + 2-3 Week Old Assigned PM Generated Work Orders (40)
- + 3+ Week Old Assigned PM Generated Work Orders (242)

Supervisor QA/QC Tools

- + Open Work Orders with No Supervisor (19)
- + Open Work Orders with No Lead Worker (31)

Work Order # Lookup

GO

Closed Service Requests This Year

- Work Orders Completed by Third Party (0)
- + Work Orders Closed in January (57)
 - + Work Orders Closed in February (24)
 - + Work Orders Closed in March (36)

Closed PM Generated Work Orders This Year

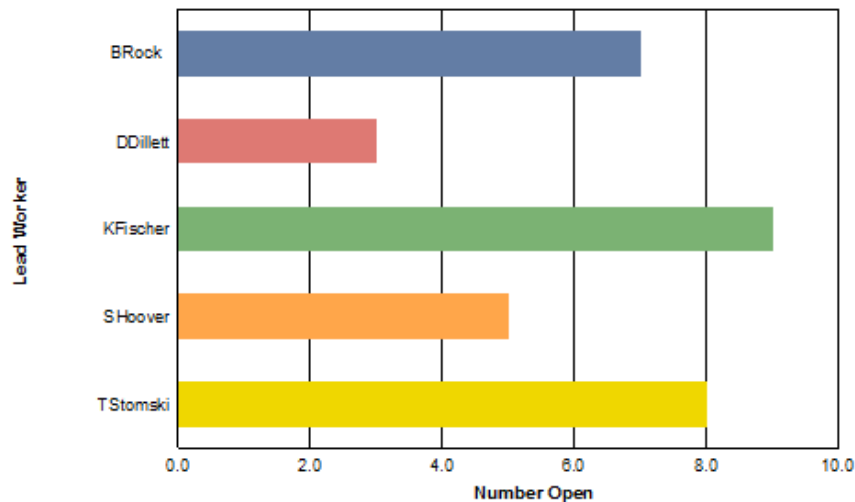
- + Work Orders Closed in January (544)
- + Work Orders Closed in February (178)
- + Work Orders Closed in March (504)
- + Work Orders Closed in April (356)

Supervisor's Dashboard

Open Work Orders

Open Work Orders by Lead Worker

Lead Code	Lead Worker	# Open
BRock	Brad Rock	7
DDillett	Dan Dillett	3
KFischer	Kirk Fischer	9
SHoover	Steve Hoover	5
TStomski	Tomasz Stomski	8



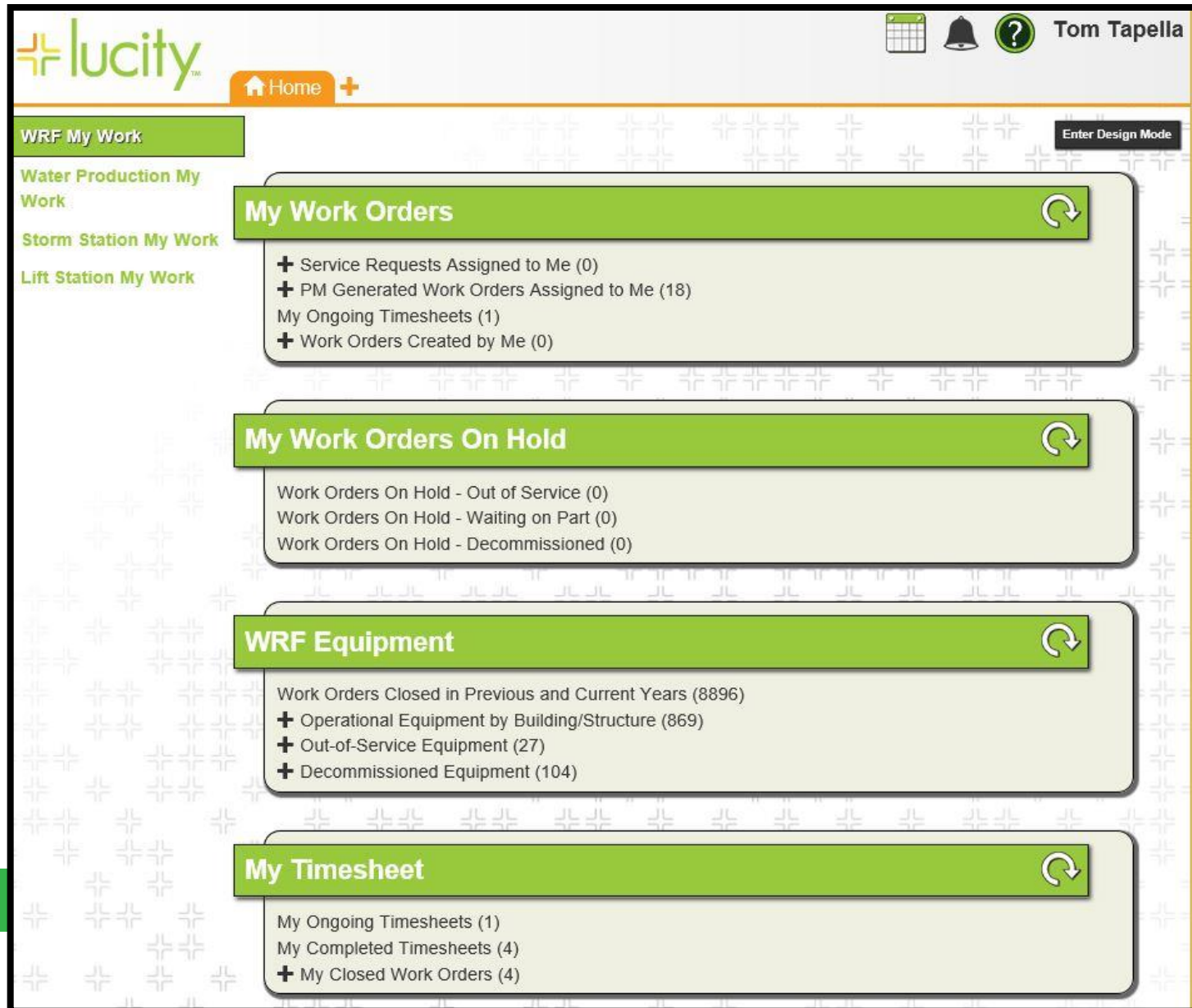
Closed PM Generated Work Orders This Year

- + Work Orders Closed in January (544)
- + Work Orders Closed in February (178)
- + Work Orders Closed in March (504)
- Work Orders Closed in April (352)
 - + Admin (1)
 - + Electrical (65)
 - + Lift Stations (72)
 - + Maintenance (124)
 - + Operations (43)
 - + Water Production/Lift Stations (47)

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Operator's Dashboard



The screenshot displays the 'Operator's Dashboard' for the 'lucity' system. The top navigation bar includes the 'lucity' logo, a 'Home' button, and user information for 'Tom Tapella' with icons for a calendar, notifications, and help. A sidebar on the left lists navigation options: 'WRF My Work', 'Water Production My Work', 'Storm Station My Work', and 'Lift Station My Work'. The main content area features four green-titled cards, each with a refresh icon:

- My Work Orders**
 - + Service Requests Assigned to Me (0)
 - + PM Generated Work Orders Assigned to Me (18)
 - My Ongoing Timesheets (1)
 - + Work Orders Created by Me (0)
- My Work Orders On Hold**
 - Work Orders On Hold - Out of Service (0)
 - Work Orders On Hold - Waiting on Part (0)
 - Work Orders On Hold - Decommissioned (0)
- WRF Equipment**
 - Work Orders Closed in Previous and Current Years (8896)
 - + Operational Equipment by Building/Structure (869)
 - + Out-of-Service Equipment (27)
 - + Decommissioned Equipment (104)
- My Timesheet**
 - My Ongoing Timesheets (1)
 - My Completed Timesheets (4)
 - + My Closed Work Orders (4)

An 'Enter Design Mode' button is located in the top right corner of the dashboard area.



Preventive Maintenance Forecasting Tools

Smart Meters Dashboard
Lucity Training Manuals
PM Forecast
Asset Creation
PM and Resource Creation
WRF Supervisor Dashboard
WRF My Work
Lift Station Supervisor Dashboard
Lift Station My Work
Storm Station Supervisor Dashboard

Upcoming PMs

+ PMs coming in the next 7 days (20)
+ PMs coming in the next 30 days (72)

All PM Templates

WRF PMs (335)
Lift Station PMs (84)
Water Production PMs (65)
Storm Station PMs (37)



In conclusion

CMMS Requires Teamwork and Continued Efforts



Image Courtesy of: <http://aib.edu.au/blog/teamwork/teamwork-is-important-in-the-workplace/>



CMMS Takeaways

Garbage In = Garbage Out

- Top to Bottom Involvement
 - Managerial input to guide information collection
 - Operator/staff input to determine user interface and maintenance plans
- CMMS Upkeep
 - Quality and standardization of data is key to provide useful reports
 - Asset Directors and CMMS Admins provide long-term sustainability
- IT/GIS Support to keep data connected
 - SQL Database
 - ESRI Partner – ArcGIS Support



Future Steps

For WRF, Water Production, Storm and Sanitary Stations

- As new construction projects occur, City requesting contractor to provide CMMS Info sheets
- Systematic upload of drawings and O&Ms

For underground utilities

- Proper interfacing with GIS (AGOL) occurring this year
- Pre-treatment & I/I program reporting



Questions?



Thanks!

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