Argon
by Jacobs

From Field Data to Solutions

Utilities face daunting challenges when managing field data, prioritizing asset conditions, and developing rehabilitation, maintenance and reinspection plans for their wastewater and stormwater assets. The effort is complicated by various inspection techniques, software platforms, and inventories.

Argon (formerly SCREAM) helps utilities across the country overcome these challenges. Argon is a state-of-the-art, EPA-highlighted sewer and storm asset management system.

- **Argon** calculates robust condition scores, designed for prioritization.
- **Argon** estimates assets' remaining useful life and calculates risk scores based on detailed asset data and GIS
- **Argon** then includes any asset history to recommend next actions for each asset (e.g., should an asset be rehabilitated or re-inspected). Argon also creates lists of recommended, scheduled work orders.
- Finally, **Argon** estimates the cost of repairs, replacement and rehab and chooses the optimal methodology for immediate action or over the lifecycle of the asset.

Armed with information from Argon, utilities can create informed, data-driven re-inspection, maintenance, and rehabilitation plans. Utilities can use Argon for a snapshot of their system or can install Argon to generate weekly work assignments and work orders.

The Argon Steps

The Argon process has five distinct steps to help utilities manage data and prioritize assets. Utilities may use some or all the steps.

The Argon Steps

Score	AI Trigger	Risk	Next Step	Costing

Score

Calculate condition scores
Argon's condition scores were designed for accurate asset prioritization. Argon assigns defect scores based on defect code, defect extent, pipe material and aggregates scores by defect families (like cracks, roots, or corrosion) which have distinct pipe failure mechanisms.

AI Trigger

Target defect combinations using AI
Argon's artificial intelligence (AI) model analyzes defects, pipe attributes and pipe location, teasing out the pipes with combinations of defects and attributes that are more likely to fail.

Risk

Calculate risk scores (bottom up)
Argon uses a risk-based, information driven, bottom-up approach to identify the Consequence of Failure (Cof) and Likelihood of Failure (LoF) risk matrices on an asset-by-asset basis. Utilities can use their own risk scoring process in place of Argon Risk. Conversely, Argon Risk can be used on its own without the other Argon steps.

Next Step

Create Plans and Schedules
Condition scores, risk scores, and work order history are input into Argon's logic matrices to recommend next steps for each pipe (e.g., should it be rehabilitated or monitored). Each pipe is given both structural and maintenance next steps which are then scheduled to create lists of recommend work orders.
- Re-inspection plans and schedules
- Maintenance plans and schedules
- Rehab plans (for CIP)

Costing

Rehab and Maintenance Costs
Estimate RUL, immediate and lifecycle costs
Argon Costing, calculates the cost of repairs, replacement, rehab and continued maintenance over time. Argon estimates short-term and lifecycle costs for each methodology and chooses the optimal methodology for addressing the utilities' priority assets. Cost estimates are ideal for budgeting purposes.:
- Current repair/replace/rehab costs
- RUL & Lifecycle costs
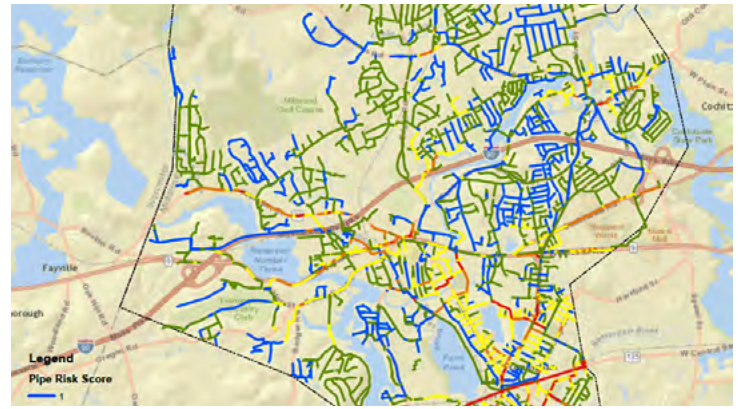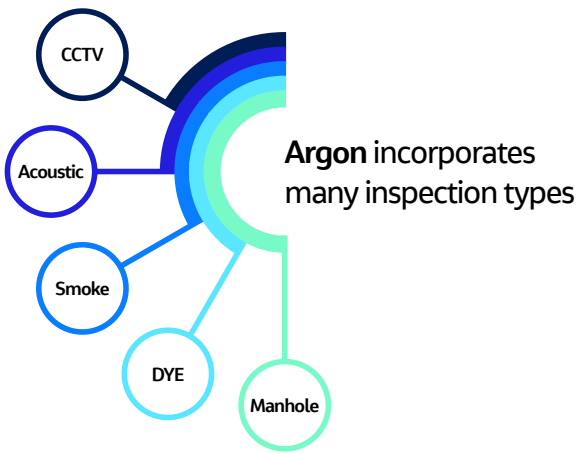- Trench locations and rehab methods

Argon is used three different ways:

- As a short-term solution to perform analyses for Jacob's projects
- As part of Jacob's web-based Dragonfly software, analyzing the PACP results
- As a continuous management system, installed on a utilities' network

When Argon is installed on site, it is integrated with the utilities' maintenance management system, inspection software and GIS. Argon is then scheduled to run (typically nightly) so results are up to date and assets are managed seamlessly.
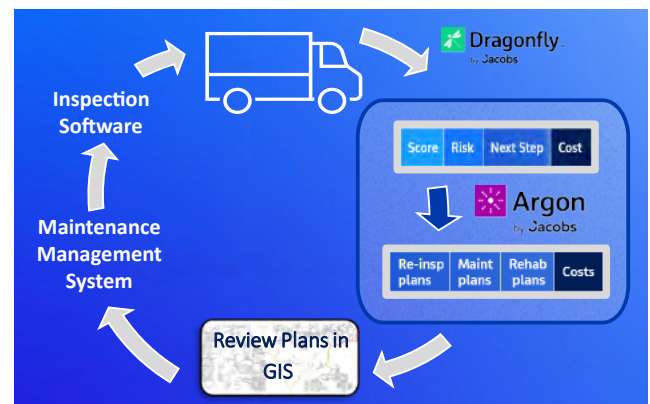
Argon's goal is to complete the inspection to work order cycle, integrating with your existing software systems

Argon incorporates many inspection types

CCTV
Acoustic
Smoke
DYE
Manhole

Example Argon Grades displayed in Reports and GIS

Diameter Large/ Small	Latest Inspection Type	High Defect Acceleration	Risk COF Grade	Structural Grade					
				0	1	2	3	4	5
Small	CCTV	No	1-2						
			3-4						
			5-6						
			7-8						CCTV 18 months	
			9-10						
			Unknown						

Example Portion of Argon Next Step Structural Logic

Replace Immediate Costs

	Option 1	Option 2
	Trench	Tunnel
Costing Factor	1.25	1.00
Num laterals total	7	7
Lateral reinstate unit cost ($ per lat)	1,355	1,355
Replace unit cost ($/ft)	415	2,124
Total cost	$151,351	$589,550
Selected Option	Trench	
Selected Option Cost	$151,351	

Repair Immediate Costs

	Option 1	Option 2
	Trench	Internal Spot Repair
Costing Factor	1.25	1.00
Num laterals in trenches	2	2
Lateral reinstate unit cost ($ per lat)	1,355	1,355
Replace unit cost ($/ft)	816	220
Feet of trench costed as point	10	10
Num trenches	2	2
Total cost	$21,233	$6,705
Selected Option	Internal Spot Repair	
Selected Option Cost	$6,705	

Rehab Immediate Costs

	Option 1	Option 2	Option 3
	CIPP	Slipline	Shotcrete
Costing Factor	1.00	1.00	1.00
Num laterals in trenches	1	1	1
Lateral reinstate unit cost ($ per lat)	200	200	200
Replace unit cost ($/ft)	127	253	10,000
Feet of trench costed as point	10	10	10
Num trenches	1	1	1
Total cost	$41,662	$76,007	$2,737,859
Selected Option	CIPP		
Selected Option Cost	$41,662		

Argon Costing for an Example Pipe

Other Argon Capabilities

Manholes And Special Structures:

The **Argon** steps are available for manholes and other special structures. **Argon** Scoring, Next Step and Costing gives utilites the ability to better prioritize and pinpoint assets needing reinspection, cleaning rehab or repair. **Argon** incorporates MACP inspections and can be configured for other inspection types.
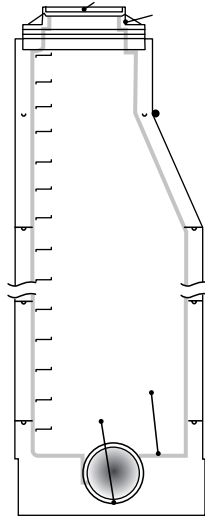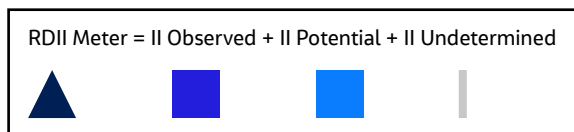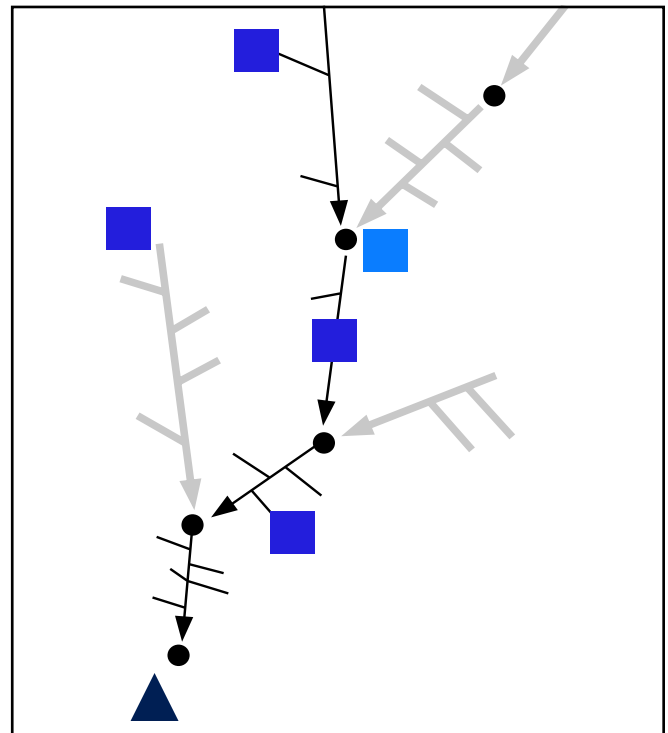
Argon Macp Inspections

Component	Struct Grade	StructII Grade	Corrsn Grade	Quick Fix Needed
Cover and Frame	3	3	0	Yes
Seal	0	0	0	No
Chimney	1	2	1	No
Cone	0	1	0	No
Wall	0	1	0	No
Bench	0	0	0	No
Steps	0	0	0	No
Channel	0	0	0	No
Drop	0	0	0	No

Infiltration And Inflow:

Argon's infiltration/inflow (II) balancing module compiles both observed and potential sources of II from multiple inspection types then allows users to balance the flow using metering data.

RDII Meter = II Observed + II Potential + II Undetermined

Argon's Infiltration/Inflow (II) Balancing Module