

Leading-Edge Asset Management

2nd IWA Leading-Edge Conference & Exhibition on Strategic Asset Management

Planning upgrading of urban water networks – is there a need for the CARE-approach?

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Planning the rehabilitation of the Las Vegas water distribution network using CARE-W

Annie Vanrenterghem-Raven, L. S. Hafskjold

This presentation is based on two papers

- CARE-W
- 2 case studies
- Experiences
- Challenges
- Future development needs



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What is CARE-W?

- Computer Aided REhabilitation of Water Networks
- Series of tools that can be used as a whole or individually. On zonal or network level.
- The project was supported by the EC 5FP over 3years period, ended in 2003
- 10 research centers and 15 utilities participated



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The global picture and the background for CARE-W

- Water stress
- Aging infrastructure
- Climate change facing new challenges
- Demands for sustainable management
- Rehab planning is essential for Asset Management (AM) and for sustainable development



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Strategies applied in rehab planning

- Strategic planning on "network level"
- Tactical planning on pipe level, deals with the selection and ranking of projects to improve service.
- Technological level for selection of adequate technologies for the projects



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Performance Indicators



Performance Indicators (PI)

- Tracks Physical Condition, Water Resources, Operations, Quality of Service and Finances in view of rehabilitation planning;
- Analyze performance on network or zonal level
- Useful to track historical development in the utility, perform benchmarking and set targets



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Long Term Planning



Long Term Planning defines

- Current stock
- Degradation profile
- Economic data (direct cost of failure, variable cost of water produced, cost of replacement, etc.)
- Scenario of rehabilitation: when, what, how?



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Annual Rehab Planning



Annual Rehab Planning (ARP) is a multy criteria decision support system



ARP gives priorities on specific pipes, and the results can be presented in GIS

pe ID	Priority		
67703		-	
187468		-	
167690		╡⊾	
167659			$ \langle \langle X \rangle \rangle$
181459		-	
181447		-	
181450	—	-	
186040		-	
167474		-	
167486		-	



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LV: Spectacular entertainment...?



.. and fantastic desert nature !



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Water System Growth LVVWD



"We have to plan for the future now"

Marcellus Jones, head of Distribution, Las Vegas Valley Water District



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Photo: Las Vegas Valley Water District

Las Vegas "the ideal" candidate for CARE-W

- State of the art GIS
- Full hydraulic model
- Smart people eager to lead this field.
- Still difficult as LV systems were designed to support operations to deal with "now". While rehabilitation planning is about planning for the future based on the past. This requires a different way of organising data.
- Pipes needs "a history" in rehabilitation planning!



Organising data and GIS for AM



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When should assets be replaced?

Pipelines --- Life Expectancy

Steel40 to 100 YearsPVC35 to 120 YearsDuctile Iron40 to 90 YearsAsbestos Cement 20 to 80 Years



- Ranges are broad and a good plan is needed
- Asbestos Cement is the Early Challenge



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Current Assets (3D Histogram)



Investment plans, th<u>e LVVWD "Nessie Curve"</u>





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Conclusive words in LV

- It takes time to understand the AM system and its benefits
- Education of staff is crutial for data collection etc.
- AM is an expert system
- Ideal to build an AM in parallel with a GIS/hyd.
- Existing systems often need adjustments
- The results are not better than the data!









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Initial PI studies on zone level, to prioritise areas for more detailed rehabilitation planning (phase 1)

- 14 selected PI based on the needs in Trondheim
 - Water leakage
 - Interruptions planned/unplanned
 - Water quality
 - Rehabilitation and repairs
 - Customer complaints
 - One new "SRB"- PI based on share of grey cast iron pines in areas subject to SRB-corrosion
- The results is now taken further to phase 2
 - (complete CARE-W)



All PI analysed in ArcGIS,



	екказје /0
	73
Ranheim øst	69
Risvollan-Stub	69
Nedre Kolstad	63
Heimdal sør	60
Heimdal nord	54
Nedre Flatås	52
Bromsta-Tunga-	47
Sverresborg	45
Ugla	44
Litjvatnet	42
Sjetnemarka	40
Berg-Otilienbo	38
Hallset	35
Heimdal øst	32
Åsvang-Moholt	31
Havstein	30
Nidarvoll-Foss	28
Jakobsli øvre	23
Strindheim-Ros	20
Nardo-NTH	19
Lade	13
lla	13
Kastbrekka	12
Øya	12
Sentrum	11
Reppe	11
Bakklandet	11
Trolla	
Reppe	
Reppe	
Malvik	

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"New PI" to analyse the problem of SRB corrotion in Trondheim. Areas with clay and ductile iron



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The prioritised zones after weighted comparison of the PI results



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Experiences Trondheim

- PI analysis on zones can be compared to an internal benchmarking, but not all PI were possible to analyse without reference to the whole network.
- Useful exercise as a pre study and for coopertion with other sectors in rehab planning
- Cooperation with the municipality and GIS/AM developers makes it easier to get good quality data



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Comparing the two cases

Trondheim	Las Vegas
150 000 inhabitants	1 million inhabitants ++
(Norway 4,7 million)	(US 300 million)
"Normal" population growth	"abnormal" population growth
"old" network	"young" network
Lots of water	Dry!



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A Plan/framework with clear objectives Relevant and reliable data Adequate Tools Models + Management (people!)



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Thank you for your attention !



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