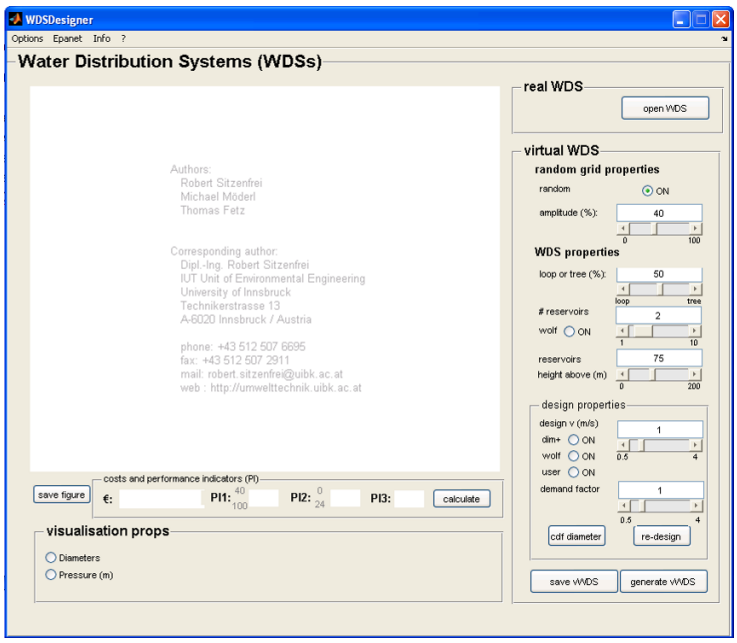
SYSTEM ID: WDS-Designer

NARRATIVE DESCRIPTION

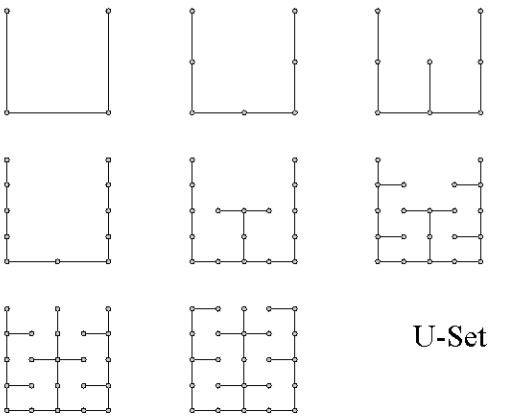
With the WDS Designer a tool for the algorithmic generation of synthetic water distribution systems (sWDS) based on GIS data was presented (Sitzenfrei et al., 2010). On basis of real world GIS data sWDS with varying properties can be generated. The sWDS generated are therefore comparable with real world water distribution systems (rWDS) but due to the algorithmic generation and the input parameters for the generation process, contrary to real world data, available with varying properties. The GIS data input necessary is:

- spatial water demand (population density)
- spatial junctions distribution (building density)
- digital elevation map

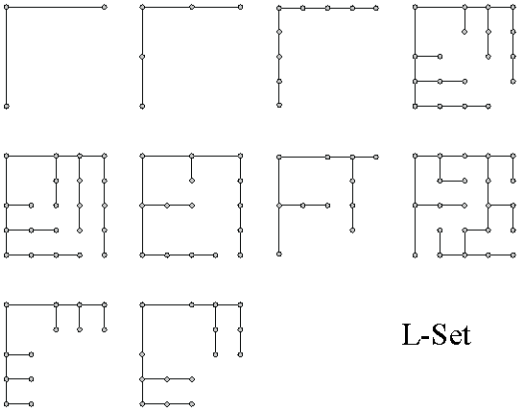
The generation process is controlled via a graphical user interface (GUI) and the generated sWDS as well as rWDS can be displayed with the GUI. The sWDS are composed of different network motifs (U-Set, L-Set, H-Set, O-Set). Several analysis concerning layout, graph, hydraulic or quality properties can be performed. The properties of the generation process of the system layout can be controlled by diverse parameters and therefore different sWDS with varying boundary conditions can be generated. Subsequent the generated system is auto-pipe sized according to parameters determined via the GUI. Besides the basic analysis of the generated sWDS provided by the GUI, an additional feature of this tool is that the sWDS can be saved as EPANET input files for further investigations. With the presented tool water distribution systems of real world represented by EPANET input files can be loaded, evaluated (hydraulic performance indicators and layout evaluations) or edited (e.g. redesigned).



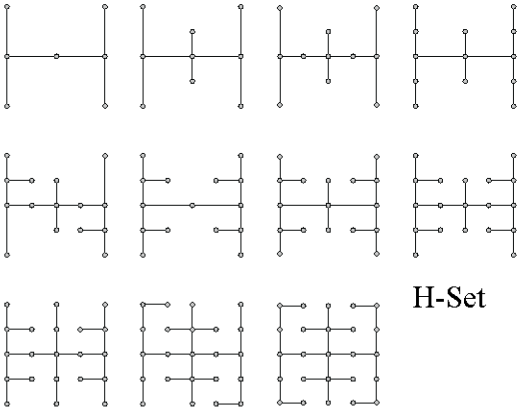
NETWORK SCHEMATIC:



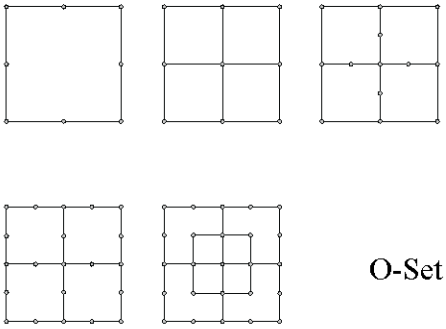
U-Set



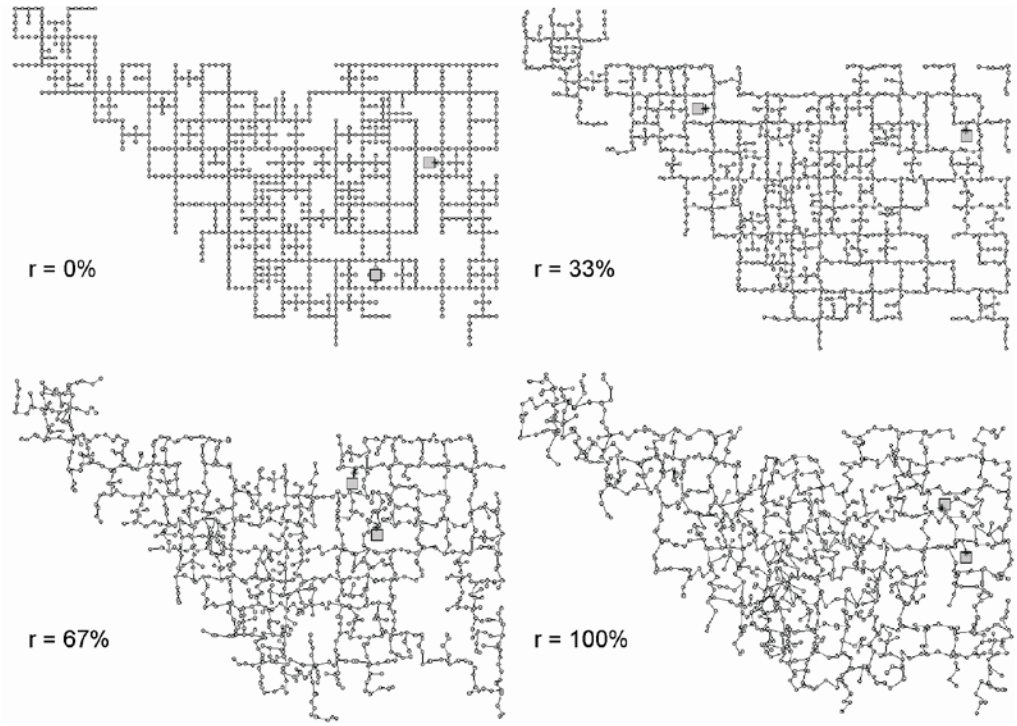
L-Set



H-Set



O-Set



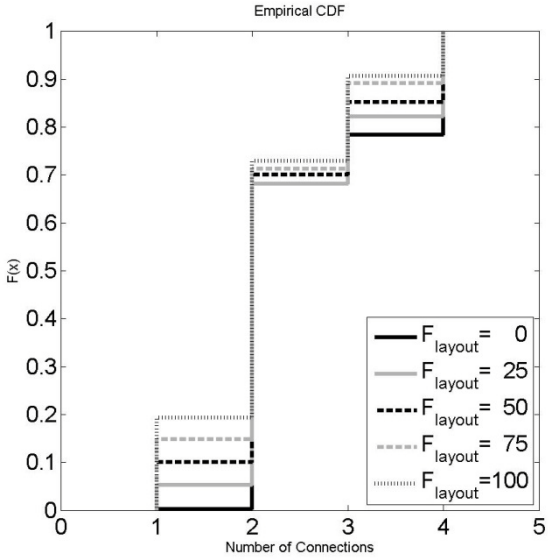
HISTORY OF THE NETWORK FILE

The approach of this tool can be applied to any appropriate GIS data. Within current version (1.x) of the tool the GIS input data is kept constant. The input data of that WDS is downloadable from university of Exeter (http://centres.exeter.ac.uk/cws/benchmarks/expansion/42-wolf-cordera-ranch). An application to different GIS data is shown in e.g. Sitzenfrei *et al.*, 2010; Sitzenfrei *et al.*, 2011.

AVAILABLE INFORMATION

Physical attributes	
Network geometry data	
Elevation data	
Pipe data	
Elevation data	
Demand data	
Total system demand	
Nodal demand data	
Hydraulic data	

PIPE/LOOP HISTROGRAM:



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Sitzenfrei R., Möderl M. and Rauch W. (2010a). Graph-based approach for generating virtual water distribution systems in the software ViBe. Water Science and Technology: Water Supply, 10 (6), 923-932.

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Sitzenfrei R., Moderl M., Hellbach C. and Rauch W. (2011). Application of a Stochastic Test Case Generation for Water Distribution Systems. World Environmental & Water Resources Congress, May 22 - 26, 2011, Palm Springs, California, USA.

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DETAILED DATA SUMMARIES

NETWORK CHARACTERISTICS:

# Total Pipes:	about 2000
# Branch Pipes:	depending on strategy
Ratio (Branch Pipes / Total Pipes):	
# Nodes	about 1800
# Reservoirs	1 - 10
# Tanks	0
# Regulating Valves	Unknown
# Isolation Values	Unknown
# Hydrants	Unknown
Elevation Data	YES

PIPE DATA:

Available pipe diameters for the pipe sizing process can be defined in the GUI. The diameters below are the default diameters.

Diameter (in)	Length (ft)
80	
100	
125	
150	
200	
250	
300	
350	
400	
500	
600	

PUMP DATA:

Pump Horsepower	NO
Pump Curves:	NO

DEMAND STATISTICS:

Demographic Type	Population	Households
Directly Serviceable:		
Indirectly Serviceable:		
Total Serviceable:		

Production Statistics	
Total Annual Volume Produced (MG):	
Total Annual Volume Purchased (MG):	
Total Annual Volume Provided (MG):	
Estimated Annual Water Loss:	

Water Costs	
Customer Type	
Customers within the municipality	
Customers outside the municipality	

CUSTOMERS AND USAGE:

Customer Type	Customer Count	Average Daily Demand (MGD)
Wholesale:		
Residential:		
Commercial:		
Institutional:		
Industrial:		
Other:		
Total Customers:		
Flushing, Maintenance & Fire Protection:		
Total Water Usage:		

DATA FILE ATTRIBUTES:

ATTRIBUTE		UNITS
Pipe Length & Diameter	X	Meter
Pipe Age		
Node Elevation	X	Meter
Node Demand	X	LPS
Valves		
Hydrants		
Tank Levels		
Tank Volume		
PRVs		
WTP		
WTP Capacity		
Pump Data		