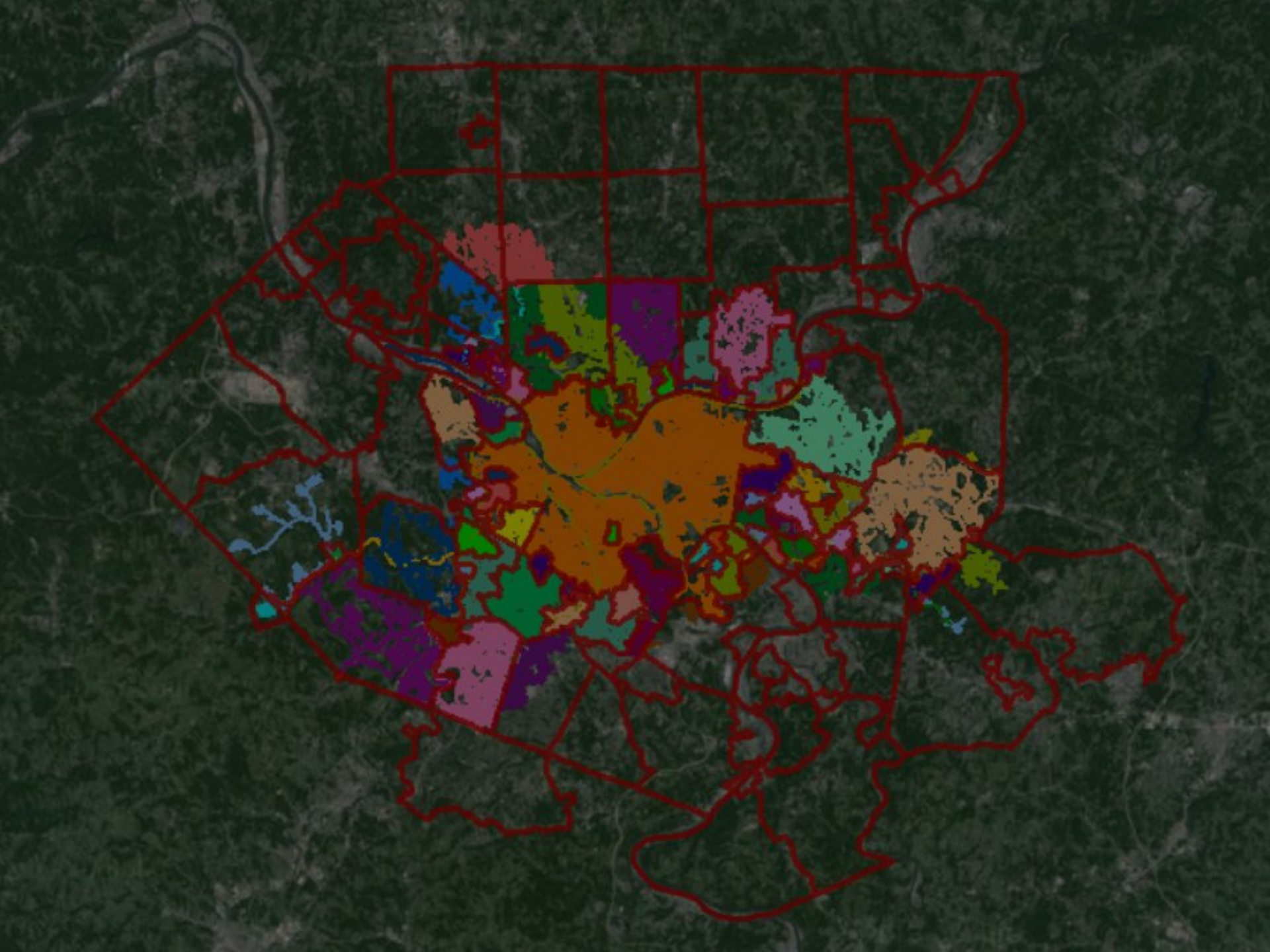
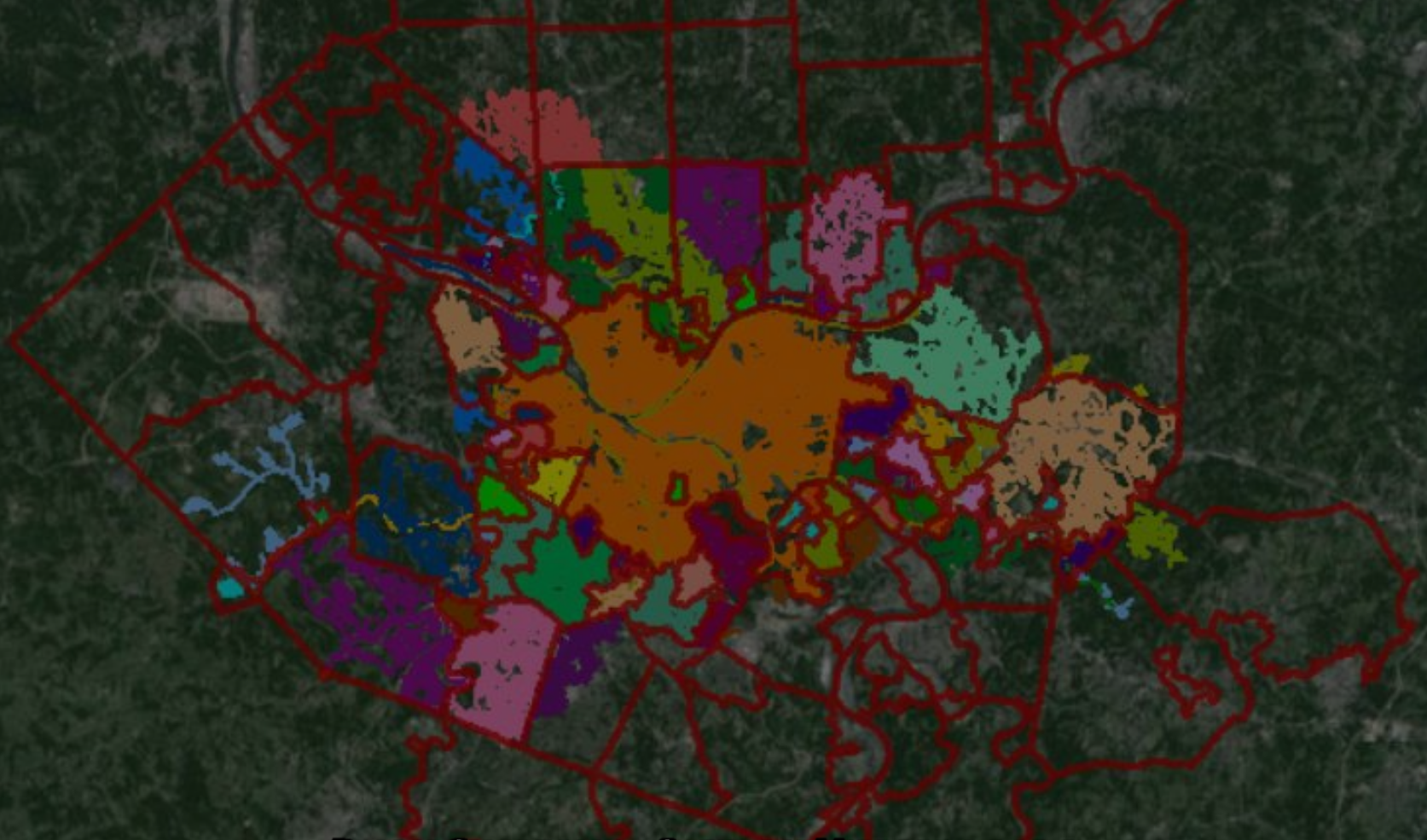


SEWERS OF THE FUTURE

evaluating regionalization alternatives for stormwater and sewer systems
in Allegheny County, Pennsylvania using the Analytic Hierarchy and Network Processes



BRIAN CHALFANT & SREERAM VISSAPRAGADA

BQOM 2521: Decision Making in Complex Environments

Dr. Thomas L. Saaty and **Rozann Saaty**

15 October 2013


PNC PARK
alcosan
THE PROBLEM
These waters receive sewage from sewer overflows as a result of rain, snowmelt, and other events. Please limit contact with these waters at these times.
For more information please call ALCOSAN at 1-888-936-9363. Please report the observation of any discharge occurring during dry weather to that number.
ALCOSAN STRUCTURE
A-05


9 BILLION GALLONS

MANDATED CHANGE

THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

UNITED STATES OF AMERICA,
COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF ENVIRONMENTAL
PROTECTION, and
ALLEGHENY COUNTY HEALTH
DEPARTMENT
Plaintiffs,

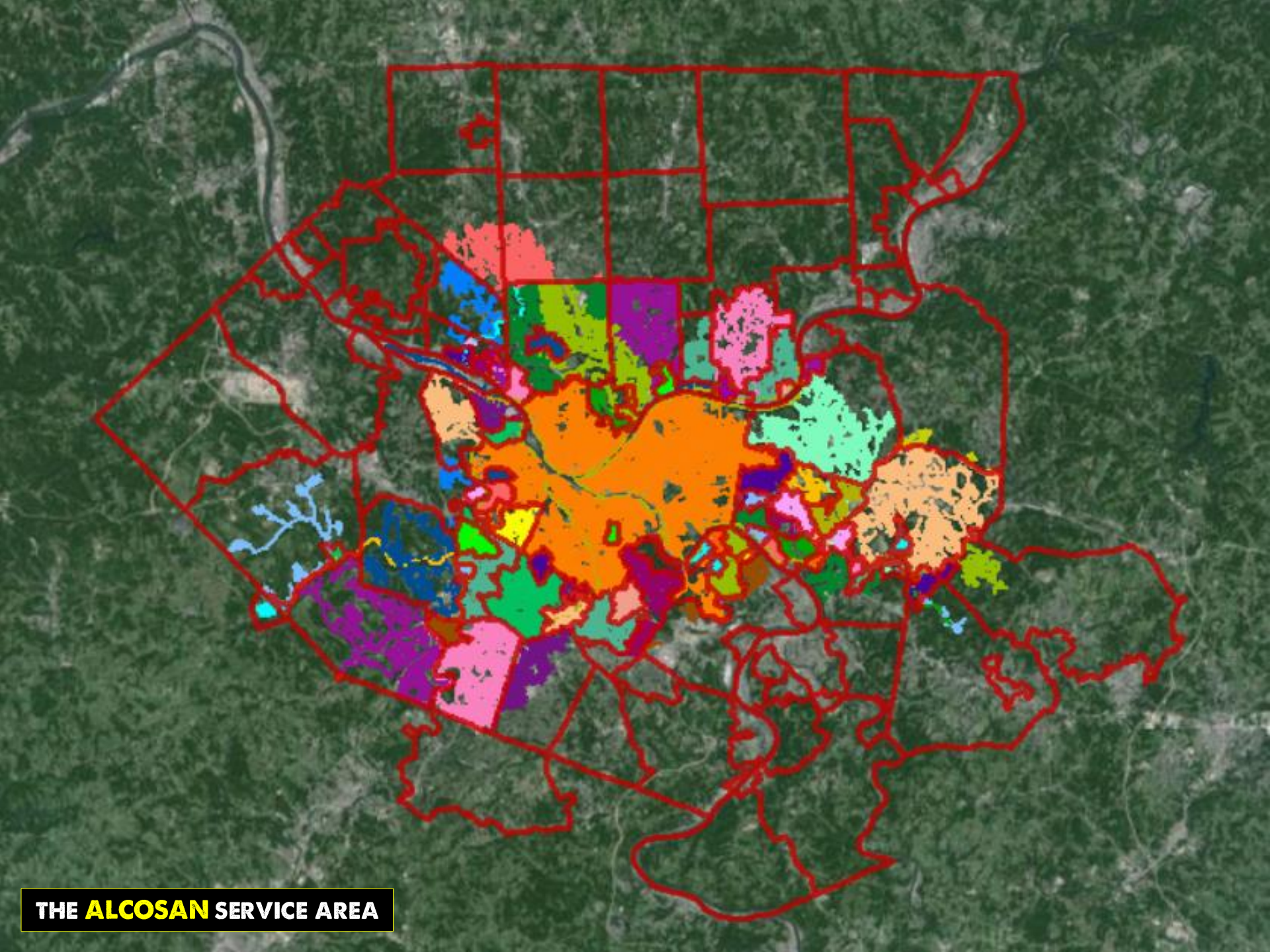
vs.

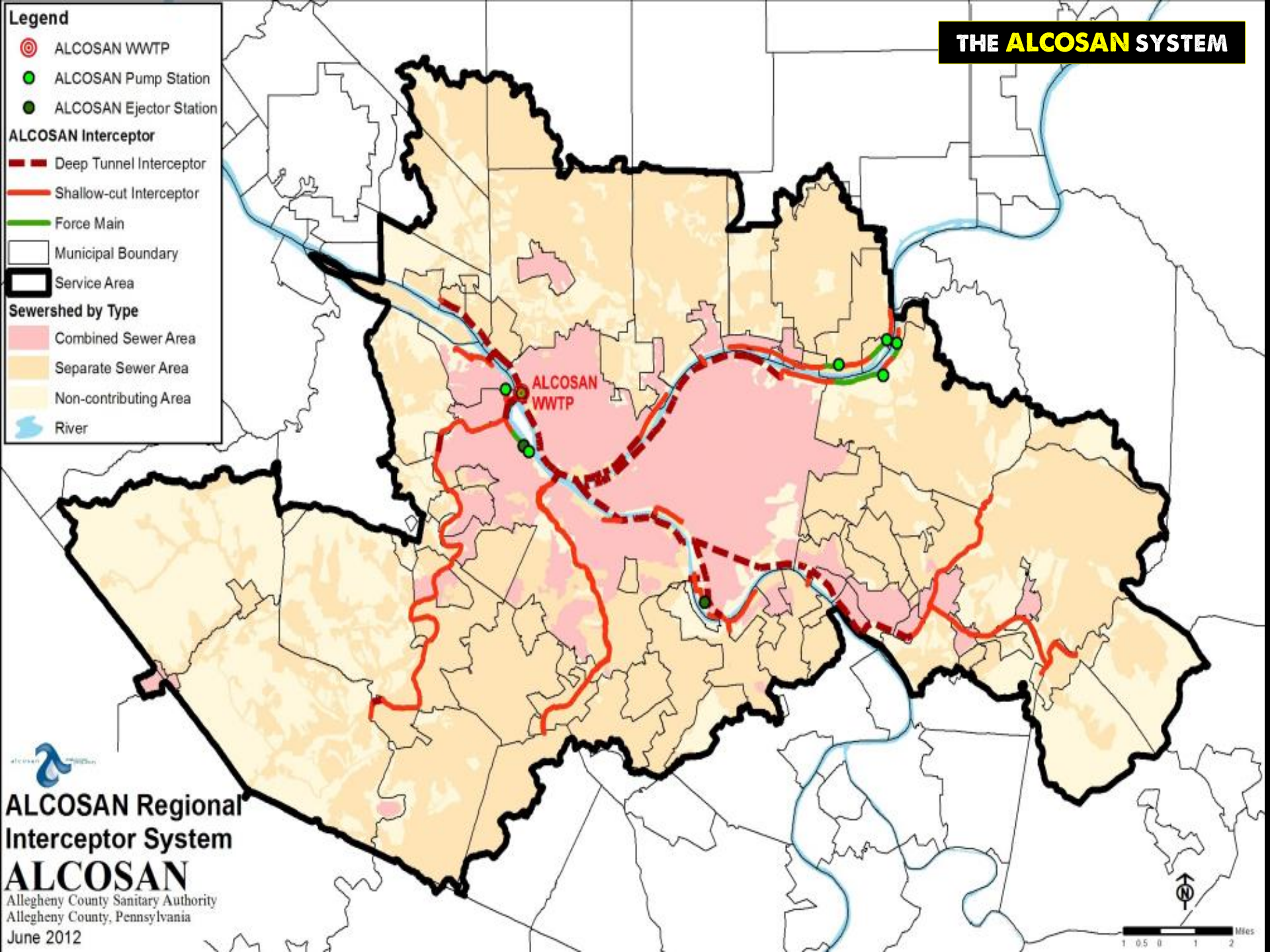
ALLEGHENY COUNTY SANITARY
AUTHORITY,
Defendant.

Civil Action No.

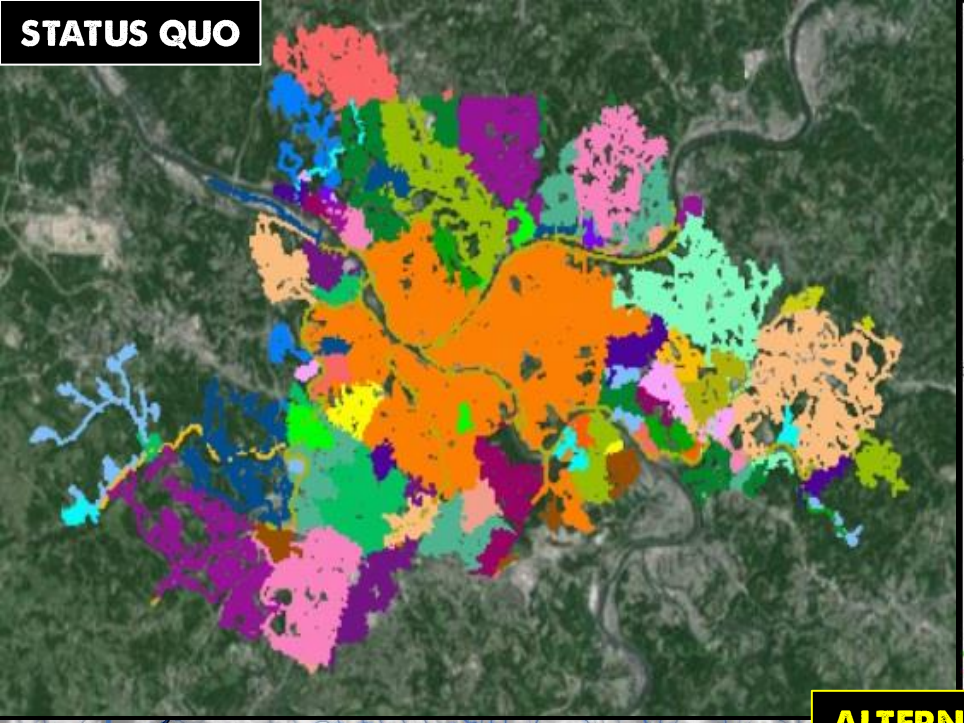
CONSENT DECREE

2 BILLION DOLLARS

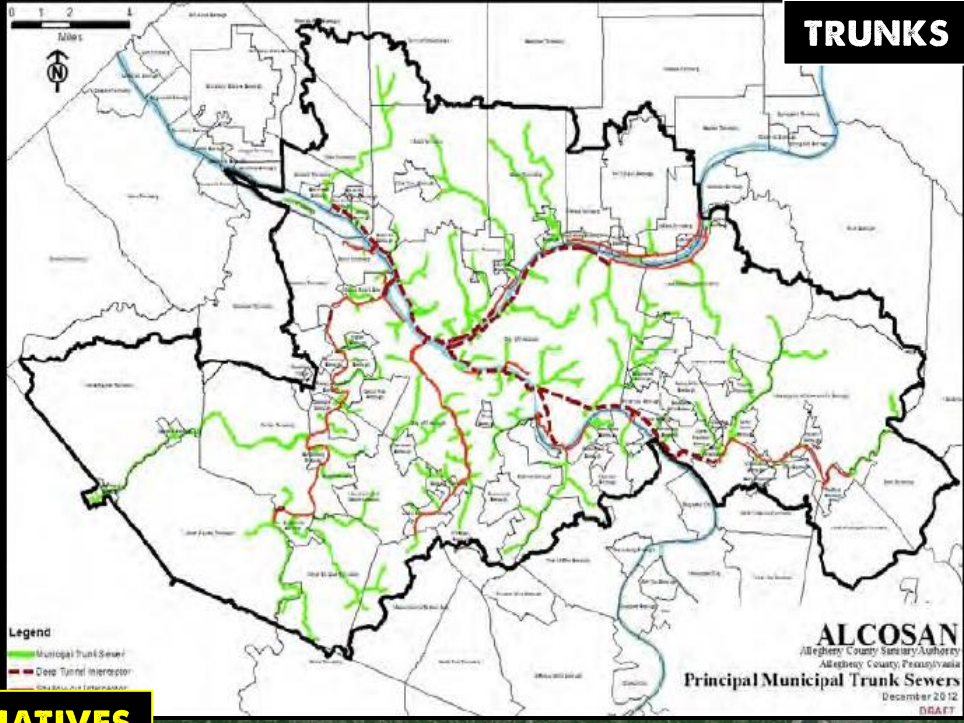

THE ALCOSAN SERVICE AREA


THE ALCOSAN SYSTEM
Legend
ALCOSAN WWTP
ALCOSAN Pump Station
ALCOSAN Ejector Station
ALCOSAN Interceptor
Deep Tunnel Interceptor
Shallow-cut Interceptor
Force Main
Municipal Boundary
Service Area
Sewershed by Type
Combined Sewer Area
Separate Sewer Area
Non-contributing Area
River
ALCOSAN WWTP
ALCOSAN Regional Interceptor System
ALCOSAN
Allegheny County Sanitary Authority
Allegheny County, Pennsylvania
June 2012
N
Miles
1 0.5 0 1 2

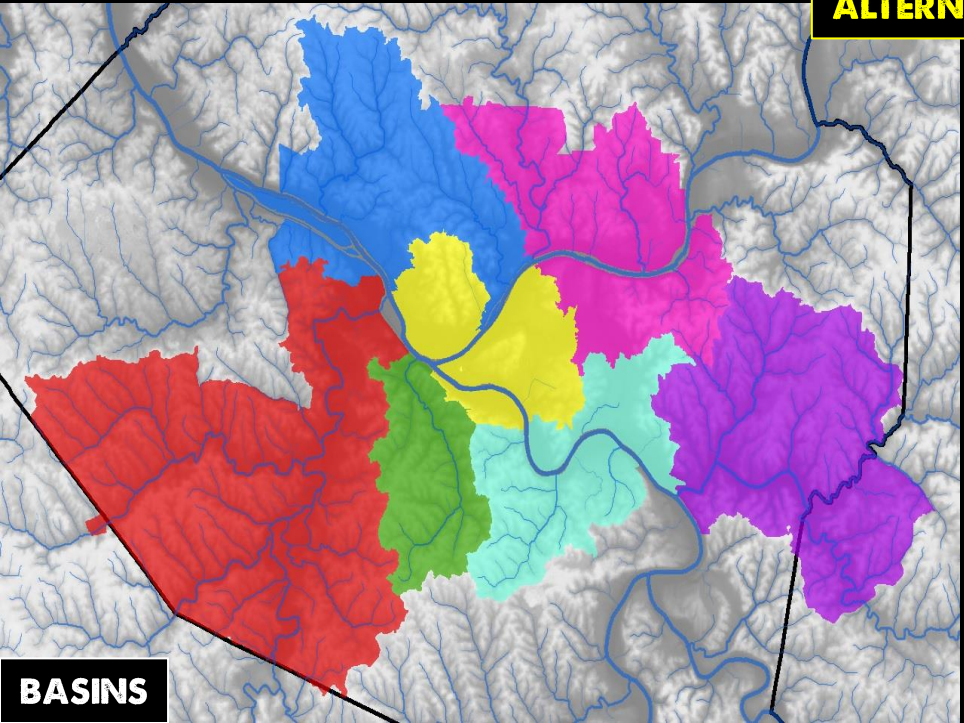
STATUS QUO



TRUNKS



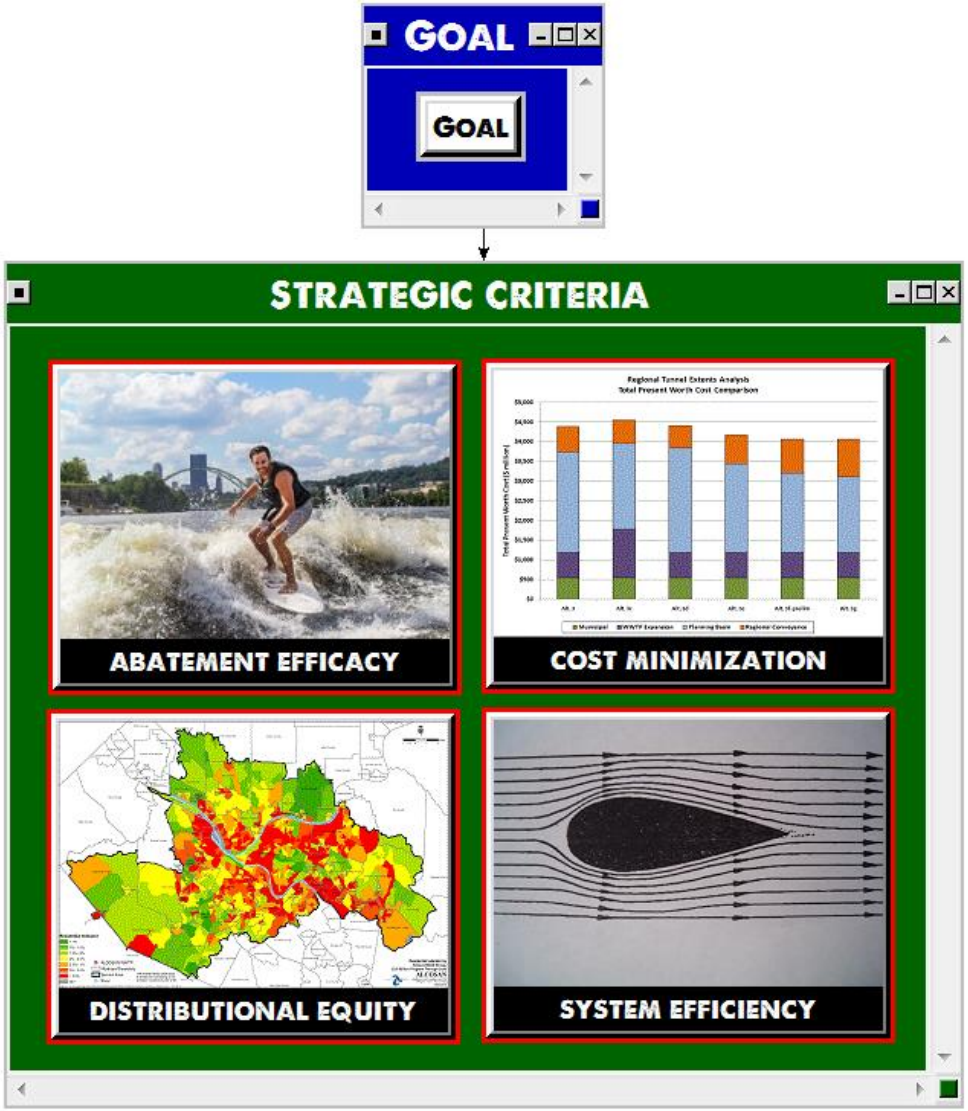
ALTERNATIVES



BASINS

REGIONAL

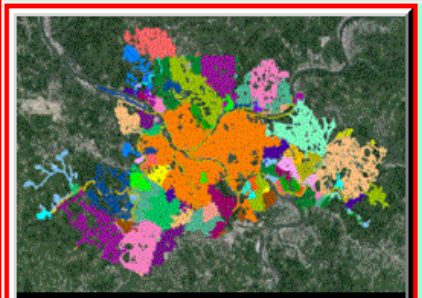
OUR MODEL


GOAL
GOAL
STRATEGIC CRITERIA
ABATEMENT EFFICACY
COST MINIMIZATION
DISTRIBUTIONAL EQUITY
SYSTEM EFFICIENCY
MODEL
1.BENEFITS
Subnet
2.OPPORTUNITIES
Subnet
3.COSTS
Subnet
4.RISKS
Subnet

control criteria	subnet			
	benefits	opportunities	costs	risks
legal	reduced need for complex intrasystem contracts & agreements among municipalites and ALCOSAN	streamlining future negotiations with regulatory bodies	asset transfer transaction costs (e.g., risk assessement by ALCOSAN)	contractual / financial obligation impediments / restrictions
	consolidating wet weather plans into a coherent master plan	facilitating regional water resource planning	costs of terminating existing & implementing new O&M agreements	opposition to necessary legislative revisions / amendments / approvals (e.g., creation of ALCOSAN stormwater authority)
	expediting approval of wet weather plan(s)	creating a coherent, hydrologic legal framework	costs of updating germane legislation and municipal plans (Act 537, MAA, SWMA, MS4) to allow for / reflect new arrangements	setting precedent for service centralization
financial	system investment & operation efficiencies (e.g., consolidation of redundant billing systems and budgeting efforts)	facilitating implementation of flow-based rates	loss of municipal cash flow	some municipalities may be unable to finance necessary upgrades
	more efficient and equitable allocation of system costs (e.g., accounting for stormwater and potentially I/I)	lower overall borrowing costs with unified system	costs to set up new rate systems (e.g., to incorporate stormwater rates)	unanticipated cost overruns
	lower overall compliance costs by prioritizing & coordinating investments across the whole system	encourages green infrastructure implementation	higher overall borrowing rates with fragmented system	possible fines for failing to meet regulatory mandates
		better leverage for funding with unified system voice		
regulatory	coordinating overflow abatement strategies	streamlined permit applications & compliance reporting	inefficient flow externalization in un-integrated system	localized overflows in fragmented system
	integrated stormwater and wastewater system management	standardized system monitoring	suboptimal abatement coordination in fragmented system	continued regressive externalization of flow
	ability to account for extra-jurisdictional flows	unified system planning	regulatory bodies investing resources reviewing numerous plans	exacerbating decline in downstream communities
organizational	reduced intermunicipal regulation arbitrage	more balanced representation on ALCOSAN board	institutional redundancies and inefficiencies	labor / union opposition
	compatibility with current institutional framework	more effiicent service from centralized system authority / governance	creating new / reorganizing existing institutions	less responsive service from centralized system authority / governance
	political palatability	synergistic cooperation on other issues (e.g., blight)	crafting political consensus	shift away from local control

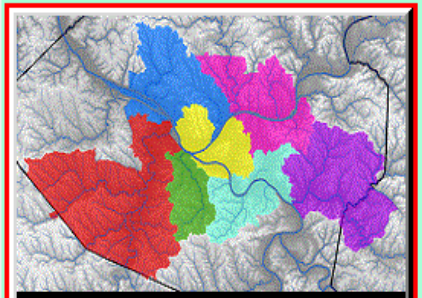
CRITERIA

ALTERNATIVES



STATUS QUO

TRUNKS



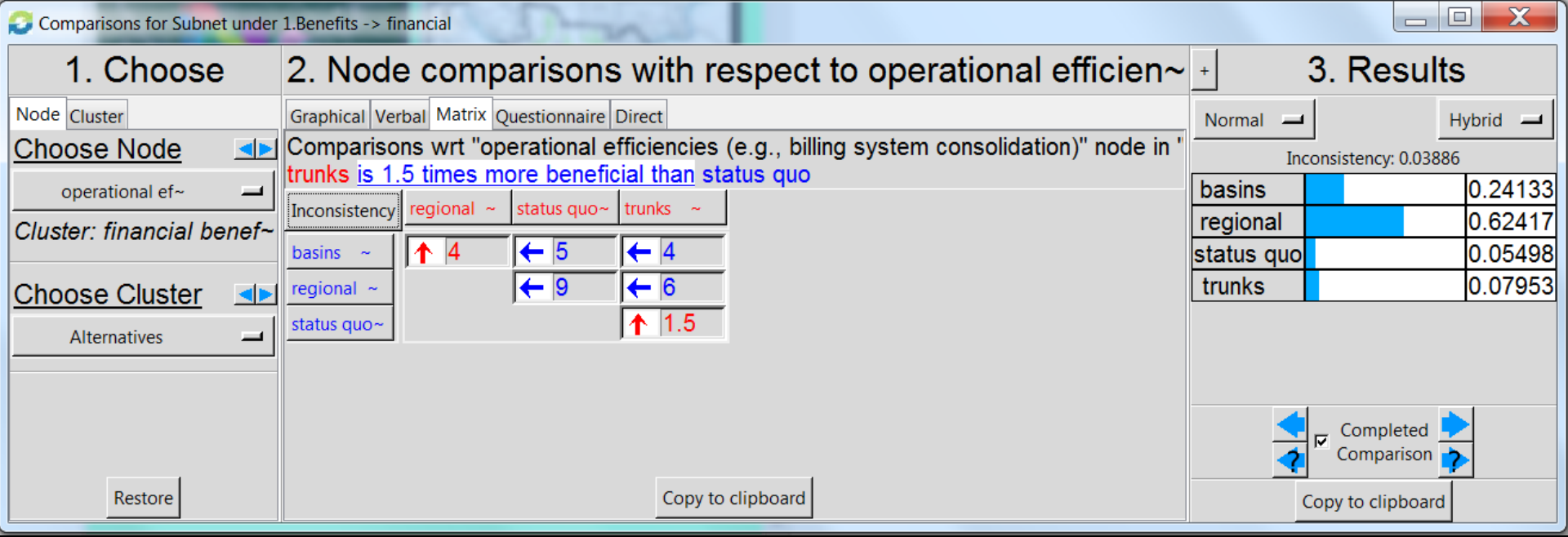
BASINS

REGIONAL

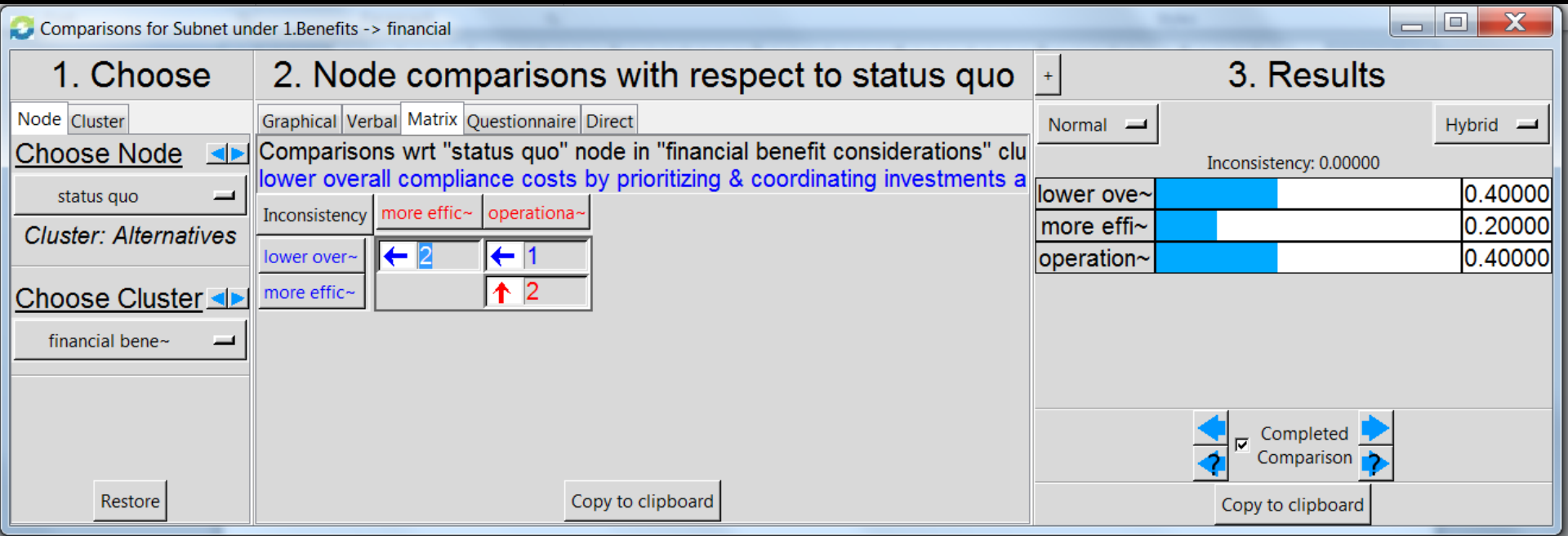
FINANCIAL BENEFITS SUBNET

FINANCIAL BENEFIT CONSIDERATIONS

- OPERATIONAL EFFICIENCIES (E.G., BILLING SYSTEM CONSOLIDATION)
- MORE EFFICIENT & EQUITABLE ALLOCATION OF SYSTEM COSTS
- LOWER OVERALL COMPLIANCE COSTS BY PRIORITIZING & COORDINATING INVESTMENTS ACROSS THE SYSTEM



EXAMPLE PAIRWISE JUDGMENTS FROM THE FINANCIAL BENEFITS SUBNET



Ratings for Super Decisions Main Window: Chalfant_Vissapragada_ALCOSAN_Regionalization.sdmod: for...

File Edit View Calculations Help

Super Decisions Ratings

	Priorities	Totals	abatement efficacy 0.550510	cost minimization 0.260114	distributional equity 0.129490	system efficiency 0.059886
1.Benefits	0.383433	0.805198	1 exceptional	2 above average	2 above average	1 exceptional
2.Opportunities	0.207132	0.434971	2 above average	3 about average	2 above average	2 above average
3.Costs	0.330863	0.694802	2 above average	1 exceptional	1 exceptional	2 above average
4.Risks	0.078573	0.165000	4 below average	3 about average	4 below average	3 about average

STRATEGIC CRITERIA / SUBNET RATINGS

New synthesis for: Super Decisions Main Window: Chalfant_Vis...

Here are the overall synthesized priorities for the alternatives. You synthesized from the network Super Decisions Main Window: Chalfant_Vissapragada_ALCOSAN_Regionalization.sdmod: formulaic: ratings

Name	Graphic	Ideals	Normals	Raw
basins		0.324829	0.225341	0.700252
regional		1.000000	0.693721	2.155758
status quo		0.031627	0.021941	0.068181
trunks		0.085046	0.058998	0.183338

Okay | Copy Values

MULTIPLICATIVE

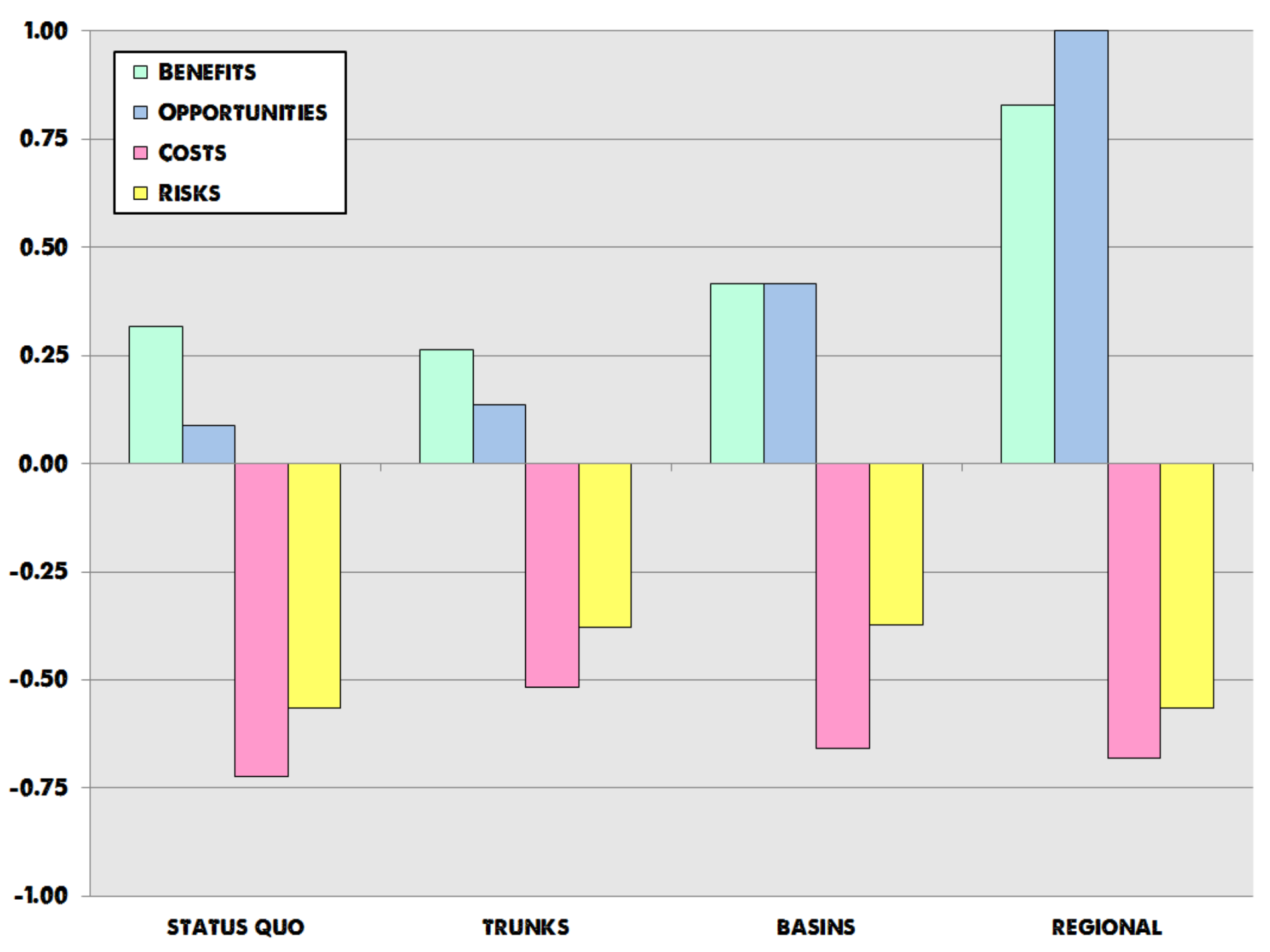
ADDITIVE (NEGATIVE)

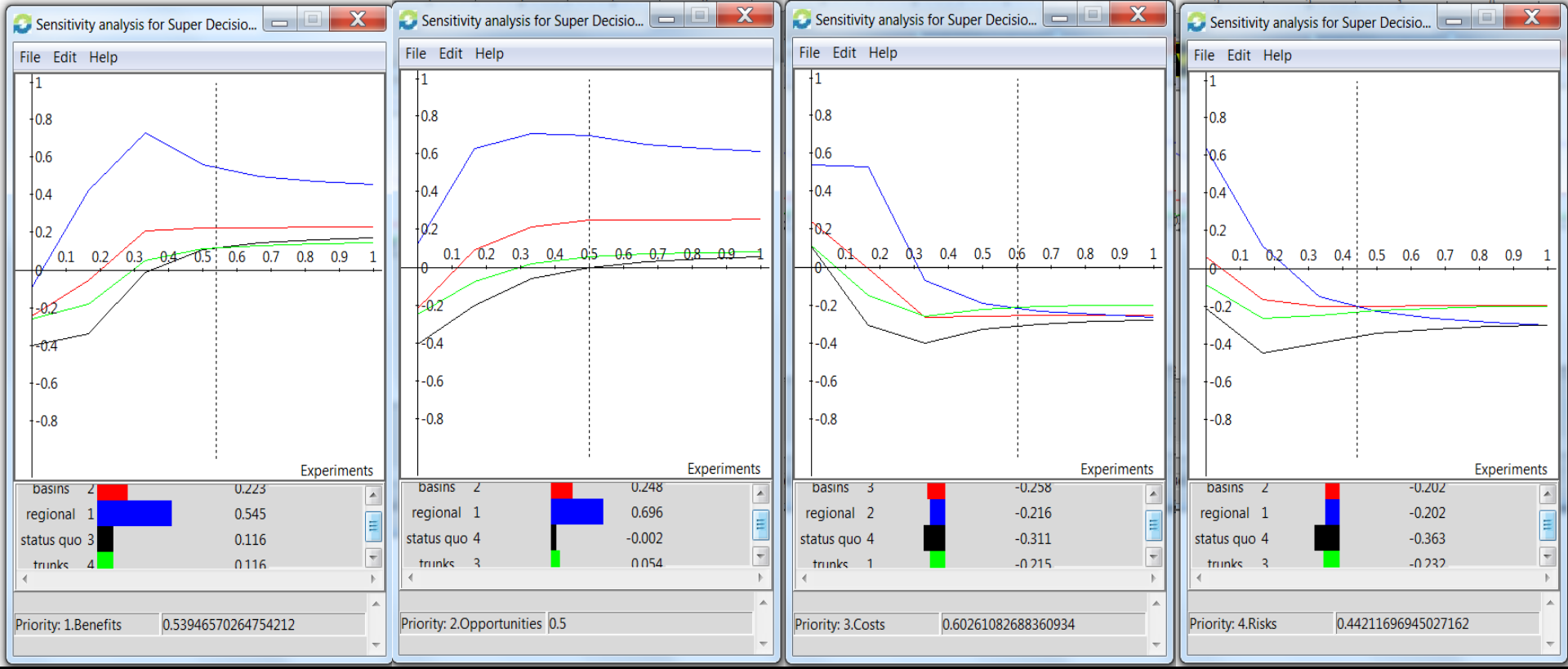
New synthesis for: Super Decisions Main Window: Chalfant_Vis...

Here are the overall synthesized priorities for the alternatives. You synthesized from the network Super Decisions Main Window: Chalfant_Vissapragada_ALCOSAN_Regionalization.sdmod: formulaic: ratings

Name	Graphic	Ideals	Normals	Raw
basins		-0.008110	-0.004380	-0.002073
regional		1.000000	0.540119	0.255612
status quo		-0.565054	-0.305196	-0.144434
trunks		-0.278280	-0.150304	-0.071132

Okay | Copy Values


1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
-1.00
BENEFITS
OPPORTUNITIES
COSTS
RISKS
STATUS QUO
TRUNKS
BASINS
REGIONAL



SENSITIVITY


TAKEAWAY
regional alternative
is dominantly preferable...


LIMITATION
... but results are conditional on
model structure and judgments...


STRENGTH
... but AHP/ANP framework implemented in SuperDecisions
fully documents and quantifies model structure and judgments, and
our model can be modified to account for and evaluate different perspectives.


THANK YOU.
QUESTIONS?