Sustainable Water Management in the University of Sonora, Mexico

2nd. International Workshop
Advances in Cleaner Production

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Objective

The purpose of this article is to describe the effectiveness of the University of Sonora's Sustainability Management System (SMS) about water management, and provide more insights for enriching the actual debate about how to prevent, eliminated and reduce water use inefficiencies on campus.

Methodology

- Subject of study. Sustainable management of water at the Industrial Engineering Department.

- Scope. The information was gathered in the buildings 5F, 5G, 5J, 5K, 5M and 5O during 3 academic periods:

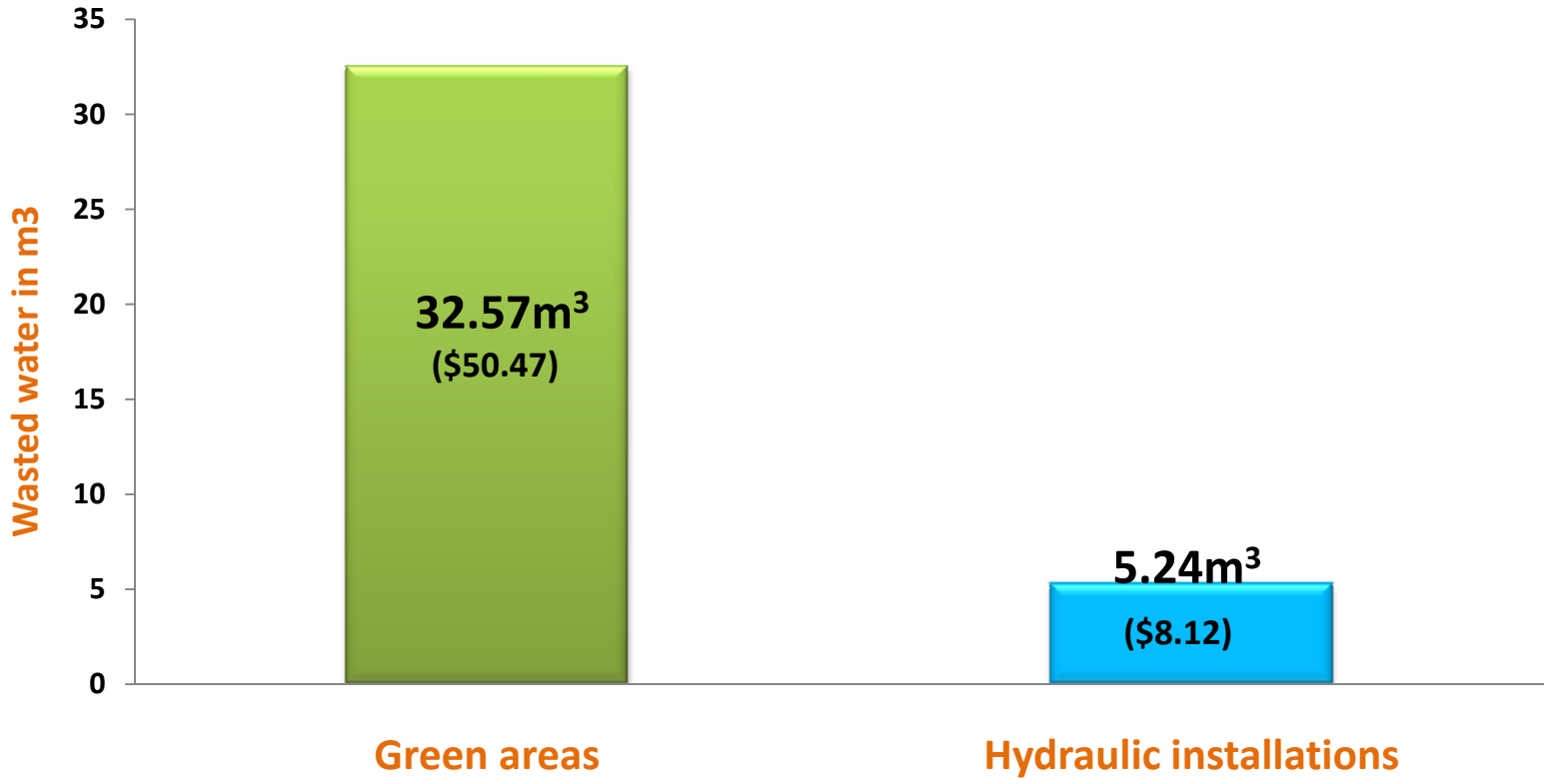
  - **Semester 2008-1 (January-June 2008)**
  - **Semester 2008-2 (August-December 2008)**
  - **Semester 2009-1 (January-March 2009)**

Methodology

- Data collection instrument. Sustainable Management System

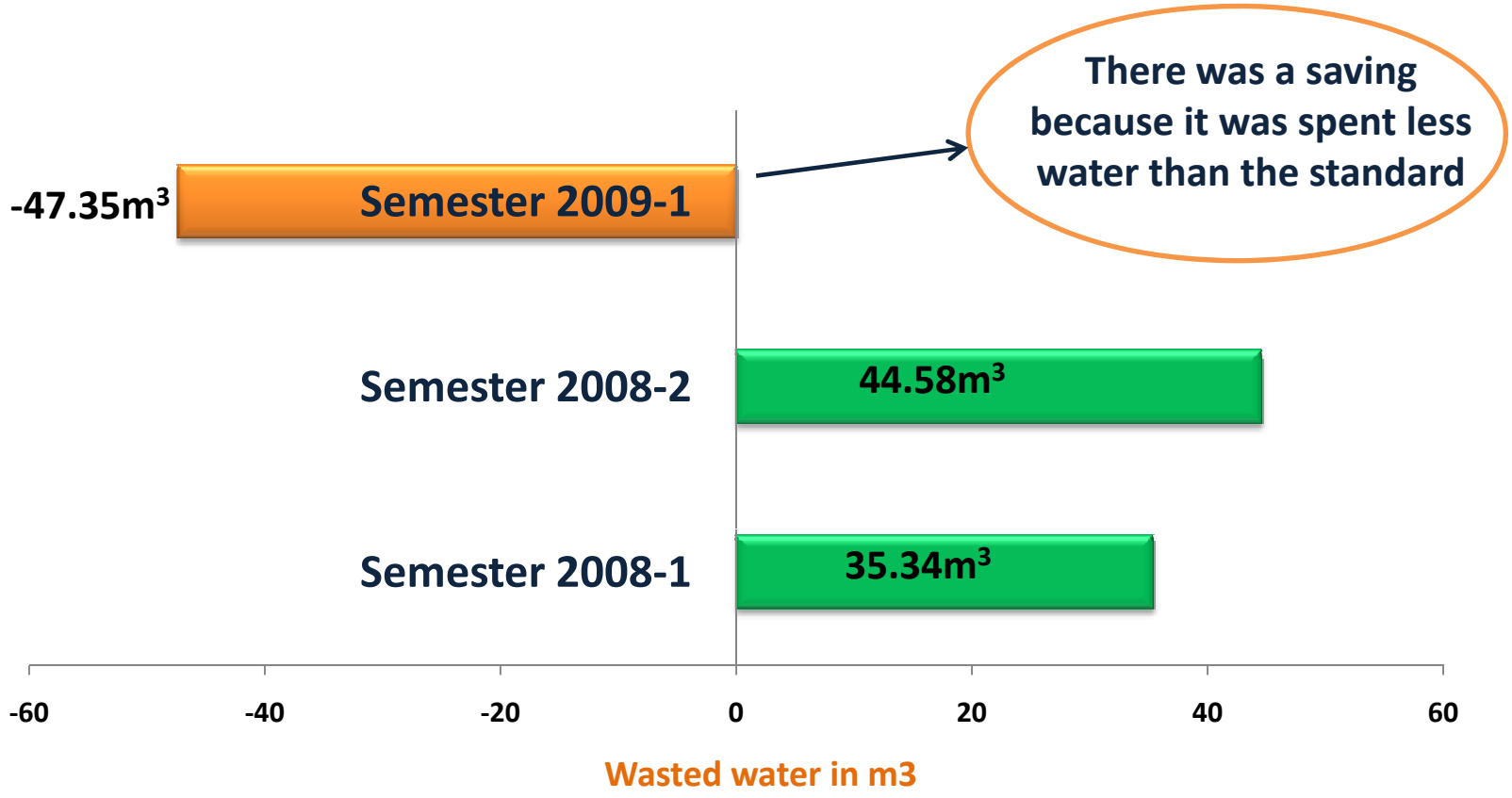
Certified in ISO14001:2004 in July 2008
by a Third-Party Auditor

Findings



Note: Price of m^3 $1.55 dollars

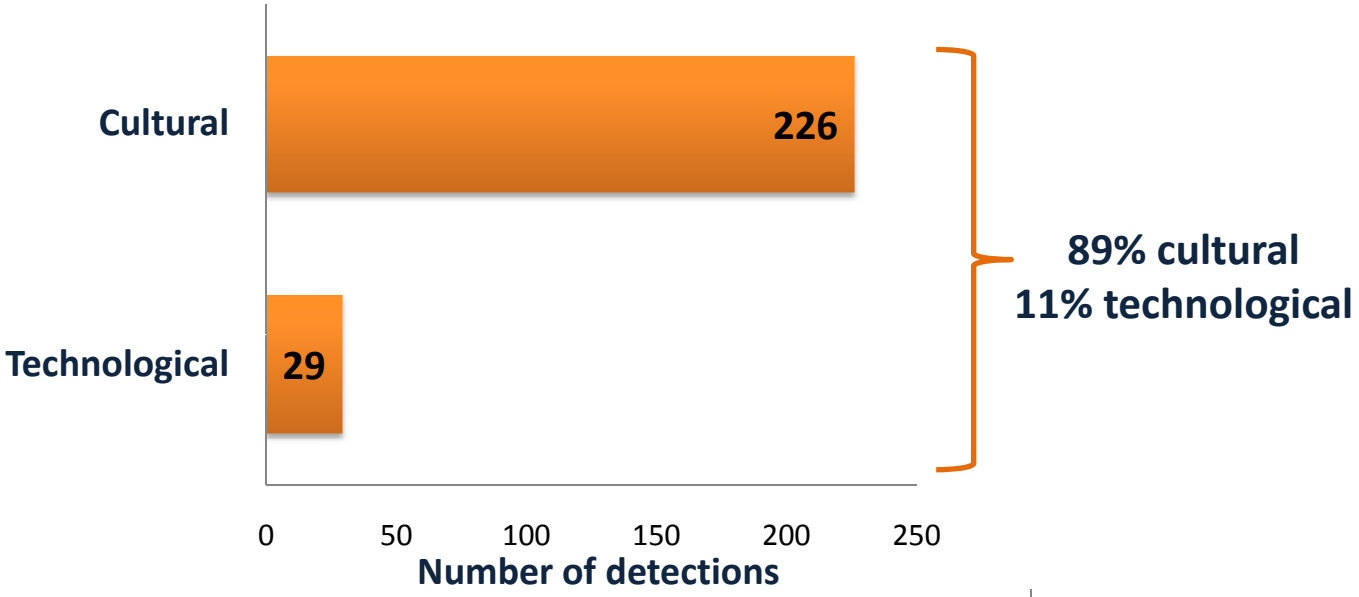
Green areas

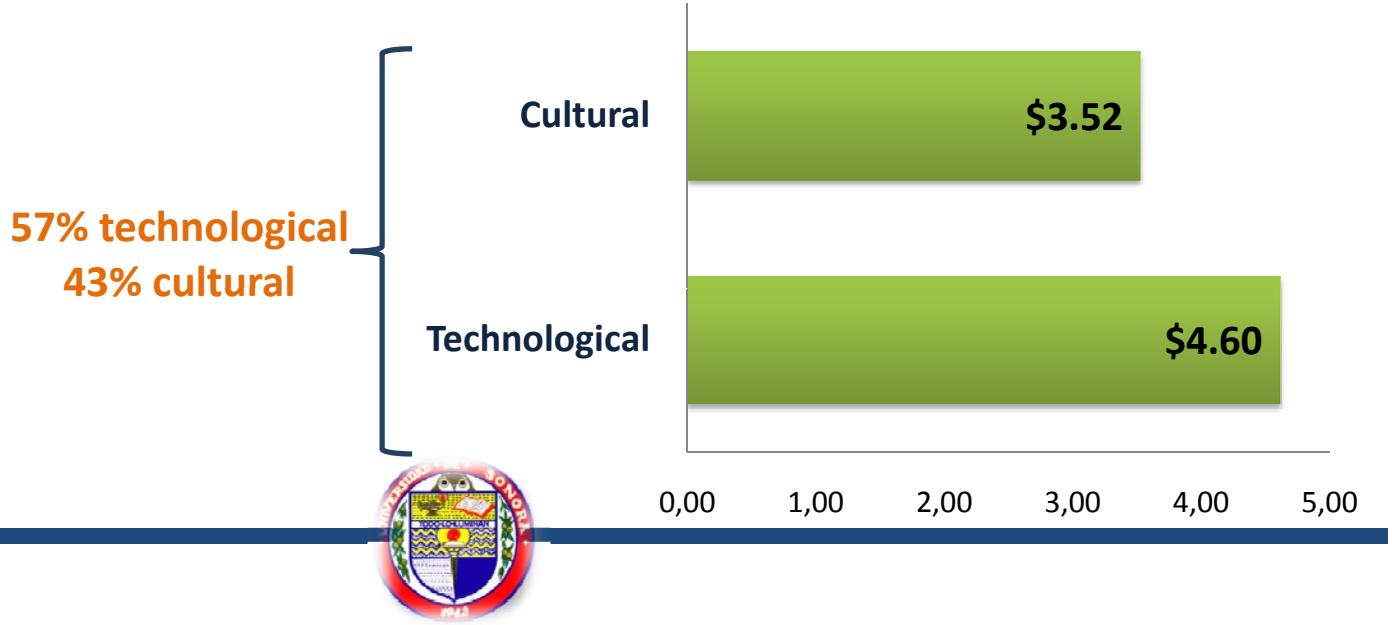

There was a saving because it was spent less water than the standard
-47.35m3
Semester 2009-1
Semester 2008-2
44.58m3
Semester 2008-1
35.34m3
-60
-40
-20
0
20
40
60
Wasted water in m3

Hydraulic Installations

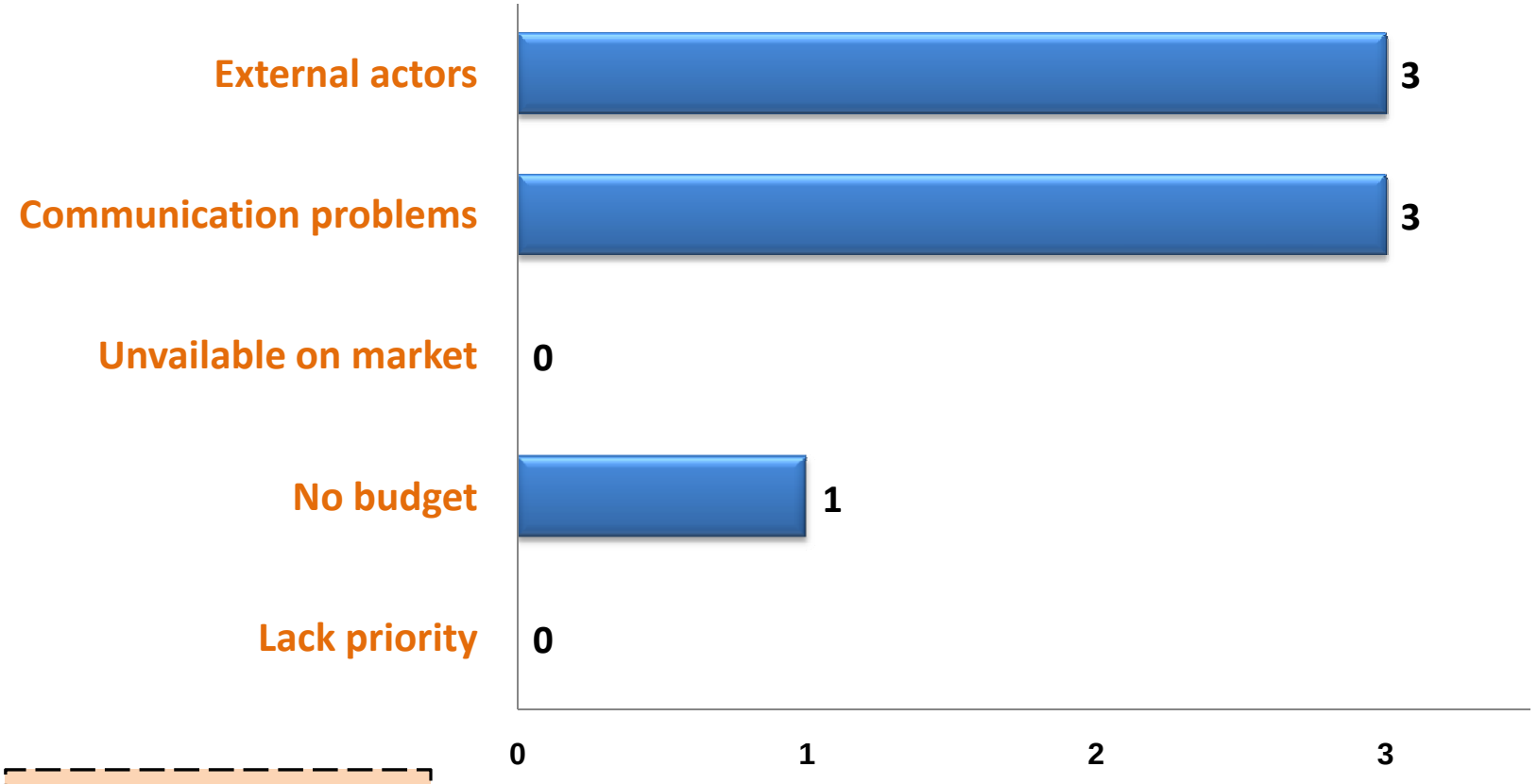
All Buildings	2008-1	2008-2	2009-1	Total
Total detections	81	102	72	255
Total events	400	400	284	684
% detections	20%	26%	25%	37%
Detections per week	5	8	8	-
Total waste in m3	1.19	2.05	2.00	5.24
Cost in dollars	1.84	3.18	3.10	8.12

Breakthrough Failures





Failure´s Justifications against the standard (5 working days)



From 29 technological failures
22 were in compliance

Discussion

Technological failures
represent 57% of the total

$8.12 dlls.

LONG PAYBACK PERIOD

70 semesters
or 35 years

Assumption

Instalation of Dry Urinals

$190 dlls.

Use of Qualitative Indicators

Evaporation

In the present semester there was no wasted water on green areas..

The reason?

Special attention in

Schedule and Duration of Irrigation

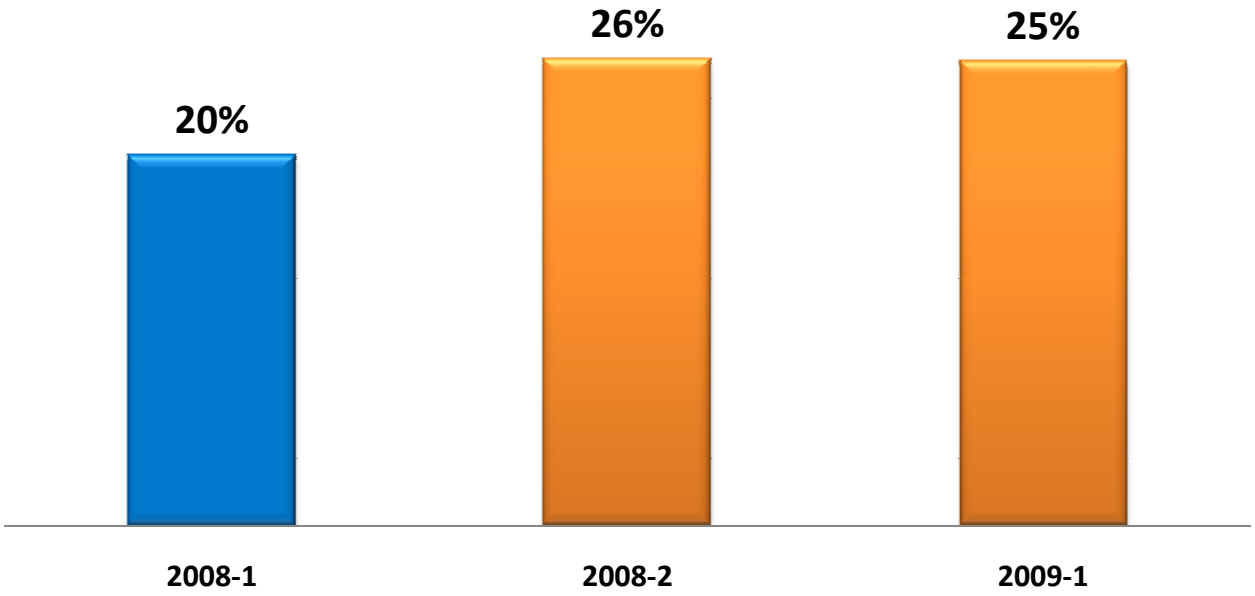
Compensation on Green Areas

Building	2009-1	
	m^3	
	Waste/Saving (Table 2)	Real Waste
5G	-12.03	0.00
5J	-52.19	0.00
5K	13.09	13.09
5O	3.78	3.78
Total m^3	**-47.35**	**16.87**
Dollars	**-73.39**	**26.15**

$32.57m^3$ → Difference → $246.07m^3$

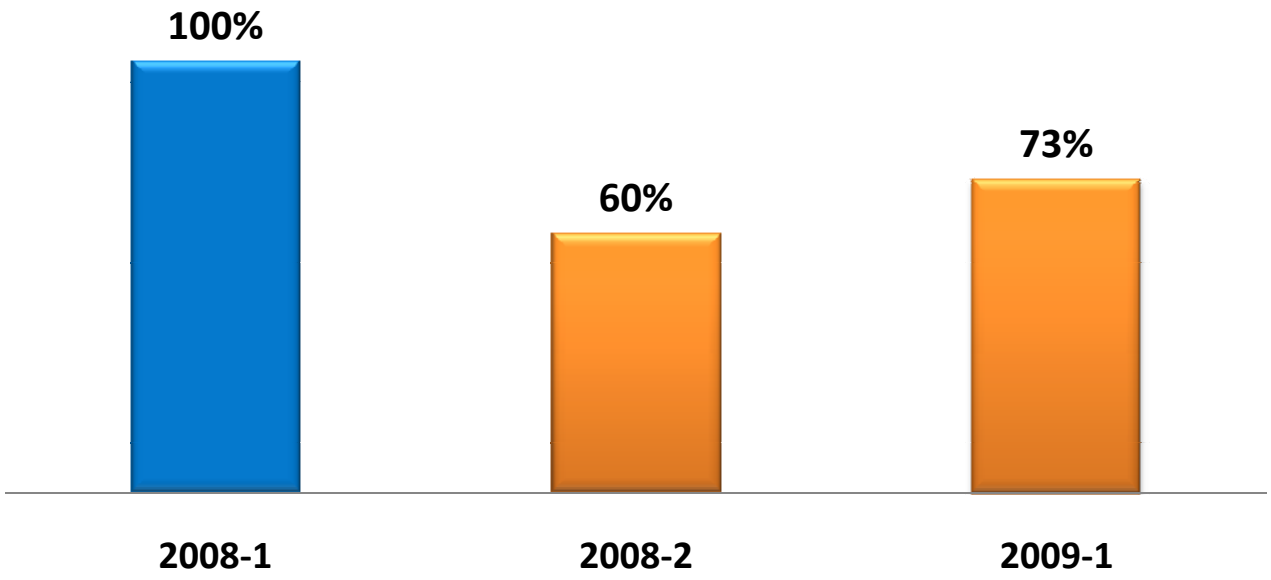
Increase in detections

All Buildings	2008-1	2008-2	2009-1
Total detections	81	102	72
Total events	400	400	284
% detections	20%	26%	25%



Failures against the standard

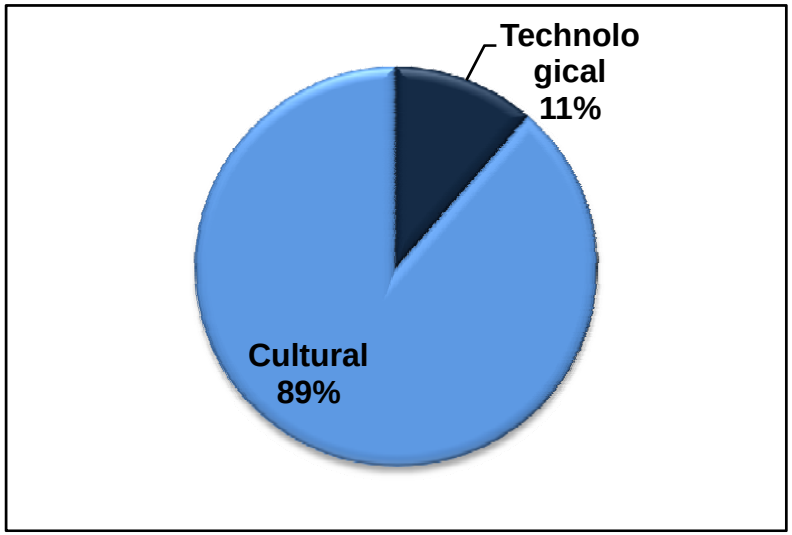
All Buildings	2008-1	2008-2	2009-1
Technological failures	8	10	11
Justifications	0	4	3
% in compliance	100%	60%	73%

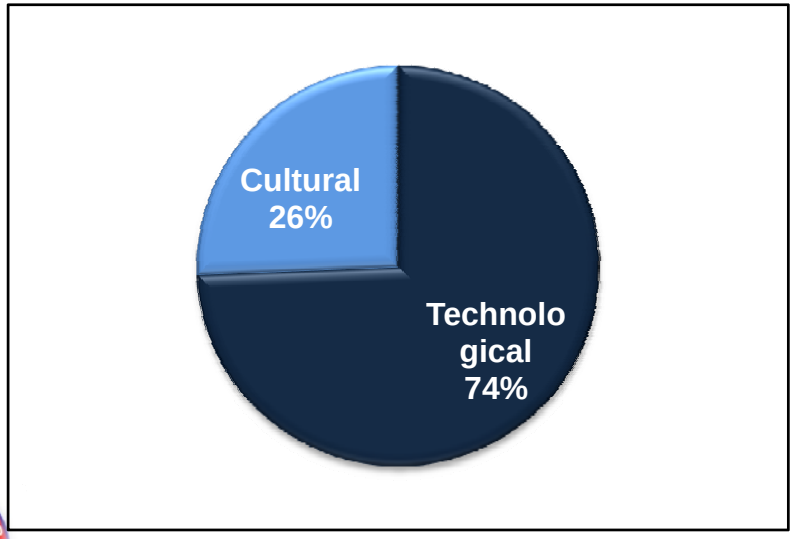


Cultural inefficiencies

Building	Frequency	
5F-LR	1	1
5M-MR	216	0
5K-MR	2	2
5K-LR	2	2
5O-LR	5	5
Cultural failures	226	10
Population	1645	
Population without compromise	13.74%	0.61%

MR= Men's room
LR= Ladies' room





Conclusions

- Environmental and economic benefits

Wasted water
38m³
$59 dlls.

0.04% →

Consumed water
94,517m³
$146,501 dlls.

Conclusions

- What has been the usefulness of the SMS?

Conclusions

- Continuous Improvement

Response time of the SMS

Conclusions

- Water Awareness Program

Conclusions

"SMS has helped to the University of Sonora to promote the efficient use of resources and training of professionals who participated with the society in transition to more sustainable lifestyles"