Get SMART

by Dana Donatucci

Dana Donatucci has directed the University of Minnesota Recycling Program in the twin cities' campuses of St. Paul and Minneapolis, Minnesota since 1988.

A pilot project confirms that convenience is a key factor in boosting capture rates.

One "smart" way to increase the collection of recyclable materials is to make the process no more difficult than disposing of the items as waste. A level playing field in terms of convenience is important because we are all lazy at one time or another. At the University of Minnesota, removing desk-side containers for trash and centralizing trash and recyclables collection was found to have a tremendous effect in boosting material recovery.

Through voluntary participation in its recycling programs, the University of Minnesota has a current overall recovery rate of 30 percent of its solid waste (2,700 tons per year). However, the university has the potential to recover more than 60 percent of its waste.

To achieve that goal, a complete change in the way waste is handled, from dock to desk, had to occur. By implementing the SMART system, or Self Managed Activities for Recyclables and Trash, the way waste is handled changed dramatically. Because custodians no longer provide desk-side trash service, employees must deposit their own trash and recyclables into centralized containers within their work area.

The new system puts waste management responsibility directly with the individual who generates it. Meanwhile, the capture rate for recyclable materials in the monitored buildings increased, from 60 percent in the old system to 90 percent with the SMART system.

The concept

As in most institutional recycling collection programs, the university's program was an afterthought to the existing trash disposal system. Trash and recyclables were handled separately. Custodians provided desk-side trash removal for all employees. Employees had to remove recyclables to centrally located recycling containers.

This type of system favors materials being disposed as trash, because the trash disposal system was much more convenient for the individual. Therefore, it became necessary to make trash disposal and recycling equal in terms of convenience.

In an institutional setting, two methods can be implemented to achieve this balance. One method requires employees to separate recyclables into the designated categories at their work stations, and custodians would collect both the trash and the source-separated recyclables at each employee's desk or work station. A second method requires employees to take both their trash and recyclables to centrally located trash bins and recycling containers, and custodians collect the materials at these central locations only.

The advantage of the first method is that it is more convenient for employees; however, space limitations for containers at individual work stations make this option difficult to implement. The advantage of the second method is that it reduces custodial time to manage waste.

This second method is the basis of the SMART system. Individuals are responsible for the trash and the recyclables they generate. Because desk-side trash removal by custodians is no longer provided, individual employees must take their waste materials to four conveniently located containers within their work areas. Custodians empty trash containers daily and recycling containers as needed. Thus both trash disposal and recycling are integrated into the same waste management system.

The system

The SMART system consists of four 23-gallon, color-coded containers for the collection of trash and recyclables within campus buildings. There are four labeled containers, one for trash and three for collecting office paper, newspapers and commingled bottles and cans. These categories were based on the university's waste stream composition and local markets for recyclables.

Although four containers are not re-
Tested first as an outdoor system, the SMART program showed that people would deposit their recyclables in the appropriate container when the option was as convenient as disposing of trash.

required for this concept to work, we believe that four is the maximum number that can be implemented because of space limitations within office areas. Cardboard boxes are also collected but not in a container. Cardboard boxes are placed next to the containers by the generator for removal by custodians.

The pilot studies
The SMART system concept was initially developed and tested as an outdoor system. The university had converted to new architecturally compatible outdoor waste containers. Because of the cost and aesthetics, multiple containers were not an option. Therefore, it was decided to convert these containers to accommodate both trash and recyclables by changing the existing lid from one hole for waste to one hole for waste and two holes for recyclables. When pedestrians on campus find a waste receptacle, they are offered equally convenient choices for recyclables and trash.

Analysis showed that when people took their trash to a receptacle that offered them equally convenient choices for recyclables or trash, 95 percent of the recyclable ma-

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Table 1 — Humphrey Center recovery rates by material before and after pilot project

<table>
<thead>
<tr>
<th>Material</th>
<th>Percent recovered Before</th>
<th>Percent recovered After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office paper</td>
<td>73</td>
<td>94</td>
</tr>
<tr>
<td>Newspaper</td>
<td>49</td>
<td>86</td>
</tr>
<tr>
<td>Bottles/cans</td>
<td>40</td>
<td>85</td>
</tr>
<tr>
<td>Weighted capture rate</td>
<td>63</td>
<td>91</td>
</tr>
<tr>
<td>Total waste stream recovered</td>
<td>36</td>
<td>61</td>
</tr>
<tr>
<td>Purity (office paper)</td>
<td>91</td>
<td>99</td>
</tr>
</tbody>
</table>


Materials were placed in the correct compartment. With these results, we decided to move this concept indoors.

Five buildings became test sites for the SMART system. In these buildings, instructions were given to custodians and building occupants. At least one representative from each work area attended the instructional sessions, where the concept was explained and participants were educated on the materials that were acceptable and unacceptable in each recycling category.

One-week waste sorts were conducted in each building before the program was implemented and again four to six weeks after implementation. Waste was analyzed for office paper, newspaper, bottles/cans and trash. A capture rate for each recyclable material was determined by comparing the amount of that material recovered to the total amount of that material in the waste stream.

The results

Table 1 shows the recovery of each type of material recovered before and after implementation of the SMART system for the Humphrey Center. Recovery levels increased dramatically for each material, with total waste diversion increasing from 36 percent of total waste generated before and 61 percent after SMART. In addition, contamination levels decreased before and after implementation of the SMART program.

Table 2 shows the percentage recovery for the five buildings in the pilot study. The building type indicates the type of activities that occur in the building (either office, classroom and/or laboratory). During the study, usage areas were analyzed separately to determine if the type of activity influenced the degree of recycling. No significant differences were found between classroom environments (more public) versus office environments.

All buildings except Food Science had been providing recycling service since 1986. Recycling containers in the old system were located in a number of sites on each floor. Office paper recovery rates hovered around 70 percent.

However, in the Food Science building (where recycling was initiated in 1989-1990) there were only a small number of containers and a low recovery rate (24 percent). This building provided an opportunity to look at how the number of containers available versus the SMART system increased recycling recovery rates.

During Food Science implementation, participants were told that the new recycling containers would be put in place to help assess appropriate locations and other problems. Custodians continued desk-side trash service for four weeks.

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Resource Recycling March 1993
### Table 2 — Average recovery of recyclables from buildings in the pilot study

<table>
<thead>
<tr>
<th>Building</th>
<th>Type</th>
<th>Average percent recovery</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shops</td>
<td>Office</td>
<td></td>
<td>49</td>
<td>94</td>
</tr>
<tr>
<td>Westbrook</td>
<td>Office</td>
<td></td>
<td>61</td>
<td>89</td>
</tr>
<tr>
<td>Morrill</td>
<td>Office</td>
<td></td>
<td>73</td>
<td>87</td>
</tr>
<tr>
<td>Humphrey</td>
<td>Office/classroom</td>
<td></td>
<td>63</td>
<td>91</td>
</tr>
<tr>
<td>Food Science</td>
<td>Lab/classroom/office</td>
<td></td>
<td>24</td>
<td>80</td>
</tr>
</tbody>
</table>


Participants were not aware that their behavior was being monitored. During the fourth week after the recycling containers were in place, a transitional waste analysis was done.

A 69 percent average recycling rate obtained at this time was similar to other buildings in which recycling was well established under the old system. This seems to indicate that with an adequate number of containers, one can achieve high recycling rates, but the SMART system results in additional abatement.

Approximately two months after full implementation of the SMART system, all building occupants were sent a survey to evaluate their attitudes and feelings about the new system before (as they understood it when instructed) and after (as they experienced it). On the average, 61 percent of the occupants in all test buildings responded (a total of 477 people).

Respondents believe that recycling is important (99 percent), that they recycle more in the SMART program (58 percent recycle more, 41 percent the same) and that the new system is more convenient (69 percent). Overall, 86 percent of the respondents reported a positive attitude toward recycling after the SMART program was initiated.

The program costs

The 23-gallon containers used for the SMART system were chosen for their size and ease of handling by custodians. Approximately 5,000 sets or 20,000 containers will be purchased during the next year, at a cost of $250,000 to implement the system into 150 buildings throughout campus. This number of containers was estimated based on their use in the buildings studied in the pilot study.

The payback period for this expenditure is estimated to be 2.8 years, which was determined by the increase in revenues and avoided disposal fees above and beyond the current level of recycling. The significant reduction in custodial labor to manage the system (estimated to be 0.5 to 1.0 hours per custodian per day) was not included in the payback period. This available time will be used to provide other services that had been curtailed in recent years.

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The problems

Like all projects that require changes in personal and institutional habits, the SMART system encountered opposition. There was some opposition from faculty members who objected to the elimination of custodial desk-side trash service. They felt that this was an erosion of services that they have already paid for through overhead costs imposed on research grants.

Although this opposition came from only a small, albeit vocal, minority, there was sufficient validity to their concern that it prompted the institution to reevaluate its policy on how departments are charged for the services they receive. In addition, others objected simply because they felt managing wastes is a custodial, not a faculty, job.
Certain limitations were encountered that restricted the implementation of the SMART system in some environments. Laboratories were a particularly difficult place to initiate recycling, because there are common work stations used by many people and the waste generated there is not "owned" by any one person.

In this type of environment, it is not possible or practical to put the trash and recycling containers directly at the work station because of space limitations. In common work areas, custodians will continue to service trash containers, and individuals will have to take recyclables to the nearest location as they did under the old system.

In addition, restrictions of food and beverages in specific laboratories (e.g., radioisotope labs) eliminate the need for centralized trash and bottles/cans containers within those labs. Single-occupancy offices connected to these labs cannot dispose of food-related wastes into these centralized containers. Paper recycling containers are permitted in these labs, but containers for food-related wastes must be located elsewhere. Because the recycling and trash options are not the same location (unequal), the recoveries are not as high as in other environments (see Food Science, Table 2).

Physical limitations also restrict placement of containers. In buildings where single-occupancy offices are located on main corridors, fire safety issues restrict placement of containers in hallways. This inconvenience participates, since this limits placement of containers to a few common areas such as conference rooms. The requirements of both recycling and fire safety will need to be addressed as the system expands. These and other physical limitations can be overcome as new buildings are designed to incorporate this system.

The pilot studies also highlighted problems experienced by individuals. For example, some individuals complained that they did not like sorting the waste from their trash can. This indicated that greater emphasis was needed during instructional sessions on source separation techniques.

The conclusion
By involving individual waste generators actively in managing their wastes, high recycling capture rates can be achieved. To reach the highest level of recycling, individual behavior must change. The SMART system does not mandate behavior change; rather, it facilitates it. The design of the SMART system makes the very act of disposal an opportunity to recycle.

Individual management of waste not only increases recycling capture rates but has the potential to encourage source reduction. Comments made by individuals responding to the survey indicated that they were more aware of the amount of waste they handled because of the SMART system and that they became keenly interested in ways to reduce it.

The author wishes to acknowledge the following individuals who assisted in this project: James Anderson, Joan Butler, Chaus Lo, Margaret Nelson, Kristi Olson, Dave Sanocki and Aaron Weinsheimer.

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