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# Suggestions for a More Sustainable Dartmouth: A Discussion of Material Flows on Campus



Environmental Studies 50: Problem Analysis  
and Policy Formulation

Dartmouth College

2012 Spring

# Suggestions for a More Sustainable Dartmouth:

## A Discussion of Material Flows on Campus

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Environmental Problem Analysis and Policy Formulation – Spring 2012

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## Executive Summary

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This paper critically analyzes the current system of material flows at Dartmouth College. We found that the current Dartmouth College policy on material flows does not efficiently or sustainably address the flow of durable goods on campus. The research we conducted as a class indicates that there are several areas of improvement. We feel that these improvements would help make the system more efficient and cost-effective. At the end of the paper we examine five major solutions that we feel can effectively enhance the system of material flows, which would benefit the Dartmouth community. These solutions are: augmenting the existing Dartlist website, rehiring a materials manager, updating the furniture asset management program, strengthening our current working relationship with WinCycle, and arranging warehouse sales.



## Chapter 1: Introduction

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Each year the students of “Environmental Problem Analysis & Policy formation” course are asked to formulate and justify policy measures that are thought to be appropriate to deal with a local environmental problem (Bolger, 2012). This year we have been tasked with examining the potential for durable goods reuse and resale by the college. Durable goods are defined as consumer goods that do not wear out easily or one that continues to yield utility after a single use (Bolger, 2012). There is currently no system in place for the efficient resale or reuse of items after they are no longer wanted by their original user.

One person who is dedicated to solving this problem is Dartmouth’s Director of Sustainability, Rosi Kerr. Through our initial consultations with Kerr she made it clear that there is certainly a perception of unsustainable practices surrounding the reuse and resale of durable goods within the college. Our mission is to assess the actual magnitude of this problem and propose viable solutions.

This report will offer insight to the systems currently in place to reuse, resell, or dispose of durable goods. It will also assess the outside partnerships Dartmouth is currently involved in for the management of durable goods. We will use our analysis of the current state of management to process what we consider environmentally, economically and culturally sustainable for the college.

## 1.1 Environmental, Social and Academic Context

The beauty of Hanover and its natural surroundings are central to Dartmouth's identity. In the 2007 Landscape Master Plan, Saucier and Flynn aspire to "guide the sustainable development of the landscape to ensure that the landscape enriches the contemporary Dartmouth experience while preserving the intrinsic character, beauty and legacy of one of America's most significant college campuses" (2007).

While respecting the sense of tradition that imbues the Dartmouth landscape, it must also anticipate the diverse needs of the future (Saucier and Flynn, 2007). Renewable material flows will be necessary in order for Dartmouth continue to guide the sustainable development of its surrounding landscape.

Awareness of present and desired campus culture is one of the most important aspects of successfully implementing change at Dartmouth. Establishing a culture of sustainability is necessary for this transformation. To cement Dartmouth's place as a "green" campus, we must address several cultural factors regarding sustainability and environmental consciousness.

It is also important that Dartmouth maintain good community relations with the Upper Valley. The college hires many workers from the Upper Valley area who are a part of the college's material flow process. Our sustainable management of durable goods or lack thereof will directly affect the perception of Dartmouth by surrounding communities in regards to sustainable practices.

It is essential that we consider material flow solutions in the context of a higher education institution. With regards to sustainability at Dartmouth President Jim Kim has stated "*The Dartmouth community must lead in the area of sustainability and respect for*

*each other and for our earth. Let us continue the Dartmouth tradition of helping to understand and appreciate the value of our society and our resources”* (Orr, 1993). It is important to the administration of Dartmouth that the college set an example among other higher education institutions and around the world. According to the Sustainable Endowments Institute, as of 2011, Dartmouth ranks 4<sup>th</sup> among Ivy League schools in reference to various sustainability factors including areas such as, “climate change & energy”, “food & recycling”, and “green building”. Among all U.S. colleges the school ranks 21<sup>st</sup> indicating that there is still room for improvement. Enhancing the efficiency of managing materials flow at the college is an effective method of increasing Dartmouth’s grades in these sustainability areas. However, the Dartmouth players must be willing to take on these changes.

The implementation of sustainability efforts can be quite difficult at a private higher education institution due to financial constraints and cultural and administrative barriers- all of which we have encountered throughout our research process. Many environmental issues within institutions are brought to the forefront in response to financial changes such as a budget decrease. Often times in these situations the necessary change can be both environmentally sustainable and economically viable. The key players of such decisions at an educational institution are of a variety; there is the VP of the college who handles the college’s finances, the administrative employees at Procurement, the Facilities, Operations & Management (FO&M) workers, faculty, students and etc. Each player has an important role in material flows at the college and will be an important factor in the success or failure of such a change. All of these different contributors have their own set of values, backgrounds, and responsibilities,

which will shape their understanding of the problem and how to go about solving it. For this reason, contribution from all players is necessary to make a decision but cannot be made solely off the perspective of one.

The studying of material flows within our college institution connects our college experience with the background of larger sustainability issues that we have learned about both inside and outside the classroom (Orr, 1993). The act of investigating this real issue that we are key players in provides us with a very holistic understanding of how to approach environmental problem analysis.

## Chapter 2: Survey on Materials Flows and Perceptions

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An important part of assessing material flows at Dartmouth College is analyzing the current policies, practices and perceptions surrounding the purchasing, reuse, and disposal of durable goods. We were able to conduct this analysis through our survey, a number of interviews, individual research and group discussion. These qualitative and quantitative analysis methods were instrumental in the identification and eventual exclusion of potential problems in the existing materials management system. The information that was found provided context with regards to the culture surrounding materials flow in and around academic departments. Specifically, the goal was to understand and analyze reasons for the actions identified as ‘hoarding’ in academic departments. Additionally, it was beneficial to probe the exact process that individual departments set in motion to dispose of or recall items to identify if there were potential problems on the ‘user’ end, confusion as to the methodology, or simply lack of reuse culture.

The overarching approach to data collection was to first introduce basic concepts and establish initial connections with individual departments via a quick survey sent to all academic departments. From there, based on responses, availability, and personal affiliations among the data collectors, interviews were established to collect more in-depth data to expand on understanding established by the preliminary survey. While this method was fairly successful, several biases, including response and non-response bias, were introduced and unable to be controlled for.

Regardless, this data supports several conclusions that have elucidated the actualities of the current materials management system and show significant areas for improvement.

## **2.1 Survey Data**

### ***2.1.1 Question Development***

This survey was envisioned as a way to gather basic information from academic departments, serving as a snapshot of the current situation of hoarded surplus materials. Its purpose was not only to provide some data but also to introduce the project of improving materials management on campus to department administrators. As such, the priorities in choice of questions were placed more heavily on ease of response than on anticipated comprehensiveness.

Hence, the questions selected were generally simple, with enough room for elaboration. In an effort to reduce non-response bias, the survey contains multiple-choice answers, outlined in Figure 1.

Figure 1, Sequential Questions and Possible Responses of Initial Survey

<b>Question</b>	<b>Possible Responses</b>
1. Do you have surplus durable goods (i.e. desks, chairs, office supplies, etc.) stockpiled in your department?	Yes, a significant amount. Yes No Not sure
2. If yes, what types of goods comprise this surplus?	(free response)
3. Does your department have a system in place to handle an extra piece of furniture that someone has discarded?	We have a formal system We have an informal system We have a vague system Maybe

	No Not Sure
4. If yes, please describe your system (what you do, who you contact, what protocol you follow, etc)	(free response)
5. Which academic department do you represent?	(drop down list of all departments)

### ***2.1.2 Distribution***

A list of 42 administrative assistants, one from each academic department, was compiled from each respective department website. The survey was created using SurveyMonkey, an online platform for creating surveys. This tool allowed us to upload each of the questions and then compiled them into a link. The link generated by this platform was then emailed to the administrative assistant in charge of each department along with an introductory email. To maximize response, the survey and the introduction were sent to the list three times. Responses were collected over a period of one week and then the resulting data was retrieved from SurveyMonkey. An analysis of these responses is as follows.

### ***2.1.3 Responses***

Actual survey results and responses are included in the Appendix. 20 administrative assistants responded, including Chemistry (CHEM), Classical Studies (CLST), Comparative Literature (COLT), Computer Science (COSC), Education (EDUC), Film and Media Studies (FILM), Humanities (HUM), Institute of Writing and Rhetoric (IWR), Jewish Studies (JWST), Latin American, Latino and Caribbean Studies

(LALCS), Linguistics and Cognitive Science (LING/COGS), Mathematics (MATH), Native American Studies (NAS), Philosophy (PHIL), Physics and Astronomy (PHYS/ASTR), Religion (REL), Russian (RUS), Sociology (SOCY), Theater (THEA), Women's and Gender Studies (WGST).

## **2.2 Survey Data Analysis**

### ***2.2.1 State of Academic Departments' Surplus Stockpile***

Each respondent represented 5% of the total responses collected and an average of 1.4 departments. The variance for number of departments represented was 0.77 and the standard deviation was 0.87. Our survey takers represented 47.6% of the total 42 academic departments at the college. The average time spent taking our survey was 3 minutes and 24 seconds.

A chi-squared analysis was performed to analyze the frequency distribution of two variables: the state of a department's surplus good stockpile and the ability of a system to manage the stockpile. The null hypothesis proposed that the department's systems and stockpiled goods would not be correlated. The chi-squared value calculated was 40.15. With 4 degrees of freedom and an alpha (P value) of 0.05, a value higher than 9.488 is needed to show correlation. As our chi-squared value is higher than 9.488, the null hypothesis can be rejected. Thus, it can be assumed that the frequency distribution of these two variables is statistically related. This makes it possible for effects we have on a departments systems to affect stockpiled goods. If the class makes changes to the systems it can change the state of durable goods at Dartmouth.



Figure 2. Administrator Responses to Survey Question 3: Management Systems

Management System Style versus Existence of Stockpile				
	Yes	No	Not sure	Row Totals
Formal System	1	3	0	4
Informal System	10	2	0	12
Not Sure	2	0	2	4
Column Totals	13	5	2	40

$$\chi^2 = \sum \frac{(\text{Observed frequency} - \text{Expected frequency})^2}{\text{Expected frequency}}$$

$$\text{Degrees of Freedom} = (c-1)(r-1) = 2(2) = 4$$

$c$  = number of columns

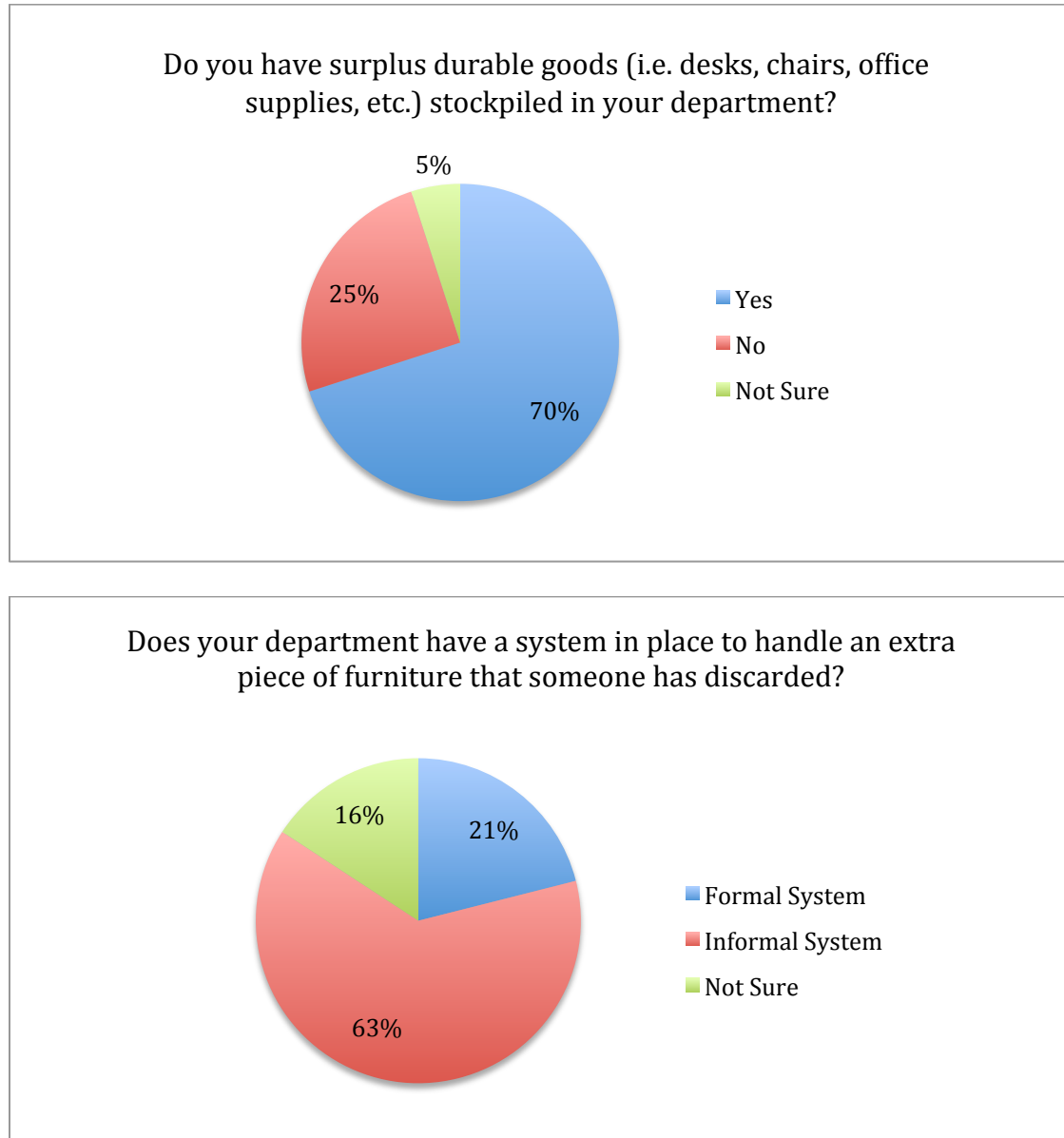
$r$  = number of rows

observed = actual value

expected = sum of individual column total and row total divided by  $N$

$N$  = sum of all row and column totals = 40

Figure 3, Administrator Responses to Survey Questions (see Appendix A)



### ***2.2.2 Potential Biases in Survey Structure***

Despite efforts to eliminate non-response bias, there are possible factors that influenced a non-response as well as a response bias. Though the survey was simple, completing the survey itself may have been a low priority for administrative assistants. It is interesting to note that response analysis (see section 1.3) revealed that the most

frequently reported result was a very small number and there was little variance between responses. This could possibly be due to a ‘clustering’ of responses from departments with similar characteristics. This clustering is likely due to size of the department, as there were respondents from a wide variety of areas of study.

Based on available data from the “2006 Dartmouth Factbook,” and the reported number of majors from each department, it is possible to interpolate the relative sizes of each department. Assuming relatively equal growth of all departments since 2006, the data should be a generally reliable source of understanding of the size of departments. The range of the survey respondents was between 0 and 40. The Education program, Jewish Studies program, and the Institute for Writing and Rhetoric are not listed at all, but the Humanities program oscillates between 0 and 2 majors granted in the described years. The largest two reporting departments were Sociology, with 40 majors, and Mathematics, with 38. While the range of the respondents is large, they are still relatively small when compared with the range of the larger non-respondents. The Engineering department reported 61 majors in 2006, and the Economics department, the largest in 2006, reported 146, followed closely by Government with 139, and then Psychological and Brain Sciences with 135.

The average size of the 17 respondents, discounting the departments that were not represented in the data, is 16.5. The average size of 7 largest departments is 103.3. This significant discrepancy between the sizes of the responding and non-responding departments indicates a severe instance of selection bias. Thus, it is easy to see that a certain amount of clustering did occur in respondents, and that specific departments likely did not respond due in part, to their size.

It was even noted by an administrator during an interview that other administrators in larger departments are exceedingly busy during this time of year and that the email containing the survey was likely to have been buried by other emails or simply ignored. While the survey did collect nearly 50% of response from all the academic departments, it is possible that these responses will not be representative of all sections of campus. Moreover, the survey did not include non-academic parts of campus, such as the Hopkins Center, Collis Student Center, or the Libraries.

Given the ambiguous nature of the issue at hand, it may have been difficult to answer the open ended questions. The response options were not qualified by a set standard, resulting in varied responses to an already wide category of questions. Conversely, there were questions that were too specific and did not address the intended purpose. For example, the Mathematics department responded that they did have surplus office supplies, but not furniture, a separation that was not made clearly in the survey questions.

Moreover, it is possible that some departments were suspicious of completing a survey that asks them to catalogue their surplus items. Strategic bias occurs when a survey taker provides a biased answer to influence a particular outcome (Sieber, 1973). It most often happens when the results of a survey directly and immediately affect the respondents. For example, if a decision to change material flows at the college depends on having a sufficiently large number of administrative assistants who complain of having too many surplus goods, the respondents who enjoy stockpiling may be tempted to provide an answer that understates their situation, rather than their true valuation, which is higher.

### ***2.2.3 Subject Selection***

Subjects for in-depth interviews were selected from the pool of respondents of the survey. There may be significant selection and non-selection bias due to scheduling conflicts, as many departments were not able to be included. While interviews with different departments from a variety of locations around campus were sought, it was only possible to interview with a few administrators in charge of smaller departments. The difficult to schedule interviews was mainly due to the busy nature of the end of the academic term, which seemed to be amplified for an administrator in charge of a larger department. Those who were interviewed included Hope Rennie of the Institute of Writing and Rhetoric, Leslie Barrow who oversees Classical Studies, Russian, Jewish Studies, Linguistics and Cognitive Science, and Comparative Literature, and Sheila LaPlante of Latin American, Latino and Caribbean Studies and Native American Studies. While these interviews gives a wide breadth of experiences to look at, they only account for small departments.

### ***2.2.4 Participant Biases***

As with the survey results, there are response biases involved in the collection of data with interviews. Though we used scripted questions, it is possible that interviewing styles and actual questions asked varied between the interviews. Additionally, as was the case with Leslie Barrow, there are administrators who may have a better understanding of their own departments than others. Please see Appendix A for a transcript of the interviews conducted.

## 2.3 Discussion and Analysis of Survey

From the free response questions in our data, we determined that each department has its own unique method of dealing with durable goods (Student survey, April 15, 2012). Administrative assistants' comments illuminate the problem areas within the overall system that require improvements. We identified the weakest aspects of materials management at Dartmouth College: incomplete understanding, insufficient communication within the greater Dartmouth community and, a cultural absence of reuse. Coincidentally, these aspects are also the easiest parts of the system to improve.

### 2.3.1 Current Systems and Areas of Weakness

A brief description of Dartmouth's existing methodology is required to understand our analysis. As aforementioned, each department conducts materials management differently. In order to demonstrate this, we have included excerpts from our survey. Examples of materials management systems on campus is as follows:

#### Theater Department:

*"Currently we blitz out to other departments in our building to see if anyone can use the item. If not, we find a place to stow it in the department, which is inconvenient. We do not have money to pay FO&M the money to remove it, which is required. If we were allowed to take it to LISTEN or what have you, we would. We have also used FreeCycle and other listserves to find free file cabinets and other items, but don't tell anyone, because we picked it up ourselves. We*

*have no money to buy new furniture, nor money to pay FO&M”*  
*(Student survey, April 15, 2012).*

Religion and Philosophy:

*“We submit a request to ‘materials management’ aka Denise Rowell, to remove it. OR, we store it in our basement until someone here decides they need it”. (Student survey, April 15, 2012)*

Institute of Writing and Rhetoric:

*“I check if we can reuse it within our program, then I offer it on the Dartmouth office to office sharing site <http://www.dartlist.com/> But not enough other people seem to be using that list for it to be effective. If there are no takers then I get it picked up by FO&M, but that takes time and money to arrange.”*  
*(Student survey, April 15, 2012)*

Education Department:

*“Submit a work order to request pick-up by the labor crew. They take the surplus goods to the warehouse for a fee. Departments are not allowed to dispose of goods outside this system, although I'm sure some do.” (Student survey, April 15, 2012)*

Each survey response displays varying methods and systems within each department. The first respondent brings up the problem of departmental budgets. The second shows knowledge of reusable goods. The third displays knowledge of Dartlist, and the last indicates knowledge of Dartmouth's disposal policy. Improvements in awareness, communication and campus culture would help enhance materials management procedures at Dartmouth College.

## **2.4 Conclusions**

### ***2.4.1 Lack of Knowledge and Awareness***

One conclusion that can be drawn from the interview excerpts given above is that there is presently a lack of shared knowledge across departments regarding materials management procedures. Currently, a disposal policy does exist; however few departments acknowledge, in question three, its existence or adhere to its policies. Out of the numerous interviews conducted with department administrators, only a couple made reference to the existing disposal policy. Departments lack the knowledge or awareness of the College's disposal options. As the free response section of our survey indicates, some administrators are under the impression that when an item is no longer needed, it should be sent out for immediate disposal (Student survey, April 15, 2012). Free response results can be found in Appendix A. This attitude of sending durable goods to landfills before the end of their lifecycle is entirely unsustainable. In reality departments have several options. Some administrative assistants survey everyone in the department to see if they need a particular good before contacting FO&M. Some take the extra step and communicate with other departments to see if the good meets a particular need. Finally,



very few know of Dartlist, which makes items available to every department on campus. Goods can be sent to Denise Rowell (of procurement) and put in a storage facility. Others may choose to store items within the original building it occupied. These are options that are not used because they are unknown.

#### ***2.4.2 Insufficient Communication Methods***

Communication is an important aspect of materials management. While Hochstin was the materials manager, he was responsible and successful at facilitating proper communication between all necessary parties. Since his departure the responsibility has been diffused and not carried out successfully. A lack of communication creates an information breakdown within the system, making it ineffective and inefficient. We have discussed two critical areas where increased communication is important: Intra- and Inter- departmental communication.

##### ***2.4.2.1 Intradepartmental Communication***

Intradepartmental communication refers to communication within a single department. Before administrative assistants send goods out for disposal or put them in storage, they could notify members of their respective departments to inform them of available items. This would facilitate efficiency and generate less material waste. It would also save the department money by preventing the use of FO&M, which requires a labor fee of \$90 per hour. As previously mentioned, most administrative assistants expressed some level of intradepartmental communication with regards to material flows, but there is no uniform system in practice today.

#### *2.4.2.2 Interdepartmental Communication*

Interdepartmental communication may be more difficult to facilitate than intradepartmental communication. Communication from department to department is less common and more time-consuming than intradepartmental communication. Some survey respondents indicated some level of interdepartmental communication, but not on a large scale. This type of communication is typically conducted when an employee is an administrative assistant for multiple departments or when two similar departments work closely together. The Public Policy and Government departments, for instance, remain in close contact with each other, facilitating easier dialogue.

This type of communication would allow material flows at Dartmouth to become more efficient. In assessing the potential value of inter- and intra- communication, we believe that a listserv like Dartlist could facilitate better dialogue amongst the stakeholders.

Academic departments, FO&M, and Procurement are the main actors in promoting the success of material flow in and out of the College. The lack of communication that increased with Hochstin's departure may be improved with new systems, such as Dartlist, in place.

## **Chapter 3: Materials and Flows at Dartmouth**

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### **3.1 Introduction to Materials Flows**

The procedure for material flows under Dartmouth's Solid Waste Management Plan states that materials should be "reused or redistributed [whenever possible]." This procedure provides a means to achieve the vision for Material Flows under Dartmouth's Deeper Shade of Green campaign, which envisions: "Dartmouth will use sustainability and true life-cycle cost as primary criteria for materials management and for improving the efficiency of material flows." The following provides an analysis of past, present, and future material flows on campus. Then, specific areas of material flows that involve copious amounts of durable goods will be examined. These two areas include: the athletics department and new construction projects.

### **3.2 Furniture**

#### ***3.2.1 Background on Furniture Flows at Dartmouth***

##### ***3.2.1.1 Materials Manager***

The Materials Manager oversaw furniture stored in warehouses during his tenure. His responsibilities were to manage the College-owned furniture that went in and out of the warehouses. He also provided updates about what the warehouse had in stock through his well-monitored Blitz Bulletin posts. During his tenure, Hochstin did not retain a formal inventory of furniture items stored within the three warehouse facilities, but his personal knowledge of the contents was a significant mental database of the system. At

the time, the primary facility for furniture was located at Centerra Parkway. After Hochstin's departure, his warehouse and furniture responsibilities, coupled with several other duties, were distributed among three current employees of the College: Contract Manager, Denise Rowell, Fixed Asset Manager, Sarah LaBombard, and Stockroom Manager of Central Stores, FO&M, Borwell, Remsen, and Burke Stockrooms, Dana Kennedy.

#### *3.2.1.2 Warehouse Sales*

Warehouse storage in the Hanover and Lebanon area is expensive. As a result, Hochstin would organize annual warehouse sales to clear warehouse space, purge unwanted items that had been in storage for a long time, and make a small profit for the College. The sales were advertised via the Blitz Bulletin that Hochstin maintained. Hochstin and others from Procurement put a great deal of effort into preparing for the sales by staging the warehouses so furniture was visible and appealing and advertising the sale via the Blitz Bulletin. The furniture items were mostly office-wares, and were "priced to sell" (e.g. \$20 for a desk, \$10 for a file cabinet, \$5 for a chair). The sale was open to Dartmouth faculty and staff. The purchaser was required to sign a form releasing the College from liability, and was responsible for removing and transporting the furniture. Hochstin recalled the warehouse sales were successful, and the Dartmouth Community was able to benefit from perfectly usable but unwanted furniture. Denise Rowell, currently with Procurement, recalled the sales did make some money, but were often close to breaking even after administrative costs were taken into account.

### ***3.2.2 Data Collection Methods***

The data collection methods for the information below include: personal interviews with Denise Rowell of Procurement (Rowell, personal communication, 2012) and Bill Hochstin (Hochstin, personal communication, 2012), former Materials Manager at Dartmouth, along with visits to Dartmouth's warehouse facilities.

### ***3.2.3 Current Furniture Flows and Practices***

#### ***3.2.3.1 Purchasing and Acquiring New Furniture***

Furniture can be purchased or acquired via two sources at the College: through Procurement services, or through individual Departments. Procurement Services is responsible for "the implementation of efficient and effective purchasing of goods and services to meet College needs" (Procurement, 2012). The amount that Procurement spent on furniture from April 1, 2011 to April 1, 2012 was \$5,287,684 (including capital projects and furniture purchased after building renovations). Procurement Services is responsible for purchasing furniture once an order is placed for an item. Procurement is also charged with securing the cheapest price for an item or negotiating a contract for a large furniture purchase (as is the case when capital projects or renovations occur). Both large or single furniture item orders can be placed through Procurement.

Individual departments can also order furniture themselves using department-allocated funds. Funding sources include the department's general operating budget, or a specific endowed department fund. New furniture is most often purchased when a broken item is replaced, when a new faculty member arrives and wants new furniture, or when the function of a room is converted (e.g. office to conference room). Furniture may also

be ordered through individual departments when a very specific or particular item is required. Due to the hiring freeze and retirement buy-out that went into effect in 2008 under President James Wright, Procurement lost several positions that were responsible for managing furniture requests. As a result, acquiring new furniture from Procurement is reportedly slower than before budget cuts. Ordering an item can require several blitzes from the inquiring department. Instead of waiting for Procurement services, individual departments will order furniture themselves. Department administrators on behalf of faculty or staff often complete these smaller transactions.

#### *3.2.3.2 Acquiring Used Furniture*

There is no formalized, or preferred, system in place for acquiring used furniture on campus. To our knowledge, there exist three methods for obtaining used furniture on campus: Procurement, personal connections, or from Dartlist. Procurement Services manages warehouse storage of furniture, and also manages furniture acquisitions from the warehouses. Denise Rowell, currently in Procurement, has managed the furniture in warehouse storage since Mr. Hochstin left Dartmouth. Mrs. Rowell's primary responsibilities are not managing furniture in warehouse storage. She does not maintain an inventory list of stored items, but does visit the warehouses periodically. Departments seeking used furniture from the warehouses contact Denise Rowell via phone or blitz and give her the specifications for the desired item (e.g. color, dimensions). This process can be inefficient because the person requesting furniture may not know the exact measurements or features of the product they are seeking, and Mrs. Rowell has to assess warehouse inventory before the correct piece is found. Once the desired item is located, a

work order is placed with the labor crew within FO&M, and they transport the piece at a rate of \$90/hour (charged to the requesting Department). Mrs. Rowell is familiar with the warehouse contents; if the desired item is most likely in the warehouse, she visits the warehouse in person to find an item fitting or similar to specifications. Mrs. Rowell reports that this informal furniture re-use system has prevented purchasing of \$75,000 worth of new furniture between October 2011- February 2012, or \$15,000 per month (see Appendix C for list of furniture).

#### *3.2.3.3 Lifecycle of Furniture on Campus*

According to Procurement Services, the “useful life in years” of furniture is 10 years. Since furniture is generally worth less than \$5,000, individual managed are not tracked under the College’s Fixed Asset Management Program, so furniture tends to remain in circulation past its “useful life.” The primary reasons that an item is no longer wanted include: building renovation, item is broken, person or department moves and available space changes, function of a space changes, a new hire, and/or lifestyle change. When a department downsizes or moves to a new space, old furniture often becomes waste.

The functionality of an item refers to whether or not it still serves its primary purpose, but also whether it fits current norms and technologies. An item is no longer functional when it is broken or outdated. Denise Rowell of Procurement recalls several furniture styles that are no longer functional, and therefore no longer desirable. These items include large metal “battleship” desks from the ‘60s (the desks are large and modern desk chairs do not physically fit with them), vertical metal filing cabinets (which

are deep and take up floor space), and deep corner desks (once preferred for large desktop monitors; now irrelevant due to smaller computers)(interview with Denise Rowell, April 2012). While these items are still usable, they are not desirable by modern standards and tend to end up in the warehouses indefinitely.

Capital projects and building renovations result in large fluxes of used furniture into the informal furniture re-use system. In these cases, new furniture is purchased to furnish the building, and the old (but still functional) pieces are distributed within campus or the Upper Valley. Large amounts of similar furniture items are available to the Dartmouth Community, and are distributed via the informal furniture re-use system through Procurement. For example, various parties took the old chairs from Thayer dining hall when the building was renovated into Class of '53 Commons. When large volumes of material are not reused within the college, as was the case with a dishware set no longer desired during Hanover Inn renovations, the items are donated to a business or school in the Upper Valley (Rowell, personal communication, 2012).

#### *3.2.3.4 Storage and Disposal of Furniture*

As mentioned in previous sections, unwanted used furniture is stored in warehouses either rented or owned by the College. The Central Stores warehouse in Centerra Park is owned by the College and was the primary furniture storage location when the Procurement offices were located in the nearby office complex. The Central Stores warehouse is being cleared of furniture, and the majority of furniture stored there has been moved to the Route 120 warehouse or 56 Etna warehouse. The Route 120 warehouse has approximately 16,000 sq. ft of storage, although the portion used for used



furniture from the College is approximately 60% of that space (see Appendix C for list of stored items). This space is not climate controlled or heated, and is a leased space that will be demolished within the next two years. The reusable furniture stored in the Rt. 120 warehouse includes desks, steel-case filing cabinets, desk chairs, and bookcases (see fig. x). Most of the furniture is in good to fair condition, but several pieces are of the “unpopular” type described in the Lifecycle section, and have been stored for 6-7 years.

The 56 Etna warehouse is College owned and climate controlled. The space is approximately 8,000 sq. ft. and contains more “popular” items. Much of the furniture currently stored at 56 Etna is derived from building renovations. There are also several pieces from the President’s house (see fig. x). The space’s primary use will remain storage, but furniture will be moved according to the new furniture storage/management contract currently in negotiations (see “Future of Furniture” section).

Furniture can also be stored on campus, or “hoarded,” by departments. Furniture is often purchased with department funding, and there is a fear that if a piece is sent to the warehouse for storage the department relinquishes ownership of the piece. To remedy this issue, departments can store surplus furniture in unused or flux spaces within the department. These spaces include graduate offices or unused labs. Departments also store furniture in building basements. This method can prove problematic for a number of reasons. Furniture that is stored in this manner often becomes dusty, dirty, or broken and unusable, causing it to lose any value that it may have had otherwise. This furniture can also build up and get in the way. This encourages departments to throw the furniture out rather than finding ways to reuse it when they finally do need to clear space because that is often the quicker, easier solution.

Once a furniture piece is broken or has been stored in the warehouse for a period of time, it is disposed of or re-sold. Efforts are made to recycle furniture that is broken, for example a steel-case cabinet would be recycled for scrap metal. Old wooden furniture that has exceeded its “useful lifespan” is often disposed or recycled rather than stored, because it breaks during transport or storage. The College currently has an agreement with W.B. Mason to remove unwanted and unpopular furniture that has been sitting in a warehouse for an extended period of time. The College also has an office supply contract with W.B. Mason, which went into effect in 2012. W.B. Mason sells unwanted furniture items at a “Scratch and Dent” venue in the Boston area. For example, W.B. Mason removed 4-5 trailers full of the unpopular vertical steel-case filing cabinets from the Rt. 120 warehouse earlier this year. This contract does provide free material removal from Dartmouth and facilitates the sale of furniture cheaply to start-up companies and non-profits that benefit from the furniture, although Dartmouth does not receive profits from re-sale.

#### *3.2.3.5 Specialized Furniture Flows: Dorm Furniture*

Dorm furniture, both that provided by ORL and furniture owned or used by students, constitute a separate flow of furniture on campus. Furniture provided by ORL in dorm rooms include desks, chairs, beds, and chest drawers. The wood is harvested from the Second College Grant, and manufactured into furniture by Design Contempo, Inc. in Lisbon, NH (Woody Eckles, 2012). Dorm furniture replacement is done in a 15-year cycle. In the past 21 years, Woody Eckles estimates that all dorm furnishings have been replaced. The majority of furniture is repurposed, but can also be sold (e.g. to summer

camps, fraternities, etc.) or donated (e.g. truckloads of furniture sent to disaster relief efforts after Hurricanes Katrina and Irene). Unclaimed or donated student-owned items including futons and mini-fridges are sold during sustainable move-out sales, and leftover items are stored by ORL until the next sale.

#### **3.2.4 Analysis**

There are several issues related to Procurement's furniture reuse system. There is no formal position for managing or inventorying warehouse contents, this puts a greater burden on Denise Rowell when Dartmouth staff or faculty request an item. Mrs. Rowell's primary responsibility is not visiting the warehouses and recalling which furniture is stored. Mrs. Rowell and others have expressed the need for an accessible inventory list, but there are not resources at present to generate such a list. As a result, some Department Administrators have reported their requests for used furniture are unanswered, taking weeks to months for a response. Instead of pursuing the matter further or waiting for a response, they end up purchasing new furniture.

Another issue with furniture re-use from the warehouses is that stored furniture is often unpopular or a piece of a set. A person may request a certain item with size and color specifications. Often, a specific piece may not be available, or only a piece of an item will be available. If a desired item cannot be found in the warehouse, the purchaser will often buy a new piece.

Used furniture is also exchanged by word-of-mouth personal interactions or and through Dartlist. Departments that share building space may encounter situations where one department wants to remove an item that the other Department could use. In this

case, a mutual exchange allows the furniture to be reused. Similarly, if an unwanted item is placed in a hallway or entryway, any passerby can take the item for reuse. Dartlist ([dartlist.com](http://dartlist.com)), a website launched in August 2011 by Dartmouth's sustainability office, also facilitates office-to-office furniture sharing. However, only 3 office furniture items have been posted since the website's launch. Dartlist is only open to those with a Dartmouth e-mail account, and also lists items from wheelchairs to houses for sale.

### **3.3 Furniture and Equipment in the Athletic Department**

The Dartmouth College Athletic Department (DCAD) offers 34 varsity sports - sixteen men, sixteen women and two coeducational programs in sailing and equestrian. Teams compete in the NCAA Division I, as well as in the Ivy League conference and the Eastern Collegiate Athletic Conference (About Dartmouth Athletics, 2012). Dartmouth sports compete at the highest level, which is reflected in their quality and quantity of equipment and facilities. Supporting the 831 student-athletes, almost 20 percent of the undergraduate student body, are 104 varsity coaches and 52 administrators (EADA Report, 2010 and Staff Directory by Area, 2012). DCAD functions as a large material in-flow for the College through its furniture purchases to satisfy 156 staff members, equipment purchases to ensure the competitive edge of 831 student-athletes, and material purchases for facilities improvements. Recommendations should take into account the unique nature of material flows within the DCAD.

#### ***3.3.1 Departmental Budgeting and Purchasing***

There is a small budget for furniture purchases in the Dartmouth College Athletic Department (DCAD). However, due to budget constraints there is a culture within DCAD where all coaches and administrators, including Athletic Director Harry Sheehy, use second-hand furniture in order to funnel the money that they save into helping their team's performance. For example, two new offices for incoming sports psychologists were fitted with second-hand furniture in March 2012.

DCAD typically uses Denise Rowell of Procurement to find furniture in the various warehouses, but use their own manpower, a unique asset of DCAD, to transport it rather than hiring a labor crew from FO&M as most departments do. When needed, DCAD also uses the College's carpenters to amend furniture to their criteria. DCAD is particularly frugal in its furniture purchases, and should be a model for other departments to follow.

Shadara MacNicol trains new employees regarding the Procurement process. MacNicol is also the point person for those who desire new office furniture, namely comfortable desk chairs. According to MacNicol, in recent years there are fewer items to choose from in the warehouse.

DCAD has little storage space for surplus goods. Given the desire to reuse, MacNicol does not send surplus items to Procurement, because MacNicol believes they will not return. There are currently 442 square feet of surplus furniture in the basement corridor of Alumni Gym, see Figure 1, *Furniture Stored in Alumni Gym* in Appendix D. This stack of furniture is not only a poor reflection of Dartmouth Athletics to potential recruits, but also a fire hazard.

### ***3.3.2 Athletic Facilities Overview***

Since 2000, the College has invested \$85 million in athletic and recreational facility improvements (About Dartmouth Athletics, 2012). There are usually surplus materials and goods as a result of these renovations. For example, in 2011, the Alumni Gym roof was replaced. Some of the extra copper was resold and the rest went to Dartmouth's jewelry studio.

### ***3.3.5 Issues***

There are many issues with material flows through the DCAD. The current system is fragmented. Many teams have their own selling mechanisms. For instance, skiing sells old gear at the ski sale over Homecoming weekend and rowing shells are sold through Procurement, according to Galbraith. There are no mechanisms present to deal with damaged goods, especially given that the majority of used athletic equipment will probably be damaged to a certain extent. There is no storage space to hoard surplus durable goods in DCAD. The range of potential equipment is enormous. On developing a solution, we must remember that the primary goal of DCAD is to meet athletic needs. In contrast to many areas of the College, there is a constant stream of equipment that flows out of DCAD each year.

### ***3.3.4 Projection Analysis***

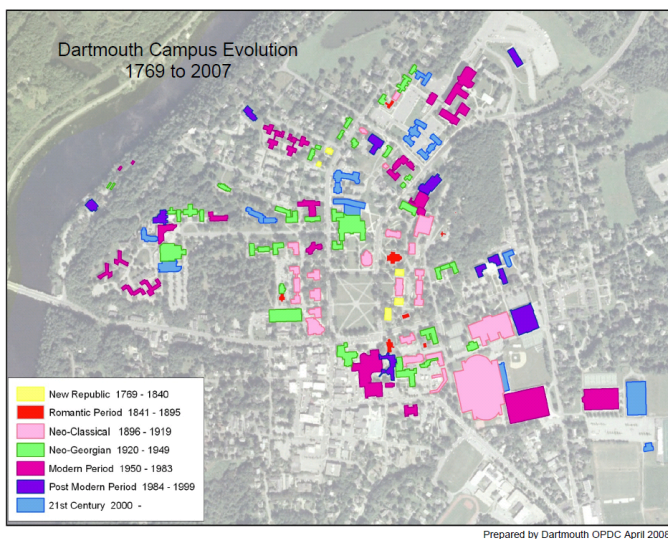
The total yearly operating expenditure for the Athletic Department is **\$3,298,950**. According to Andrew Galbraith, the Senior Associate Athletics Director for Peak Performance, the department average for “potential reusables,” such as uniforms, team equipment and office equipment, is **24%**. Every year, at book value, there are potentially

**\$791,748** worth of reusable durable goods flowing through DCAD. Taking football helmets as an example, where each helmet is used up until its warranty of three years, but still maintains value. Assume the majority of these goods have a useful life of five years, but are not competitively useful to the college after three. Applied to all DCAD equipment, after three years, there will be **\$316,700** worth of durable goods in need of sale. Assuming one-third of goods will be in a state beyond repair, after three years, there will be **\$212,188** worth of durable goods that can potentially flow out of DCAD every year and still be reused.

### 3.4 Surplus Materials Generated by Capital Projects (1999-2009)

(See Appendix D)

#### 3.4.1 General



(Stewardship Technologies, 2008)

This map above highlights the evolution of the Dartmouth campus since its inception. New buildings have been slowly added over time; adding entry points for new material flows into the College.

### ***3.4.1 Strategic Planning***

The campus planning process is closely connected to the strategic planning process. In 2009, President Jim Yong Kim challenged the College to chart Dartmouth's future collaboratively, in anticipation of our 250th anniversary in 2019. Despite Dartmouth's status as an outstanding institution of learning, the sphere of higher education is becoming more global and, hence, competitive. Dartmouth must, and will, continue to invest in its leading programs in order to remain competitive (Folt, 2010).

In 1998, the Campus Master Plan proposed the following mission statement for the campus:

*“Dartmouth College will preserve, maintain, and develop its open space, landscapes, and buildings to provide the best possible educational workplace and residence for the members of its community, and will hold the campus in trust for future generations.”*(Chan and DeWitt, 2002)

### ***3.4.2 Problem***

Over the past ten years, the College has undertaken “intense construction,” due to the Academic Growth and Student Life initiatives (Chan and DeWitt, 2002). There have been 54 major renovations and new buildings from 1999-2009, including the new Visual



Arts Center and Life Sciences Building (Whitcomb, 2010). The campus has grown and is inherently accompanied by a larger volume of material flows.

In the past, classrooms were fitted with chairs and a chalkboard; however, today, classrooms are fitted with the most modern technology available to aid teaching. The technological landscape in education is evolving quickly, and outdates at an accelerated rate. To address this issue, Dartmouth has formed the Digital Dartmouth workgroup, within the Strategic Planning process, comprised of faculty, administrators and students. The Digital Dartmouth workgroup is currently “examining technology trends, needs and opportunities that will be vital to Dartmouth’s success.”(Waite-Franzen et al, 2012) While there yet are no concrete results, the elaborate process indicates that there will be an accelerated inflow of technology in the future in order to “provide the best possible educational workplace for future generations.” (Chan and DeWitt, 2002)

It has been difficult to quantify the extent of material inflows and outflows through the College, due to an array of factors. We believe the perception of the problem is different to the reality of the problem. We hope to calculate a “ball-park” estimate of material inflows and outflows.

The construction of the new Life Sciences building, where every element is brand new, highlights the phenomenon where new durable goods are purchased for newly built or furnished buildings. By calculating the amount spent yearly on renovations and construction, we can back out a valuation for a very significant material flow.

### ***3.4.3 Projection Analysis***

According to the *1999-2009 New Construction and Renovation Summary* courtesy of Whitcomb, there were fifty four new buildings and renovations on 2,327,438 gross square feet (gsf). Sixty percent of this space was newly constructed, the rest was renovations. The College invested \$85 million in athletic and recreational facility improvements from 2000 to 2010 (About Dartmouth Athletics, 2010). These athletic improvements corresponded to 354,915 gsf (Whitcomb, 2012). Given these facts, we can assume that each gsf of construction cost the College \$239.49. Extrapolating this figure campus wide, multiplying the total gsf of construction by the cost of gsf gives a total cost of \$557 million from 1999 to 2009. New construction was responsible for \$333 million and renovated space, \$224 million. Assuming this stream of construction will remain constant into the future, each year \$56 million is spent on renovations and new construction. Making an educated guess that ten percent of construction costs go towards durable goods, the College spends \$5.6 million on new durable goods each year. If these goods are worth a tenth of their original value when they exit then we are looking at a “ballpark” estimate of \$560,000 worth of durable goods that can be recouped yearly, assuming that all goods are replaced in a cyclical nature.

### ***3.4.5 Conclusion***

There may be perceived waste with respect to furniture, and there are certain inefficiencies in the current used furniture system (e.g. no warehouse inventory list, no enforced disposal manual), but an effort is made to reduce furniture waste on campus. Broken items are recycled. Most staff and faculty use items until they are no longer

functional, and most are aware of stored items in the warehouse. Warehouse management could be more efficient.

Although there is a sustainable culture established within DCAD, there is much inefficiency in the reuse of athletic equipment. Within the administration, there is a point person in charge of educating members of the department and maintaining a stigma against using new furniture named Shadara MacNicol. From a team standpoint, certain items are being reused but others are not. There are currently informal networks to resell items; however, there needs to be consistency throughout DCAD. There could potentially be \$212,188 worth of durable goods being financially recouped by DCAD and reused elsewhere. Ideally, employees would be able to advertise goods to specific groups, such as fellow coaches or certain community groups, before others, so that specific relationships can be kept. Also, given the irregular flow of items, the system must be able to cope with a large volume of different types of goods.

From 1999 to 2009, the College invested around \$557 million into the physical plant of the college. Every year, they invested \$55.7 million – an enormous sum. While this was a time of “intense construction,” one could argue that in the future, given Dartmouth’s emphasis on facilitating competitiveness through its strategic plan, namely in technology, and the fact that this construction continued despite the dot-com crash of the early 2000s and the 2008 Recession, Dartmouth will continue to invest at such a rate

Additionally, Dartmouth only renovated 54 of the 166 separate buildings present on campus (Campus Map, 2010). Dartmouth has already selected architects to renovate the Art Museum (Pogrebin, 2012). We can expect significant material outflows in the future, perhaps in the hundred thousand dollar region.



## Chapter 4: Alternative Export Flows: Current Outlets for Reuse

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### 4.1 WinCycle

WinCycle is a not-for-profit company based in Windsor, VT that recycles and repurposes used goods for distribution in the Upper Valley. Currently, Dartmouth works with WinCycle in a limited capacity, mostly to handle used electronics. The source of Dartmouth's current connection to WinCycle is its former Materials Manager, Bill Hochstin. WinCycle can process clothes, lab equipment, computers, medical supplies, office furniture, chairs, TVs, furniture from dorms, refrigerators, etc. At this point in time, WinCycle gets about two crates a month from Dartmouth. There are serial numbers on each item, such as computers and expensive items. WinCycle scans each item in order to count the items in each transaction. Once WinCycle processes each item received the facilities manager promptly notifies Dartmouth by way of an inventory sheet which contains the specific serial numbers of each item.

WinCycle's goal is to put items that would have been disposed back into the resale market, which we feel, makes it an ideal fit for helping improve materials flows at the College. WinCycle has the manpower, capacity, and experience to ameliorate Dartmouth's problems with durable goods and waste reduction. The company prides itself in being able to receive any item and properly deal with it in the most environmentally, and economically beneficial manner. Dartmouth does not pay for WinCycle services; WinCycle generates revenue through the sale of the items it receives in order to pay employees hired from Windsor and surrounding towns.

The existing partnership works as follows:

- 1) FO&M calls and notifies WinCycle that goods need to be taken.
- 2) WinCycle then drops off 6 x 6 foot empty wood crate boxes at the necessary location. These transactions usually take place at Central Stores but WinCycle can and does pick up these crates at any loading dock on Dartmouth campus.
- 3) The WinCycle crew loads the wood crates and brings them back to Windsor.
- 4) WinCycle receives and places the crate in their warehouse and empties each box by thoroughly dismantling every item in the crate and then sorting the pieces into like parts which then can be processed and handled separately.

Ultimately the Windsor Good News Electronics Recycling Education Corporation (WinCycle) shall strive to:

1. "Provide a mechanism to dispose of non-functional computers and electronic equipment in an environmentally responsible fashion. This includes:
  - Retrieving the working parts for use in repairs,
  - Breaking down the remaining equipment into appropriate "streams" for disposal,
  - Establishing a fee schedule for equipment disposal that reflects the cost of paying to dispose of hazardous materials,
  - Reaching out to all elements of the community - individuals, organizations, schools, and businesses - to educate them to the problems associated with improper disposal of electronic equipment, and
  - Offering an environmentally safe alternative.

2. Provide functional computers and other equipment to educational institutions and non-profit charitable groups.
3. Use the recycling service as a site for educational training. To the extent possible, seek partnerships with Vermont and New Hampshire educational institutions.
4. Provide individuals in transition with valuable job skills.
5. Make the operation financially self-sufficient through the sale of components, equipment, and waste removal.
6. Structure the effort so that it can be a model program - one that can be adapted/adopted by other communities and assume responsibility for disseminating information about this initiative.”(“WinCycle-Our Mission,”).
7. These goals match perfectly with our class goal and specifically #3: “Use the recycling service as a site for educational training. To the extent possible, seek partnerships with Vermont and New Hampshire educational institutions.”

WinCycle is looking for a partnership with Dartmouth. It is in their mission statement. A more developed partnership with WinCycle could only bring Dartmouth success in responding to the durable goods and waste problem.


## **4.2 Dartlist**

Currently, Dartlist exists to promote Dartmouth community events, classifieds and any other postings under the Dartmouth Sustainability Office. As of now anyone with a Dartmouth.edu email address can make a posting about almost any item, event, or announcement. Categories include reunion housing, events, wanted, free stuff, for sale,

housing, jobs/internships, lab to lab, office to office, general, wellness, and rideshare sections. The design of the page is currently organized in an inefficient, disjointed and outdated manner when compared to other colleges programs such as Harvard's CrimsonList, but its design is based off need and necessity. There are also links to the Dartmouth Events Calendar, the Sustainability Office homepage, and the Vermont Flood Relief Fund. The posts are kept in an archive as well on a month-to-month basis. The opening page reads "Recent Posts" and these posts are presented in an unclear fashion, without specific sub-groups. A tab reading "Post on Dartlist", on the top menu of the homepage, allows anyone with a Dartmouth username to log in and post. An individual may log on, submit a post, and then get notified about a response via the respondent information they supply to their individual post.



Figure 5, Dartlist Screenshot and Crimsonlist Screenshot



# Dartlist

Dartmouth Community Events, Classifieds, and More

Home

About Dartlist

Calendar

Forum

Post to Dartlist

## Recent Posts

**Yamaha CLP-311 Clavinova piano for sale**  
May 21st, 2012, 5:19pm

**Condo for rent**  
May 20th, 2012, 9:14pm

**Casio Full-Size Digital Piano**  
May 20th, 2012, 8:19pm

**Mongoose Bike for Sale**  
May 20th, 2012, 6:57pm


**Office chair**  
May 20th, 2012, 1:53pm

**For Rent: 1 bedroom fully furnished sublet in Hanover-Summer 2012**  
May 19th, 2012, 5:03pm

Search

### Categories

- » Dartmouth Reunions
- Housing
- » Events
- » Wanted
- » Free Stuff
- » For Sale
- » Housing
- » Jobs/Internships
- » Lab to Lab
- » Office to Office
- » General
- » Wellness
- » Meetups
- » Rideshare



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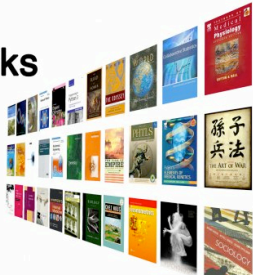
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#### ***4.2.1 Practices and Management***

A very prominent issue on the current site is the mere functionality and general appearance when visiting the site itself. When an item is input into the system, the supplier must upload a picture and fill out a quick description of the item by using a simple drop down menu. The characteristics offered as options on the menu would be identical to what people are able to put in their wish lists so close matches can be found. The site itself looks unprofessional, not up to the standards of what should be reached by an institution such as Dartmouth. Dartlist has the potential to solve durable goods issues and already does to a very limited extent. More options and clearer sections would significantly increase its use and benefits at the college. At this time, many of us in the course had no idea that Dartlist existed—displaying that the site itself desperately needs to be publicized to campus. Publicity across campus could easily be improved in numerous ways to staff, students, and the greater Dartmouth College community. Because there is little to no publicizing of the website—posts have remained on the page since its creation—and when new posts are made no notifications are sent out to campus, therefore items go unseen, unused, and eventually risk being wasted. Job listings are on there from months and months ago— an example of the lacking of a time-sensitive option on the site itself. In Chapter 8, these flaws will be expanded upon and our solutions will be proposed with strong evidence from successful examples.

## **Chapter 5: Proposed Furniture Asset Management Program**

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### **5.1 Introduction**

This section is unique, because the Furniture Asset Management Program is not a current system, but one that is currently in negotiations. The purpose of this section, therefore, is to examine the positive and negative aspects of the Program, including social and environmental impacts. People interviewed suggest that the proposed furniture management contract will save money because furniture re-use will be much easier, but the program still may not be the best choice for Dartmouth.

### **5.3 What is the Furniture Asset Management Program?**

With the loss of the Materials Manager Position in 2008, management of furniture stored in the warehouse has become a diffuse responsibility among several College employees working for different offices. To remedy the inefficient use of employee time and energy, and to liquidate costly warehouse real estate, Procurement is in the process of negotiating a contract with a private company to take inventory and store unused furniture under a “Furniture Asset Management Program.” The company, Red Thread, is currently the “Preferred Vendor” for furniture at Dartmouth, and it specializes in furniture sales and storage, so the contract will integrate both new purchases and re-use into a single furniture acquisition system for the College.

The company will store any used furniture item in a climate-controlled warehouse located in Wilmington, MA. The new company will inventory each item, which includes

product specifications/measurements and a photograph. To acquire furniture under the proposed contract, Dartmouth's customers will be directed to the company to request the item, and the company will suggest used items that fit the description, or are similar but require some modification. The customer will be presented with the purchasing cost, the cost of transportation, and, if applicable, the cost of modifying the used item.

## **5.4 Analysis of Proposed Contract**

### ***5.4.1 Benefits***

The company is experienced with furniture storage, repair, and restoration, which will allow for more efficient furniture re-use within the College. The company will also generate a needed inventory list of stored items, which will be made available to Dartmouth staff and faculty. This will allow users within the Dartmouth community to access stored items easily and request their delivery. Labor costs for delivering furniture from the warehouse will be competitive with current FO&M labor crew rates (Rowell, personal communication, 2012).

New items purchased through the company will be of a uniform type and style, making furniture re-use more seamless in the future, because once furniture across campus becomes more standardized, it will be easy for Dartmouth staff to re-use a base model item and add customized parts. One issue with the current warehouse is availability of desired furniture. If a person seeks out a used item, for example, but there are no types or sizes that meet their specifications, then the person will purchase new

furniture. If all furniture were similar in style and design, re-using furniture, or reusing pieces of furniture, would be easier and would promote more furniture reuse.

Procurement has indicated that the cost of the new furniture storage and inventory contract will be cheaper than the cost of maintaining current warehouse storage facilities off Rt 120 and at 56 Etna. Currently, the annual rental cost for the Rt 120 facility is \$90,000 per year (Rowell, personal communication, 2012). At a rate of approximately \$5.60 square feet, the total annual cost of maintaining the Rt 120 and 56 Etna facilities is approximately \$135,000 per year, excluding the cost of heating at 56 Etna. (Calculation based on Rowell, personal communication, 2012)

The new contract is priced by square footage, so the College will not have to pay for more storage than is needed. An inventory list will make managing Dartmouth's furniture stock easier; it can be generated any time and Procurement can designate items that do not experience sufficiently rapid turnover for re-sale. The company will be able to sell items, although the details of re-sale have not been negotiated. While there are many intangible benefits, the Furniture Asset Management Program contract should provide an economic incentive for the College to switch over. The contract should therefore cost less than the current \$135,000 spent annually on storage.

#### **5.4.2 Costs**

When comparing the cost of the Furniture Asset Management Program contract to the cost of warehouse real estate, the new contract does indeed save the College money (Rowell, personal communication, 2012). However, no analysis was conducted on improving the current warehouse system by, for example, hiring a Materials Manager to

consolidate warehouse inventory and promote higher furniture turnover rates to maintain a smaller warehouse stock. Thus, the proposed contract may not actually be the most economic.

Although the company will offer Dartmouth staff and faculty the choice between purchasing a new furniture item and paying for labor crews to have a used item delivered, the company's ultimate goal is profit. It is in the company's best interest to sell as much new furniture as possible, and maximize the amount of furniture stored in the warehouse, since storage is charged by square footage. Therefore, the contracted company may emphasize the purchase of new items, rather than encourage reuse of stored items. If the furniture acquisition process favored purchasing of new furniture, Dartmouth would lose the economic and environmental benefits from reusing furniture. In such a scenario, Dartmouth would be worse off compared to the present situation.

If the furniture contract does facilitate increased furniture reuse, the College would benefit from decreased purchasing of new furniture as well as fewer furniture disposal charges. However, the new warehouse would be located much farther away than current storage facilities, and would require significantly higher gasoline use. The new warehouse is located in Wilmington, MA, approximately 228 miles from Dartmouth round-trip. The current round trip distance to the College's warehouses in Lebanon is at most 10 miles, or 4% of the round-trip distance to Wilmington, MA. To provide a rough estimate of the difference in fuel usages between the two furniture storage locations, we assumed that trips to the current warehouses would be 60% more frequent. Results from this fuel usage analysis are below (see figure 1). Dartmouth's warehouses are located in Lebanon, NH (10 mile round-trip), WinCycle's warehouse is located in Windsor, VT (40

mile round-trip), and the contracted company’s warehouse is in Wilmington, MA (228 mile round trip). We assumed there would be 150 trips to the Lebanon and Windsor locations in a year, and 60 trips to the Wilmington location. Fuel usage to and from the Lebanon location is significantly lower. For the 8 miles per gallon scenario, the amount of fuel used if the warehouse were in Lebanon is 90% lower than the amount used if the warehouse were in Wilmington. Assuming the cost of gas were \$4 per gallon, the Lebanon warehouse would save \$2500-\$6000 in fuel costs annually.

Figure 6, Fuel Usage Comparison

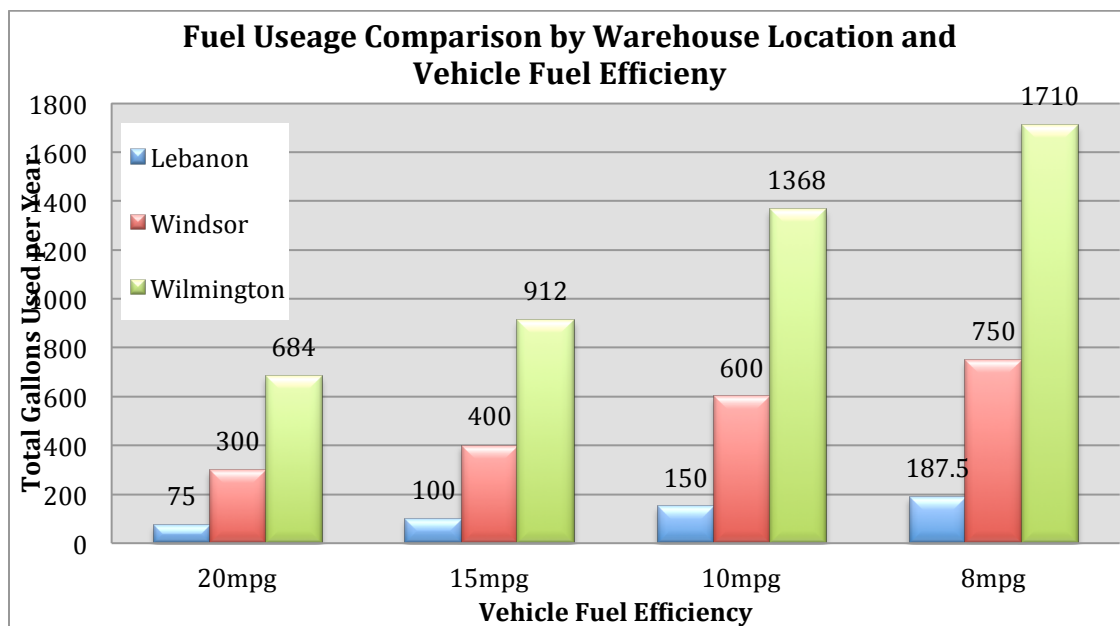


Figure x. Histogram of total gallons used per year for different warehouse locations (Lebanon, NH; Windsor, VT; and Wilmington, MA) by fuel efficiency (20-8mpg).

Assumes 150 trips made per year to Lebanon and Windsor, and 60 to Wilmington.

The proposed contract would also divert resources outside of the Upper Valley. Dartmouth warehouse staff and labor crews could see reduced working hours, or even

downsizing. Rather than support workers in the Upper Valley, Dartmouth resources would be outsourced to Massachusetts. Furthermore, the Upper Valley (including Dartmouth staff) would not benefit from potential re-selling, or donation, of used goods. Surplus furniture that has not turned over would be sold in the Boston area by the private company, and could not be reused by people in need who support the College.

## **5.5 Conclusion**

The new contract has potential to make furniture reuse at the College more efficient by inventorying and tracking all stored items. Warehouse rent would also be cheaper than maintaining multiple warehouses in Lebanon, NH. However, the company's goals may be to encourage new furniture purchase instead of reusing stored furniture. The company's warehouse is located much farther than Dartmouth's current storage facilities, and would have an associated environmental impact in the form of higher fuel usage. Moving Dartmouth's stored furniture to Massachusetts would also divert human capital (labor) and potential furniture sales/donations outside of the Upper Valley.

The same benefits of reduced warehouse rent and an accessible inventory list could still be achieved, while keeping resources within the Dartmouth community. A Materials Manager could maintain an accessible inventory list, and could advertise/promote furniture reuse more easily through personal connections and an on-campus office. This scenario would create more rapid furniture turnover to maintain a smaller stock. A smaller furniture stock would require a smaller space to rent. Furthermore, the current warehouse space could be used more efficiently with racks, to



layer available space (currently furniture is only stored on the floor of warehouses, and does not take advantage of space above). Ultimately, this scenario would be more beneficial for Dartmouth, the Upper Valley, and the environment.

## **Chapter 6: Materials Manager**

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Until the budget cuts of 2008, Dartmouth employed a full-time Materials Manager to oversee issues at the College related to disposal of surplus goods. The most recent employee in this position was Bill Hochstin, who served from 1982 to 2008. Hochstin began his time at Dartmouth as an assistant director of housekeeping and eventually earned the title of materials manager owing to his deep experience with many aspects of the College's physical operations, as well as his business background, which includes an MBA degree from Franklin Pierce University. After being offered early retirement two years ago, Hochstin took his skills, experience, and energy to WinCycle, a not-for-profit in Windsor, Vermont that recycles, refurbishes, and re-sells a variety of used goods in the Upper Valley.

Having interviewed many Dartmouth employees who worked with Hochstin we conclude that his work as materials manager provided a much-needed service to the Dartmouth community. After his departure, his duties were distributed among several employees who had to take on additional responsibilities beyond their already full workload. Our investigation into the current state of surplus durable goods at the College has suggested that without a dedicated manager to oversee these materials flows, the system is not operating at peak economic or environmental efficiency. Many reusable items are left in storage off-campus, where administrative assistants cannot easily access them. For example, if they sought to furnish offices to reuse goods and save thousands of dollars from department budgets, it is a lengthier process than necessary. Alternatively,

some of these items, such as office furniture, could be resold at fair prices to local start-ups, non-profits, or summer camps, perhaps through a distributor like WinCycle. Currently, that is not happening either, which suggests a wasted opportunity to generate revenue and build mutually beneficial ties with the local community. By our rough estimations, even simply the scrap value of outdated electronics and appliances currently in storage represents a potentially significant source of income for the College, were there a manager in place to oversee the sale of these materials. After visiting the three main warehouses used to store surplus durable goods and conferring with FO&M staff, we estimated that roughly a half million dollars worth of material is currently sitting unused. When Hochstin oversaw material flows at Dartmouth, he sought buyers for unwanted goods in the community and negotiated the sales.

In light of what we have learned about the systems that Dartmouth has in place to deal with durable goods, it is not surprising that the current situation has arisen in the absence of a materials manager. Understandably, the employees of FO&M and Procurement are very busy with their pre-existing workload, which entails effectively running the small city that is Dartmouth College. As a result, dealing with surplus goods in a way that reduces purchasing and generates revenue may not be a high priority, especially when a large warehouse for storing these items indefinitely at little or no explicit cost is available. The lack of a full-time materials manager is problematic, though, not just because it unreasonably expects other employees, namely Denise Rowell, Sarah LaBombard, and Dana Kennedy, to pick up the slack. A dedicated materials manager has an important set of responsibilities and personal connections, which, according to everyone we interviewed, made Hochstin effective at his job. Over time, he

obtained a working understanding of the types of items required and the waste generated by nearly every sub-unit of the College, even including highly specialized materials like electronics, medical equipment, etc. The potential liability and financial concerns associated with these items required Hochstin to bridge the gap between department administrators, accountants, lawyers, and labor crews. In fact, Hochstin wrote several of the disposal policies and liability waivers later approved and given legal standing by the General Counsel's office. Our investigation into the current state of these issues at the College suggests that, without someone as trustworthy and responsible as Hochstin to act as a liaison between various actors in the disposal process, many personnel in FO&M simply do not feel comfortable selling or donating these types of items for fear of (or lack of understanding of) liability. In turn, "liability" has become something of a stock rationalization for why more sustainable outcomes for durable goods are not undertaken.

In addition, a material manager forms a key link in the chain of communication between "suppliers" and "consumers" of goods within the College. During his tenure, Hochstin used the old Blitz bulletin system to maintain informal "wish lists" of items that academic or administrative departments were seeking, thereby facilitating the process of matching surplus goods being disposed with potential re-users. With Hochstin's retirement and the subsequent demise of the Blitz email client in favor of Microsoft Outlook, no equivalent system currently exists. Judging by the many administrative assistants who recalled Hochstin's furniture bulletins, this system, while strikingly low-tech, was apparently quite effective, in large part because Hochstin had developed personal relationships with many relevant employees and achieved buy-in to his system. We propose that the Dartlist website, if improved in appearance and functionality, could

help re-establish these interpersonal networks for distributing surplus goods, while also expanding the pool of potential buyers for some goods to include students and local residents. Regardless of the exact logistics of a revamped Dartlist platform, we propose that the materials manager, with technical support from computing services and labor from one or more student interns in the sustainability office, is best positioned to make the system successful.

Furthermore, even with the salary a qualified materials manager would command to work at Dartmouth and live in the Upper Valley, hiring someone to fill this position makes economic sense for the College, according to the data we have collected. Salary information publicly available on the Dartmouth Human Resources website suggests that a materials manager with a master's degree in business administration would likely warrant an annual starting salary of roughly \$80,000, with potential for salary growth up to \$122,000 ("Salary Structure"). Additionally, according to Gary Hill of FO&M, a comprehensive benefits package from the College is typically valued at 38% of the annual salary, or at least \$27,000 in this case, plus a 3% annual cost of living adjustment (Hill, class interview, 4 April 2012). The College currently saves on average about \$15,000 per month by reusing existing furniture, however its annual furniture expenditures are in excess of \$5 million. Without a Materials Manager, the College has saved an average of \$15,000 per month by reusing existing furniture. Based on the total number of items re-used, and their total worth, the average item re-used has a monetary value of \$550. Using an average worth of \$550 per item, and multiplying by the number of furniture items currently stored and available for re-use in Dartmouth's off-campus warehouses, there is approximately \$488,400 worth of furniture that could potentially be

re-used with assistance from a Materials Manager. While some projects, like the new Life Sciences Center, will inevitably warrant new purchases, they will also assure a steady stream of used furniture marked for reuse. Clearly there is still significant potential for money-saving improvements in re-use. And these figures only include furniture, just one category of durable goods. On the flip side of reuse is the possibility of resale, either for scrap or for use by others outside the College. The stockpile of items at the College's warehouses in Lebanon, NH is a potential source of revenue for Dartmouth, likely a significant enough source to fund a salaried materials manager position. Barring a truly comprehensive, zero-waste durable goods system at Dartmouth, the flow of surplus items requiring disposal or reuse will not cease any time soon, and thus neither will the need for a materials manager and the economic justification for paying one. Reports from staff in FO&M and Procurement that the College will soon stop renting one of its warehouses in Lebanon, NH and will be clearing another warehouse of furniture– thus, necessitating the disposal or relocation of its contents – add further timeliness to our suggestion that a materials manager be hired.

In addition to overseeing furniture flows, the Materials Manager position has several other opportunities to make material flows more sustainable and equitable in the Upper Valley, and to generate moneymaking or saving initiatives. The former Materials Manager, for example, was responsible for instituting Dartmouth's recycling program. As technologies change, so do procedures for electronics disposal. Mr. Hochstin was responsible for navigating computer recycling at a time when no such programs existed. Currently, several major electronics manufacturers with which Dartmouth does business, including Apple, offer recycling take-back programs. However, this may not always be

the most profitable arrangement for the College. In 1997, for example, Mr. Hochstin negotiated the private sale of an fMRI machine from the psychology department for \$475,000 – several hundred thousand dollars more than the take-back price the manufacturer would have paid (Hochstin, class interview, 13 April 2012). While sales of this scale may be infrequent, they exemplify the potential economic impact that a Materials Manager could have at the College.

Obviously, simply throwing money at the problem by hiring another salaried, management-level employee is not a reasonable solution. Rather a candidate should be carefully selected for the position by a search committee well-versed in the relevant economic, logistic, and environmental issues which would fall under the materials manager's purview. Based on our conversations with Hochstin and current managers in FO&M, we suggest that a materials manager for Dartmouth should have a wealth of experience in facilities or waste management at a large, preferably educational institution; an education in business management, including an MBA degree; strong credentials relating to sustainability with past employers; comfort working with digital technologies to facilitate networking; and interpersonal skills suited to communication between a variety of actors within the Dartmouth community, from labor crews to the President of the College. Finally, in personal communication, the former Materials Manager for the College, Bill Hochstin, has offered to train a new hire free of charge. Hochstin is personally vested in the economic and environmental health of the Upper Valley and is committed to helping Dartmouth promote sustainability.





## Chapter 7: Liability Issues

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At Dartmouth, liability risk is one of the most important issues to evaluate before undertaking a project that redistributes and repurposes materials on campus and beyond. When thinking of the various durable goods – wood, furniture, electronics, machinery, and the like – that are available for resale or distribution to the general public, the school’s liability must be covered before completing the transaction. While myriad laws can come into play in the process of repurposing a good, there are two major sections of the law that are applicable to our proposed management system: product liability law, and contract law. A strong understanding of these three areas of the law will help reduce liability risks, which includes everything from what happens if someone hurts himself while loading an item into a vehicle to who can use the software on repurposed computers, to who is responsible for the toxic chemicals inside refrigerators. While understanding these three laws with respect to our project provides a strong foundation for mitigating liability risks, it is also clear that among the many goods that Dartmouth owns, some present unique risks. For example, Timber Trespass and Occupational Safety and Health Administration regulations (Smith and Anderson, 2012) govern issues related to timber and logging. Therefore it is prudent to keep in mind that liability law, product law, and contract law are not the only three laws that can be applied to the repurposing of goods at Dartmouth, rather they are merely the most universally applicable.

Many colleges and universities by their nature are susceptible to liabilities that can be magnified as the school undertakes a project in which goods are being sold or given away. It is therefore important to evaluate what conditions make the school more

susceptible to liabilities so that each issue can be addressed and legal cases can be mitigated. However, there are several general legal terms that are commonly cited in liability, product, and contract law that we must define before evaluating risks—liability, tort, and negligence are the three most important definitions to this report. According to the Bouvier’s Law Dictionary (4th Edition, 1984):

*Liability* is “responsibility; the state of one who is bound in law and justice to do something which may be enforced by action. This liability may arise from contracts either express or implied, or in consequence of torts committed;”

*Tort* is “an injury; a wrong”

*Negligence* is “the failure to exercise that degree of care that, in the circumstances, the law requires for the protection of other persons or those interests of other persons that may be injuriously affected by the want of such care.”

In addition to understanding legal definitions, it is important to understand what may increase Dartmouth’s chances of being held legally liable for something. For example, the Brevard School District outlined several common sources of legal liability, many of which are directly applicable to defining liability within an educational setting. These include: (1) poor supervision, (2) poor instruction, (3) failure to warn, (4) unsafe facilities and poor equipment, (5) skill level and over-matching, (6) poor protective measures, (7) liability of equipment, (8) altering equipment, and (9) installing equipment (Brevard School District, 2011). While it seems as though these liabilities are related to teaching students and not directly to the repurposing of goods, each of these issues are transferable to our project. For example, the number one risk factor was “poor supervision” which is not only important in education, but also when transferring goods. Using poor protective equipment, poor instruction on how to use and transfer a good, or failing to warn someone about potential hazards while moving a good could all lead to

increased liability risk for Dartmouth. In addition, while this list is not exhaustive, it does provide the foundation for how Dartmouth can begin to reduce its liability risks through a goods giveaway or disposal program. Many of the suggested recommendations made in this paper would address each of the aforementioned common sources of legal liability. For example, hiring a Materials Manager would ensure that adequate supervision and instruction is in place during the repurposing process. A Materials Manager would also ensure that proper protective measures are taken and that equipment would be used with reasonable operating instructions. In addition, having buyers sign a contract like the one presented in Appendix B is one way that Dartmouth can avoid “failing to warn” during a sale. Addressing the most common sources of liability with respect to each good that is repurposed or disposed of will help mitigate the chances of Dartmouth being held liable for a consumer’s injury.

In order to fully comprehend the risks associated with our project it is also vital to review product law. Product law applies to all contributing parties along the manufacturing chain of a product. The Cornell Legal Institute defines contributing parties as any party from the “manufacturer of component parts (at the top of the chain)” to “an assembling manufacturer, wholesaler, or the retail store owner (at the bottom of the chain)” (Legal definitions, 2012). Although not a conventional retail store, Dartmouth College would assume some liabilities associated with re-selling goods. The subjects of product liability suits are generally tangible items similar to the durable goods that we are proposing to sell, but occasionally product liability subjects can include naturals (pets), real estate (houses), intangibles (gas), or writings (navigational charts).

Products liability claims are largely based on the Consumer Protection Act (CPA) of 1987 (Consumer protection act 1987, 1993) which, in turn, is based on an effort to consolidate the Consumer Safety Act of 1978 and the Consumer Safety (Amendment) Act of 1986 (32 I.L.M. 1406 1993). Using CPA 1987 as a framework, most product liability claims are filed on the core basis of negligence, strict liability, or breach of warranty (Cornell Legal Information, 2010). Of these three claims, negligence and strict liability are the two that are most likely to affect Dartmouth. *Strict Liability* can occur in both tort and criminal law. In the product liability area of torts with which we are concerned, a *strict liability* is applied when a defective product causes injury to an appropriate plaintiff. Defined by *Nolo's Plain-English Law Dictionary* (2012), *strict liability* is “automatic responsibility for damages due to manufacture or use of equipment or materials that are inherently dangerous, such as explosives, animals, poisonous snakes, or assault weapons. A person injured by such equipment or materials does not have to prove the manufacturer or operator was negligent in order to recover money damages” (*Nolo's Dictionary of Law Terms and Legal Definitions*, 2012).

In addition to being held culpable by negligence or strict liability, there may be specific considerations under New Hampshire law, because many states have enacted their own product liability statutes. However, the United States Department of Commerce has promulgated a Model Uniform Products Liability Act (MUPLA) that provides the framework for each state's products liability statutes (Cornell, 2010). In any case, there are several processes that must occur in order for Dartmouth to be held liable for a defective product.

The first step that the victim of a defective product must take is to prove that the product was legitimately defective (Cornell, 2010). The victim can prove his or her case by looking at design defects, manufacturing defects, or defects in marketing. It is likely that Dartmouth is most susceptible to incur liability by defects in marketing, because these include improper instructions and failure to warn. Studying design defects, manufacturing defects, or defects in marketing are several components in creating a liability case. It is likely that Dartmouth is most susceptible to incur liability by defects in marketing, because these include improper instructions and failure to warn. Liability is not dependent on lack of reasonable care, but rather based on evidence that the product has a “defect” in three ways:

1. Improper manufacturing where the product was assembled in a defective and/or “unreasonably dangerous” situation.
2. Poor design to result in a defective and possibly dangerous product.
3. Lack of warning to consumers about “known risks” of harm to render the product defective and/or unreasonably dangerous (Marks, 1998).

Contract law defines the legal exchange of goods under several general boundaries. First, when goods are exchanged, there must be mutual consent from both parties indicating their agreement to the deal or transaction. The objectives of the trade or exchange must be clear to both parties. As one party offers another party an exchange of goods, the recipient accepting the offer for the contract considers it to be binding. For example, if an item is offered for \$50, the receiving party must agree to this exchange for the contract to be valid and in good understanding. Such an understanding is considered

to have mutuality. When goods are sold or traded, they must be done so in exchange for objects of mutual value (Larson, 2010).

The contract holds both parties accountable for completing their portions of the transaction; the power of the contract lies in enforcing both ends to complete their half of the transaction. The timing of whether a good will be delivered before or after payment of money or other goods is at the parties' discretion. In either case, both parties are bound to their agreement that the transaction will occur in timely manner. Additionally, an underlying component of a contractual agreement lies with the assumption that both parties are acting on good faith. For example, the Procurement Department of Dartmouth College should realize there are no obvious or hidden flaws with the goods that they sell to the public. In situations where common law is applicable, such as this, a warranty of merchantability is assumed with the sale of goods, indicating that the item is as it looks and has no hidden defects. If there were defects and the College intends to continue the sale, the process should continue with labeling indicating the situation (Uniform Commercial Code 1992). Before the sale of an item, the College could develop a quick system to make sure that the item is in good, standing order – a check of the legs, safety of tires, health of wood. The receiving party, by agreeing to the contract, will uphold their portion of the deal and provide the mutual offer in return.

Lastly, the transactions that are outlined are in accord with the legal restrictions of the laws that exist regarding those goods. If wood is sold from the College to an outside buyer, the transaction shall follow the legal boundaries that are already set in place with those types of goods. As previously mentioned, OSHA and Timber Trespass are factors in cutting down and selling wood to private buyers. When selling furniture or electronic

goods, their respective product laws shall be referred to as a contract or a waiver for the release of illegal or improper material is not enforceable (Larson, 2010). For the transfer and exchange of durable goods from Dartmouth College to be recognizable in a court of law, the waiver should adhere to the guidelines of the item's respective product and contract laws to create a fair exchange for both parties. Ultimately, for the transfer and exchange of the durable goods from Dartmouth College to be enforceable, the waiver must confine to the requirements of creating a safe agreement amongst all parties. A sample waiver that the College could employ for this purpose is provided in Appendix B. Representatives from the Office of General Counsel have reviewed the waiver and given preliminary approval (interview with Ellen Arnold, 15 May 2012).

## Chapter 8: Recommendations

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### 8.1 Furniture Asset Management Program

- **Procurement should consider a more detailed cost-benefit analysis of the proposed Red Thread contract, taking environmental and societal costs into account. Pending a discovery that Red Thread is not the best option for Dartmouth, Procurement is discouraged from finalizing the contract, or renewing the contract in future years.**

The proposed furniture contract with Red Thread has the potential to save the College thousands of dollars in warehouse storage costs, but the amount saved does not take into account additional environmental and social costs. The amount of fuel used to transport goods to and from campus would not only cost thousands of dollars more, but the amount of fuel used would increase by up to 90%, or an order of magnitude. Furthermore, Dartmouth resources would be diverted away from the Upper Valley. Dartmouth staff, employees, and Upper Valley businesses would lose the potential benefit of purchasing used goods.

Finally, hiring a Materials Manager instead of Red Thread would be a viable solution to deal with the problem of furniture flows within the College, and would assure that Dartmouth's best interests and core missions are central to operations. A Materials Manager would have a vested interest in furniture re-use and waste reduction, not selling new furniture (which is the motivation of a private company such as Red Thread).



Furthermore, a Materials Manager could more than support his/her own position by negotiating sales of surplus goods, instead of donating them, or allowing a company such as W.B. Mason to remove furniture with only small returns to the College. A Materials Manager could also negotiate sales of goods beyond furniture, including high-value items such as lab equipment, and could also oversee sustainability initiatives to make Dartmouth's flows of durable goods, waste, and energy more sustainable system.

## **8.2 Dartlist**

- **Based on the information in Chapter 4, Dartlist should be revamped with a new template to increase posts, website visits, and campus awareness as an alternative way for durable goods distribution.**

Based on the issues we identified in Chapter 4, we propose a solution to the current Dartlist problems by producing a new, revamped Dartlist. This will be an augmented version of the current system in order to boost functionality. A number of other schools similar to Dartmouth have a successful resale program through online programs akin to Dartlist. The models used by Harvard and Tufts are ideal templates that Dartlist could adopt to ease the user experience in posting items for sale.

### ***8.2.1 New Organization***

The new system would be divided into three main spheres to include a public sphere, a student sphere, and an administrative sphere and it will continue to be run by the Sustainability Office. The public sphere would be simply open to the public while the

student and administrative sphere would require a proper login and password. Each section would be clearly divided on the homepage so the user knows exactly which section is best suited to their individual needs-diversifying the current, bland appearance of the website as well as making it easier to use.

The public section of the website would be used for goods that can be utilized by anyone outside of the College in order to promote resale throughout the Upper Valley. The student section of the website would be only accessible with a student's Dartmouth College login username and password. The student section would act as a platform where students can post their personal items that they want to sell to others within the student body. Futons, iPods, clothes, textbooks or other various student goods would fall in this category.

The administrative section of the website would require a proper administrative username and password. In this section, professors, administrative assistants and other staff can access information about what furniture and other durable goods are available on campus--broadening the current status of needing strictly "[dartmouth.edu](http://dartmouth.edu)" address. Dartlist would allow them to peruse the contents of the warehouse and send in requests for items they require. The website would have a section where each individual could add items to their own personal wish list and would receive an email notification when an item matching their description is added to the system. Procurement cards would be used in a fashion similar to their current use. Staff could request a card and can only use it with previously approved vendors. The purchase, since it is via credit card, will be electronically recorded in order to help the College know what items it possesses.

### ***8.2.2 Increased Membership and Awareness***

As previously mentioned, the level of public awareness needs to be increased. To remedy the situation, we have come up with 3 solutions:

1) Disseminate Information to Freshmen During Orientation: Orientation is a wonderful time for freshmen to learn how Dartmouth works. There are numerous information sessions held on everything, from working a MacBook, to meeting department chairs. We see this time as an excellent opportunity to disseminate information about Dartlist and/or Dartmouth material flows. This could be done in the form of an information session, pamphlet, showcasing a banner on the green, etc. The options and ideas are endless. We think reaching students as freshmen, when they are eager to learn more about Dartmouth would be an effective strategy and would result in increased awareness.

2) Using Undergraduate Advisors (UGAs) as a Resource: During freshman year and beyond, UGAs are a constant great resource for students with inevitable questions. Their responsibilities include weekly or monthly floor meetings, transmitting important information to the students through various means, etc. We feel that using the mass number of UGAs on campus to promote awareness of Dartlist would be a successful endeavor. We envision the UGAs bringing up Dartlist at a floor meeting or including it in a floor email or offering the site in person if a student asks about purchasing/selling furniture.

3) Dartlist Intern: Lastly, we feel that the creation of the position of a Dartlist Intern would greatly increase the effectiveness of Dartlist. This intern could not only

work on improving and constantly updating Dartlist, but they could also help spread awareness. They would be responsible for emailing out to campus, creating signs or posters, and working with departments on campus that require additional help/tutorials for using Dartlist. We feel that these three options would increase publicity of Dartlist and efficiently increase material flows at Dartmouth.

Our last solution includes the donation of certain goods that have remained on the list for a period of time. We feel that if specific items remain on the list for a predetermined amount of time (example 5 years) then it would be inefficient to continue including this item on the site. Another institution might need this item that is clearly not needed at Dartmouth. These institutions include places like The Haven, Listen, Habitat for Humanity, etc. Another option could be an Upper Valley yard sale that would function in accordance with the liability waiver we have drawn up. Finally, if there are still goods remaining after these initiatives, then they could be taken to WinCycle to be disposed of properly. We feel that these modifications would improve the effectiveness and awareness of Dartlist and thereby increasing efficiency of material flows and surplus goods at Dartmouth College.

### **8.3 Materials Manager**

- **In consideration of environmental and economic benefits, we recommend that Dartmouth hire a competent and experienced individual to manage materials flows at the College. As stated previously in Chapter 6, having interviewed many Dartmouth employees who worked with the former**

**Materials Manager, Bill Hochstin, we conclude that his work as materials manager provided a much-needed service to the Dartmouth community. Our investigation into the current state of surplus durable goods at the College has suggested that without a dedicated manager to oversee these materials flows, the system is not operating at peak economic or environmental efficiency.**

#### **8.4 WinCycle**

- **Based on the economic advantages of partnering with WinCycle, Dartmouth should improve its relationship with WinCycle to take advantage of free shipping to its storage facilities. Currently, it costs \$90 an hour in order to hire FO&M to transport and dispose of durable goods.**

Given what we have learned about the current relationship between Dartmouth College and WinCycle, we recommend strengthening our current working partnership with them. Utilizing this unique company to a greater extent will help alleviate Dartmouth's waste problem. A stronger partnership with WinCycle can help reduce the amount of waste and increase economic and environmental efficiency. Since Dartmouth already has a relationship with them, increasing the flow of materials to WinCycle for repurposing or proper disposal is an easily implemented solution.

#### **8.5 Warehouse Sales**

- **Dartmouth College should hold annual warehouse sales to lighten its load of durable goods that have been stored at a capacity and economic loss to the College in the past.**

Based on the information stated in chapter 5, we recommend holding annual warehouse sales. Warehouse storage in the Hanover and Lebanon area is expensive. As a result, Hochstin would organize annual warehouse sales to clear warehouse space, purge unwanted items that had been in storage for a long time, and make a small profit for the College.

## **Chapter 9: Conclusion**

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The issue of material flows on Dartmouth's campus is the product of a multi-scale communication breakdown due to the loss of a Materials Manager, no formal or supported system, as well as perceived and real liability red tape. All of these issues are embedded in a culture that fails to encourage materials reuse and redistribution. While Dartmouth has made considerable strides in the advancement of sustainability and environmental awareness, the material goods problem highlighted in this report demonstrates the need for further progress in this arena. In keeping with the tradition of past Environmental Studies 50 seminars, it is our hope that the College takes our recommendations into serious consideration as it moves toward a more sustainable future.

We propose several cost-effective and comprehensive solutions to improve the durable goods system at the College. These recommendations include six major components: (1) reviewing the Furniture Asset Management Program, (2) improving the efficacy of Dartlist, (3) hiring a Materials Manager, (4) expanding Dartmouth's

partnership with WinCycle, and finally, (5) updating the Solid Waste Management Policy.

While this report aims to achieve a more sustainable Dartmouth, we faced many challenges. When we looked at Dartmouth and its environmental, economic, and sociological dynamics we saw a complex picture which truly challenged the ability to implement effective change within the institution. Furthermore, the fact that goods are continuously in flux, flowing from one destination to the next, increases the level of difficulty. However, since Dartmouth can and should be a model institution for other schools, we were compelled to propose adequate solutions.

Every solution in the recommendations section is viable, but each has their own unique advantages, which may fit better with the culture or needs of the College. The main strength of the Furniture Asset Management Program is its ease of implementation but the physical and carbon footprint costs are high and it somewhat isolates us from the Upper Valley Community. Dartlist has the advantage of already being on campus and of being similar to working programs at other schools; however the rapidly changing nature of the tech world means that Dartlist is a temporary solution and making it a more prominent and working part of campus culture will require a large effort. This problem was dealt with much more efficiently in the past when Dartmouth still employed a Materials Manager. A return to that system could vastly improve the management of durable goods on campus; however, budgetary concerns make this option less appealing. Dartmouth currently has a connection with WinCycle and WinCycle has the capacity to expand their operations, directly benefitting the larger community. Currently, any goods that are sent to WinCycle do not bring revenue back to the College.

The Solid Waste Management Policy of 1988 currently lacks a system to electronically monitor goods that are available for reuse. With a revision of Dartlist, the College will be better able to meet the needs of both providers and potential customers. As the policy relies heavily on the existence of a Materials Manager, it should better reflect the changes that have occurred in FO&M infrastructure, and to continue efficiently in the future, the policy needs to acknowledge the multitude of key factors.

We as students in ENVS 50 have tried to examine and quantify the parts that will decrease the flow of the waste and increase the flow of knowledge. As Aldo Leopold wrote in the *Journals of Aldo Leopold* “We shall never achieve harmony with the land, any more than we shall achieve absolute justice or liberty for people. In these higher aspirations the important thing is not to achieve but to strive” (Leopold 2008, 90). In this respect, we must continue to strive for a more sustainable Dartmouth.



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## **APPENDIX A: INTERVIEW QUESTIONS FOR DEPARTMENT ADMINISTRATORS**

Interviews with department administrative assistants were conducted in a uniform manner with the following questions:

### Background

1. How long have you worked here?
2. Do you know/have heard of Bill Hochstin?
3. Have you ever managed other academic departments at Dartmouth?
4. Where have you previously worked?
  - a. Do you remember any other systems for dealing with surplus goods from those previous work experiences?

### Hypothetical Scenario

1. Hypothetical scenario (what do you do when you have a desk):
  - a. What do you tell whomever you call? (can make 'whoever' more specific depending on response to previous survey)
  - b. How do you specify where this good will go? (do you? or can you?)
2. What do you do when you/department needs an item? (call procurement, materials management, surplus police, etc).
  - a. Other than (mentioned source) what are your department's other sources for material goods?

### Systems Level

1. Describe the department's 'formal system' for dealing with surplus goods, if you mentioned one in the previous survey.
2. Do you deal with a specific person from FO&M for picking up surplus goods?
3. Does your department usually have monetary constraints that effect how you acquire material goods?
4. Does your department communicate with other departments regarding reusable goods?

- a. If YES: Is there a communication network between the departments in this building?
- b. If YES & an INFORMAL NETWORK: Do you feel that informal networks are sustainable?
- 5. Do you think your system should be improved? (Do you feel that the material flows in the College & in your department are efficient?)
  - a. If YES: On what aspects of the material flows system should our class focus on to have maximum impact?

### Culture

- 1. Does your department routinely re-use goods?
  - a. If NO: Are you willing to do so?
- 2. Do you plan on getting your goods back if you warehouse them?
- 3. How would you define sustainable? (Are you concerned about sustainability?)
- 4. Rate your department's sustainability on a scale of 1-10 (1=extremely unsustainable; 10=reduce, reuse, recycle whenever possible)

## APPENDIX B: SAMPLE LIABILITY WAIVER

[DEPARTMENT NAME HERE]

DARTMOUTH COLLEGE

[NAME OF PHYSICAL SPACE ON CAMPUS, E.G. FAIRCHILD HALL]

HANOVER, NH

### Department Supply Disposition Form

The Department of [department name here], in compliance with College policy\*, is disposing of the following items:

List items here:

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Items received by:

Print name: \_\_\_\_\_ Title/Organization: \_\_\_\_\_

Receiver hereby agrees to accept all goods as is and hereby holds harmless the disposing department and the Trustees of Dartmouth College from any damage, injury, or death resulting from their use.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Department Authorization:

Name: \_\_\_\_\_ Date: \_\_\_\_\_

\*Note: item(s) does not classify as high value asset as defined by the College.

## Dartmouth College Controller's Office

*Home > Policies >*

### Disposal Policy

Procurement Services is responsible for the coordination of disposition of surplus property. Materials.Management@Dartmouth.edu must be notified of any College property which is to be sold (including property transferred using interdepartmental transfer of funds), traded in, salvaged, donated, or scrapped, except as provided for below. Procurement Services will not handle hazardous waste and real estate that fall under the purview of Environmental Health & Safety and the College Real Estate Office, respectively.

College property is defined as any item, whether or not it is an operable or complete unit, which was purchased by the College - with gift, grant, contract, or restricted general fund money - or donated to the College. Title is vested in the College unless there are specific provisions reserving rights for another party, which frequently occurs when property is purchased, in all or in part, with federal funds. When this is the case, dispositions must be managed in accordance with applicable College and federal policies. Procurement Services and the Office of Sponsored Projects will assist in clarifying such restrictions and make a determination to whether title passes exclusively to the College at some point.

If no monetary transaction is involved, then departments are free to transfer to other departments at will. However, the Fixed Asset System must be updated to indicate the new location of the equipment. If the item remains within the College and no federal funds were involved in the procurement, Procurement Services does not need to be involved except as required to maintain the Fixed Asset System.

The effective management of surplus property limits liability and disposal costs while providing a sizable source of income for Dartmouth. All property must be disposed in accordance with Federal regulatory requirements. Valuable space becomes available when surplus is not allowed to simply accumulate; it should be managed as inventory with retention decisions based upon need, replacement cost and opportunity for reuse.

Although the primary objective is to facilitate reuse of excess property through internal transfers, an equally important objective is to obtain the maximum proceeds for the sale of surplus property.

*Last Updated: 12/9/10*

## APPENDIX C: FURNITURE LISTS AND FIGURES

Table 1. List of Furniture Re-used between Oct. 2011 - Feb. 2012, valued at \$75,000 new, total  
(Rowell, personal communication)

File Cabinets/ Drawers	Count	Desks	Count	Chairs	Count	Tables	Count
Enter Drawer	2	L-shaped work station	2	Round tables	2	Wooden decorated tables	4
Box file	1	75" Desk	1	Conference Table	3	Large black table	1
2-drawer vertical	2	Sit/stand corner	1	Stool	1	42" round table	1
4-drawer vertical	1	Desk returns w/peds	2	Caster conference room chairs	80	Wooden conference table 8'x42"	1
3-drawer laterals	3	Shay Cooper desks	4	Caster desk chairs	10		
4-drawer lateral	2	Complete electric corner units	2				
5-drawer lateral	1	Complete corner w/ 2 returns	1				
Bookcase	1	30"x60" desk	1				
6'x4' wooden bookcase	1	Corner, 2 returns w/ peds	1				



File Cabinets/ Drawers	Count	Desks	Count	Chairs	Count	Tables	Count
Lateral file 42"	2	Corner	1				
		Mobile peds	2				
<b>TOTAL</b>	<b>16</b>		<b>18</b>		<b>96</b>		<b>7</b>

Table 2. List of Furniture Items Stored at Rt. 120 Warehouse Facility

File Cabinets/ Drawers	Count	Desks	Count	Chairs	Count	Tables	Count
Vertical file cabinets	80	60" wide desks	23	Plastic chairs	29	48" diameter round table	9
		75" Desk	1	Upholstered dorm chairs	19	75" diameter round tables	9
				Office chairs	24		
				Leather chairs	3		
				Wrought iron chairs	100		
<b>TOTAL</b>	<b>80</b>		<b>23</b>		<b>175</b>		<b>18</b>
						<b>Grand Total</b>	<b>296</b>

## APPENDIX D: ATHLETIC DEPARTMENT STORAGE

Fig. 1: Furniture stored in Alumni Gym

Quantity	Type	Category	Details	Size (Height, Width, Depth) in cm
3	Chairs	Furniture	Desk, cushion, wheels	32, 22, 22
4	Desks	Furniture	Steel, woodtop, drawers	30, 60, 30
1	Cabinet	Furniture	Matching desks above— woodtop	54, 28, 19
1	Small table	Furniture	Wood top	35, 27, 24
1	Old printer	Electronics		16, 16, 19
1	Large Cabinet	Furniture	Steel, old fashioned	74, 36, 18
2	Tables	Furniture	Nice	27, 47, 27
5	Stacked Cabinets	Furniture	Steel, cream, old fashioned	52, 28, 15
1	Chair	Furniture	Leather	25, 37, 35
1	Counter Section	Furniture	Wooden veneer top	25, 37, 35
2	TVs	Electronics	Old school	30, 25, 20
10	Misc	Furniture/	Room dividers/Material/Wood...	50, 50, 50
		Misc		(many layers)

## APPENDIX E: Photographs From Warehouses

