System Architecture of System Design and Management Website

Project Description

SDM website is a great information source that introduces SDM program at MIT on the web. The website also serves as a central repository of information on student profiles, SDM thesis, student financial accounts, news, etc., As there are many stakeholders involving with this website system, it is very interesting to understand and analyze in-depth important stakeholders' needs, the relationship among stakeholders and how the needs are satisfied via the current design of the website system. In addition to that, the system components are appealing to be studied in detail as well because it shows how the system sub-components are chosen, based on the corresponding chosen system concept.

Project Goals

- To explore the current SDM website components, its structure and how they interact with each other component including other supporting systems
- To investigate the needs of stakeholders that significantly affect the current website functionality
- To criticize the current website structure and its components based on the given set of stakeholder needs
- To recommend possible website components that would greatly satisfy the stakeholder needs

SDM Website Stakeholders and Needs

We started our work for analyzing SDM website by identifying different stakeholders and their needs. Since websites are a medium or means of distributing or acquiring information, we were able to identify stakeholders by questioning ourselves who is the beneficiary for different types of information available on SDM website. Unlike any commercial products, we do not see any indirect beneficiaries as a stakeholder. Essentially, all of the stakeholders are either providers of the content on the website or referrer of information presented on the website. Identified stakeholders and their corresponding needs are listed below. As seen from the list, most of the stakeholders were SDM/MIT related entities. One of the intuitions we got from this process was that the SDM website may have very narrow target in terms of viewer providing sufficient information for each of them. Such intuition, in a way, guided us in identifying concept of this its architecture, which will be presented later on in this paper.

Direct Beneficiary

- SDM student
    - Need to acquire information regarding news around SDM community, class schedule, alumni, billing, and past thesis easily and timely. Also, want to promote SDM program to the general public and prospective employers.
- SDM alumni
    - Want access to information regarding news around SDM community.

- SDM applicants
    - Need to acquire detailed information regarding SDM program to make decision of applying to the program. Also want to use the online application system to apply securely and easily to SDM.
- SDM Faculty
    - Need to provide information to SDM students for the purpose of facilitating education
- SDM Staff
    - Need to provide full and clear information to prospective applicants in order to acquire maximum number of applicants and hence gather excellent student body. Also have the needs to acquire students' personal data through the website and present billing information to current students. In addition have the responsibility of promoting SDM program to the general public.
- Companies
    - Need to acquire information about SDM program to understand what type of education their prospective employee has been involved with. Also, potential SDM sponsor companies wish to determine whether the program matches their intent.
- General public
    - Want to acquire information about MIT SDM
- MIT
    - Need to promote SDM program in order to raise perceived value of MIT within the public. Also to gather students and hence tuition.
- LGO
    - Need access to information regarding class schedule, alumni, billing, and past thesis easily and timely while sharing LGO/SDM virtual community website with SDM program.

Representation of Stakeholders, Needs, and its Relationship

From the identified stakeholders and needs, we have used two of the frameworks we have used in class. Below, based on the stakeholders and their needs we have identified, we have mapped different benefits provided by the SDM website to corresponding stakeholders. On the next page, we have mapped these stakeholders and needs on a flow diagram to better understand how different stakeholders relate to one another via SDM website project. As partially mentioned earlier, relationships among stakeholders surrounding SDM website was rather simpler than we have imagined. That is to say that some of the influential factors of an architecture such as the regulatory and competitors were not included probably because the academic nature of the chosen architecture.

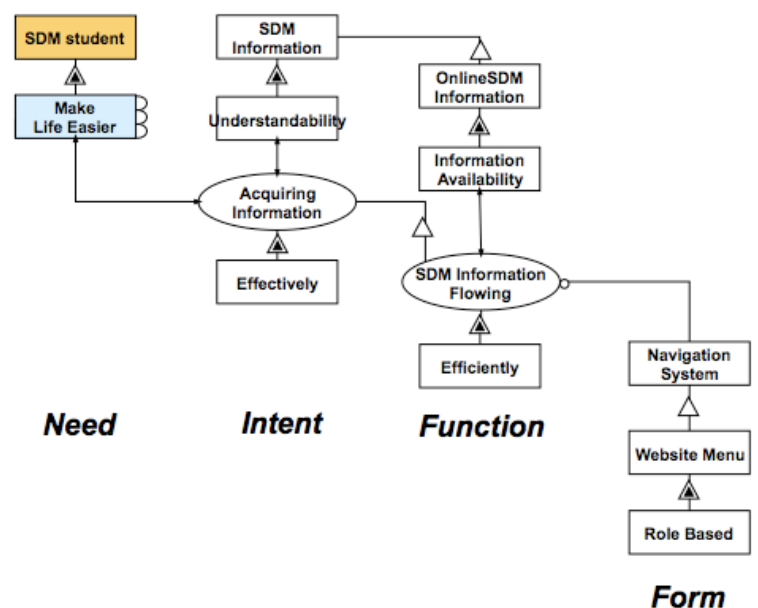# Beneficiaries and Needs –SDM Website
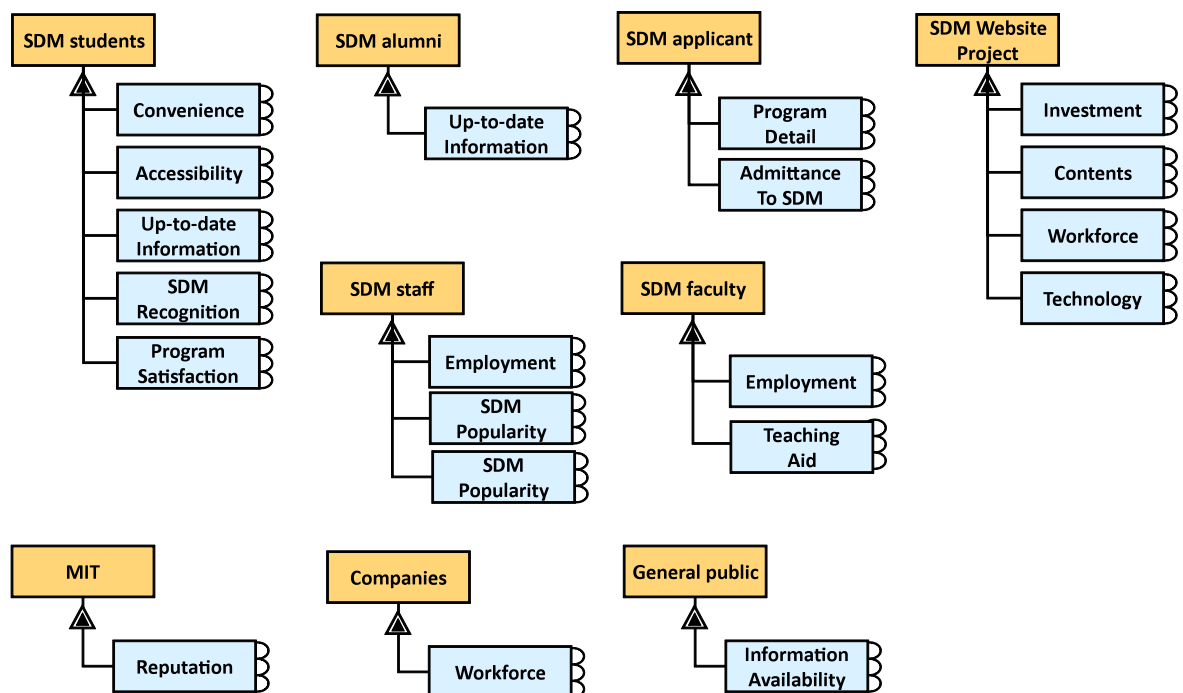
Interpreting Needs as Flows: SDM Website
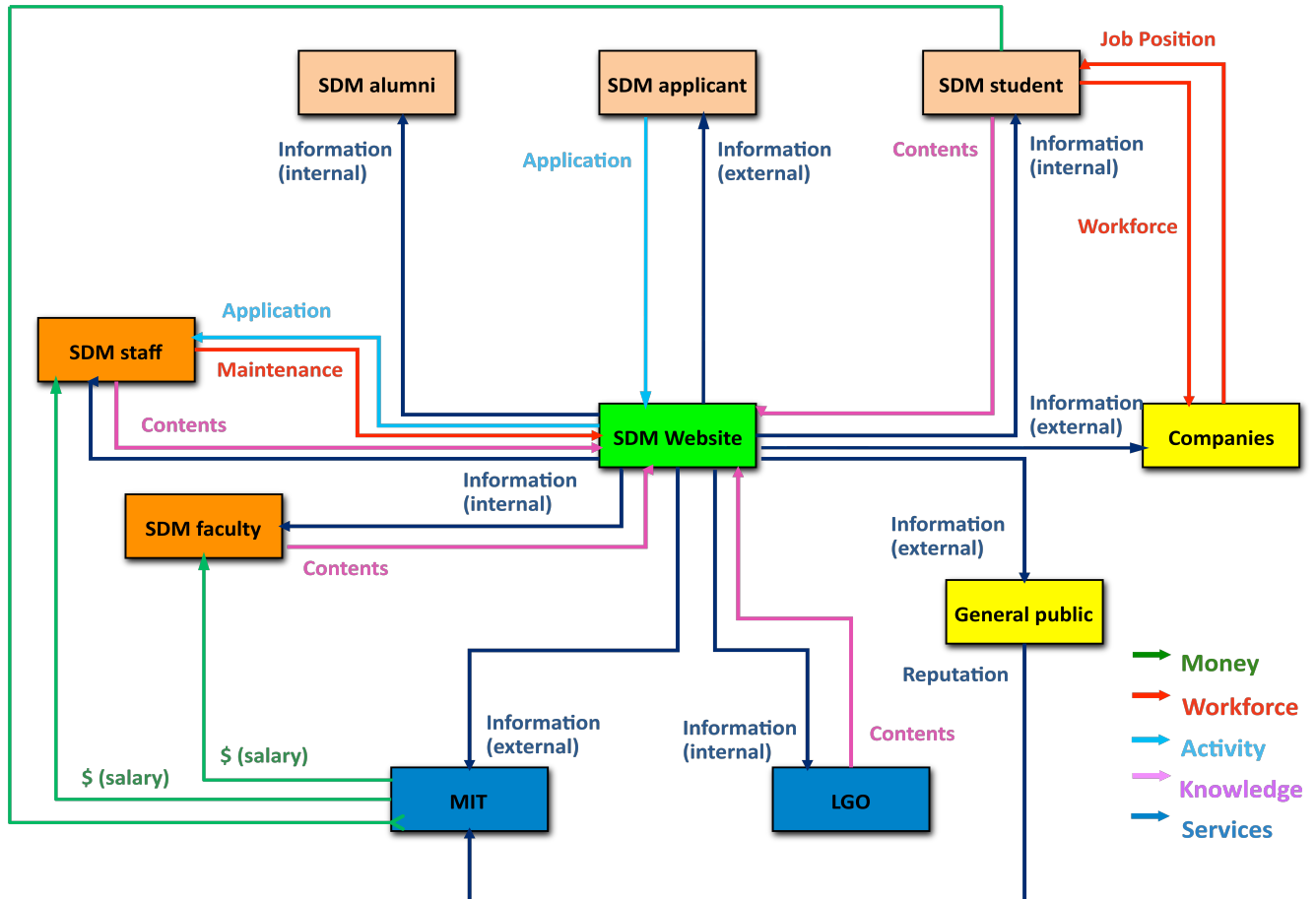
Needs to Form – SDM Website

From various stakeholders identified, we have identified SDM students as the primary stakeholder and acquiring information related to SDM as their primary need. Figure below depicts how the primary need is fulfilled by the architecture. Note that we have decided to put our emphasis on "how" information is presented on the SDM website and not "what" is being presented. More specifically, our focus was put on exploring different methods or techniques of presenting information effectively so that different stakeholders will be able to acquire necessary

information efficiently.

Goal Statements – SDM Website

Based on stakeholders' identification and their various needs, we developed the following statement of goal for our website architecture using the hierarchical To… By… Using… concept we have learnt in class:

- **To** provide information about SDM program
- **By** allowing people to access that information worldwide
- **Using** a computer connected to an IT network

Concept Generation

After we had developed the system problem statement and related descriptive goals for the SDM website, our team has brainstormed and come up with four possible ways of flowing information about SDM program through the website structure:

- **Role-Based Website Structure** – This concept introduces the website structure which is constructed based on the key SDM program stakeholders, consisting of SDM students (i.e., prospective students, current students and alumni), SDM faculties (full-time, visiting and emeritus) and industry-related companies. With this structure, SDM stakeholders can easily access to their own information within few clicks.
- **Dynamic Website Structure** – This second concept represents a website structure that is dynamically populated based on the popularity of website pages. In this case, the website navigating statistics can be analyzed and then dynamically construct the website structure according to those statistics.
- **Academic Product Website Structure** – This concept is intended to present information about the degree and classes offering by SDM program, which are consider the main product from this academia. The concept appears to be the best concept for students who want to learn more on what the SDM program offers in exchange for the tuition.
- **Benefit-Based Website Structure** – This concept highlights the benefits of SDM program, useful SDM researches, SDM learning experiences and the business cases where SDM concepts can help the business operate more efficiently, which would be a set of expected outcomes for students who decide to take this program to further their career.

After discussing within the team, the best concept that would fit to the SDM program is the role-based website structure as it is believed that most website visitors are both students who want to understand what SDM program is about and industrial partners who want to see how the knowledge offered by SDM program can contribute back to their organizations. Furthermore, because the website content is classified and presented into 3 main categories which correspond to 3 primary user groups, the website structure can efficiently flow information to the key SDM stakeholder roles, leading to higher understandability of those stakeholders. At the end, the important needs of major stakeholders can be mostly satisfied with this chosen website structure.
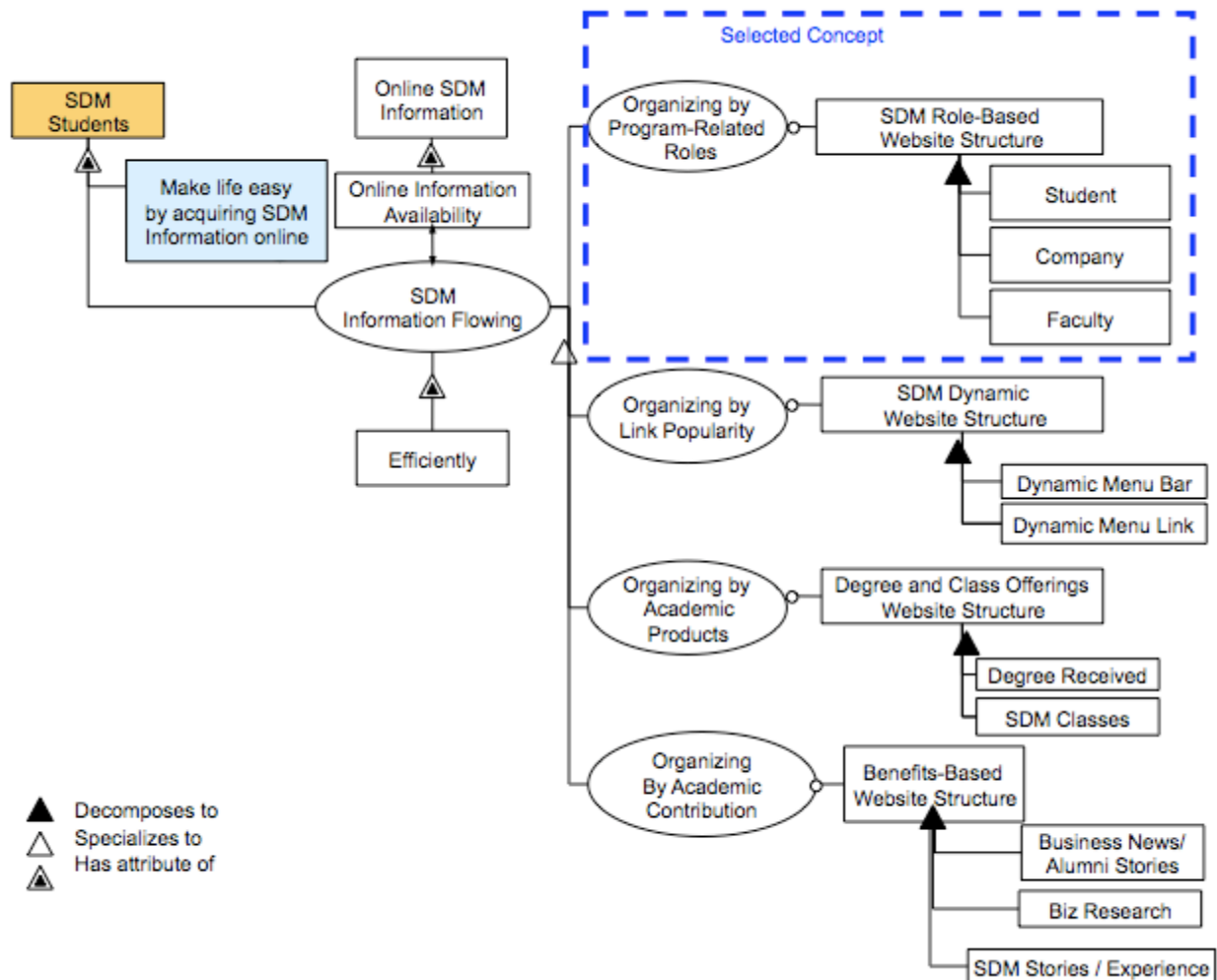
Level-1 Process-Object Architecture

Level-1 Process
According to the concept generation diagram, **organizing information based on the SDM stakeholder roles efficiently** became the level-1 primary process of the SDM website. At the same time, SDM website is built to provide an online communicable channel for:

- Receiving queries or feedbacks
- Easy-to-understand media or visual objects
- Getting latest information about SDM program
- User-friendly information display

to help the website audience understand and stay up-to-date with the SDM events more convenient. All of which are the other value processes in the level 1.

Level-1 Object
Unlike physical objects, information is so abstract that it is difficult to clearly define the solid form of information objects. Thanks to information mapping technique, it appears that there are 7 types of common information objects[1] found in any document. These object categories are listed in accordance with the

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[1] http://www.namahn.com/resources/documents/note-IM.pdf

research of Prof. Robert E. Horn, who is the inventor of information mapping technique. The technique is a research-based approach for creating structured documents and communications that are clear, concise, and user-focused[2], which can be used in both paper-based system and computer-based system.

Basically, all the information can be captured in these 7 forms:

- Procedure – is a task or number of steps leading to a result (operational 'how-to' level)
- Process – describes why a task/process is done (on a management level)
- Structure – describes the structure of a physical, material object (printer, form, machine, ...)
- Concept – describes an idea, a concept
- Principle – a policy, rule telling what is allowed and what not
- Fact – proposition without proof/argumentation
- Classification – sorting of chunks/units into classes

This information mapping technique can be illustrated in the figure below.
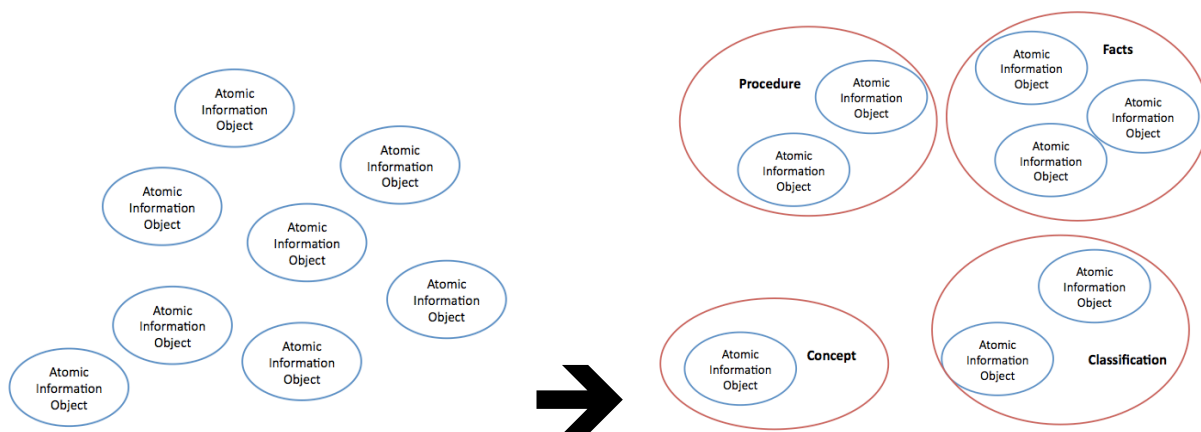
We can think of any chunk of information as an atomic information object. They can be captured in 7 forms as mentioned earlier. Similarly, all of the pages in the SDM website or even just topics in a single webpage could be thought as an information object.

Level-1 Process-Object Architecture Matrix

As shown in the table below, under each information object category, some information objects in the SDM website are provided as examples for better clarity in this level 1 process-object architecture matrix. It appears that all the SDM information objects exist in various forms in order to facilitate all the critical processes in level-1 intents. For instance, the "contact us" information object (representing in a form of "contact us" page) facilitates the process of receiving queries from users through contact information. As a result, users can understand what contact they could email or call to ask for more information (which corresponding to the process of querying from users).

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[2] http://en.wikipedia.org/wiki/Information_mapping

Another example is that SDM program structure can be illustrated via graphics to provide easy-to-understand information for students to learn about the SDM program components and its structure, which facilitate the process of illustrating concepts through visual objects.

	SDM Website Level-1 Information Objects						
Common Information Object Type in websites	**Procedure**	**Process**	**Structure**	**Concept**	**Principle**	**Facts**	**Classification**
Specific Information Object in SDM website context	▪ SDM Application Procedure ▪ Preparation Procedure for January session ▪ Contact Us	▪ SDM Candidate Qualification ▪ SDM Teaching Style ▪ SDM Learning Experiences	▪ SDM Program Structure (The illustrated graphics of SDM knowledge components)	▪ Degree Concept (SDM knowledge elements) ▪ SDM Classes contributing to knowledge elements ▪ Program Overview	▪ The Objective of SDM existence ▪ Mission Statements ▪ Promise	▪ SDM News and Events ▪ SDM Activities ▪ Employment Reports ▪ Class Statistics ▪ History ▪ Degree Tuition Costs	▪ Learning Options (distance, full-time) ▪ Faculty ▪ Thesis ▪ Classes ▪ Industrial Partners
SDM Website Level-1 Process — Organizing Information Based on the Stakeholder Roles					X	X	X
Receiving Queries From Users	X						
Illustrating concepts through visual objects	X		X	X			
Dynamic Generating/Updating Information	X	X	X			X	X
User-Friendly Displaying Information	X	X	X	X	X	X	X

Align the content with the Sloan business school Website				X			X
Align the content with the MIT Website				X			
Align the content with the ESD Website				X			X

From the matrix, it shows the fact that most of the existing information objects can fulfill the given primary process and other value processes. However, some of the information objects are still required to enrich the content of the SDM website. For example, a graphic of SDM program structure could be added into the website to provide easy-to-understand content for prospective students.

Level-1 Object-Object Architecture

The table below shows the relationships among level-1 information objects. Our team defines 3 kinds of possible relationship among those objects, which are referencing, describing and being a part of. For example, the information object "SDM application process" might mention about the average GMATH score of prior SDM cohort, which is considered a SDM fact. For that reason, information object "SDM application process" **refers** to information object "average GMATH score", which is the fact. With this framework, the website structure can be rearranged according to this architecture to ensure the highest efficiency of the website information flow.

	SDM Website Level-1 Information Objects						
	Procedure	**Process**	**Structure**	**Concept**	**Principle**	**Facts**	**Classification**
	▪ SDM Application Procedure ▪ Preparation Procedure for January session	▪ SDM Candidate Qualification ▪ SDM Teaching Style ▪ SDM Learning Experiences	▪ SDM Program Structure (The illustrated graphics of SDM knowledge	▪ Degree Concept (SDM knowledge elements) ▪ SDM Classes contributing to knowledge	▪ The Objective of SDM existence ▪ Mission Statements ▪ Promise	▪ SDM News and Events ▪ SDM Activities ▪ Employment Reports ▪ Class Statistics ▪ History	▪ Learning Options (distance, full-time) ▪ Faculty ▪ Thesis ▪ Classes

		▪ Contact Us		components)	elements ▪ Program Overview		▪ Degree Tuition Costs	▪ Industrial Partners
Procedure	SDM Application Procedure		R, D				R	R
Process	SDM Candidate Qualification	P			P	R	R	R, D
Structure	SDM Program Structure (The illustrated graphics of SDM knowledge components)				R, D	R	R	R, D
Concept	Degree Concept (SDM knowledge elements)		R	P		R	R	R, D
Principle	The Objective of SDM existence		P	P	P			R, D
Facts	SDM News and Events		P	P	P			
Classification	Learning Options (distance, full-time)	P	R, D	R, D	R, D	R, D		

Note: R: Referencing to (Concept Linking) | D: Describing (Concept Expanding) | P: Be a Part of (Concept Incorporating)

Current SDM Website Structure Versus Proposed SDM Website Structure based on the object-object architecture matrix

Current Structure of the SDM Website

To better understand how the current website functions as a hub for presenting information regarding SDM program, we have explored its structure focusing on how different information are presented. Below is the list of contents that are provided in the website. Because of the nature of the product/system we are evaluating, we are interpreting contents of the website as components or forms of the architecture.

SDM Website
-interpreting contents as components of the system-
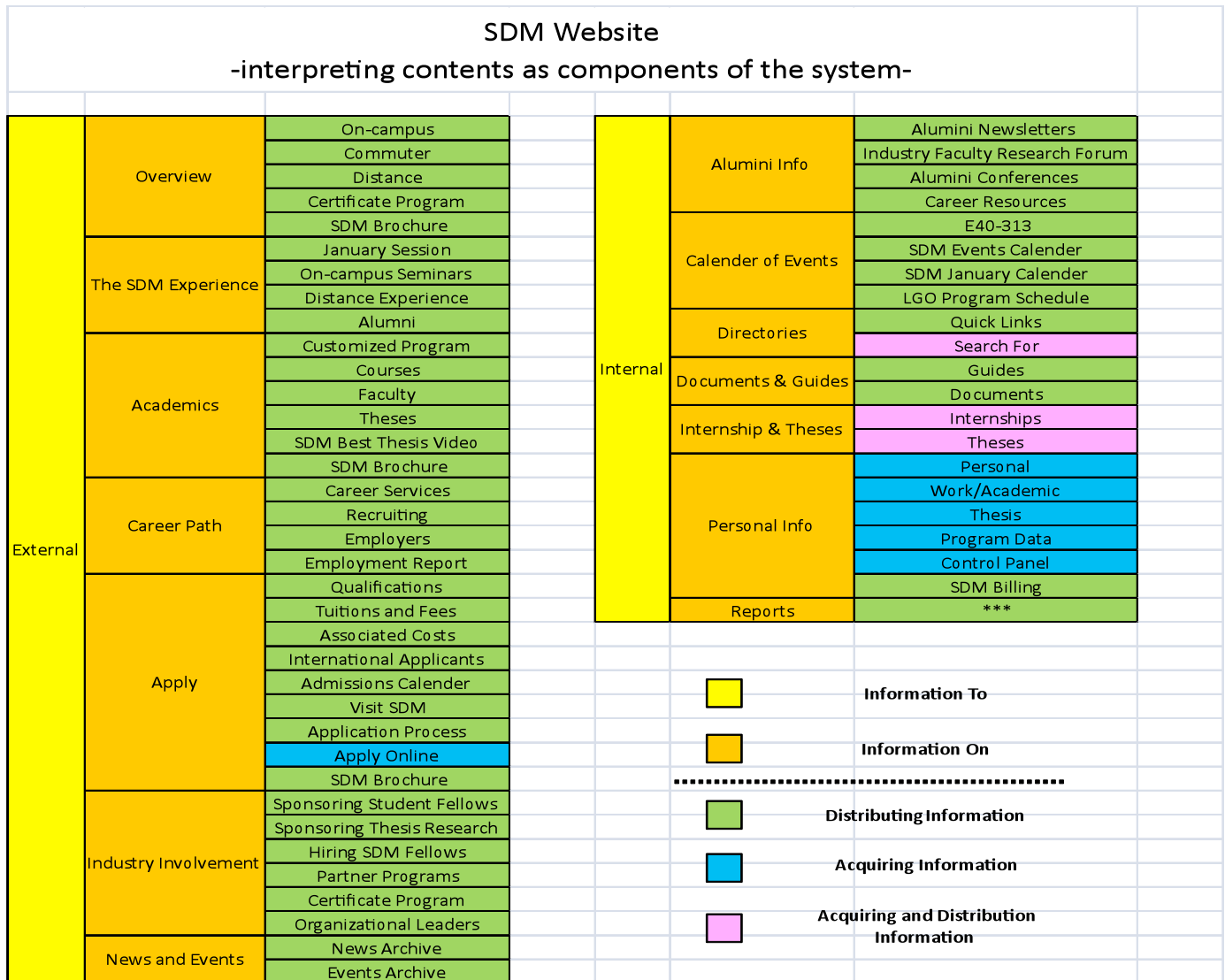
As represented in the figure above, we have identified different functions that each of the components may provide for the users of this website, namely distributing, acquiring, and searching. In the current website, information is presented based on the grouping we have listed above, while different functions are fulfilled by different components or forms of the system. To depict the current structure, drawn below, we have extracted some of the important components and mapped them with different functions fulfilled by the system. Note that not all components are covered in the diagram.
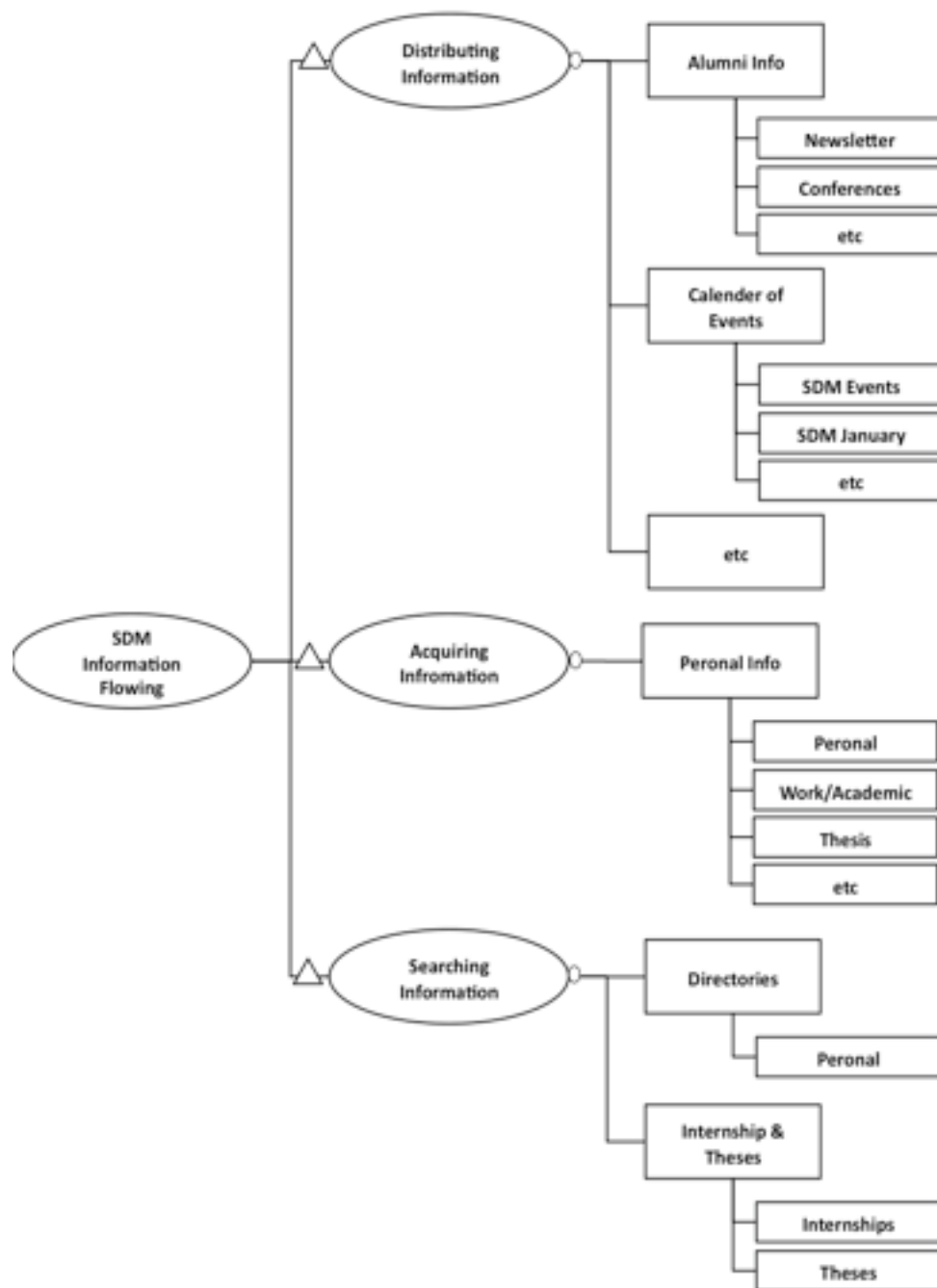
Although the current website structure can sufficiently convey information to the stakeholders, it is still difficult for stakeholders to fully understand the content. This inefficient information organization could come from the fact that the stakeholders' needs are not taken into the website designs' consideration at the first place. For that reason, with new way of organizing information developed by the team, the current structure can be rearranged to bring a better of acquiring, searching and distributing SDM information while flowing information more efficient because stakeholders can follow through the well-defined website structure to get information they are actually interested in.

Recommended Structure of the SDM Website

Since we chose the concept of organizing information based on the SDM roles, three main information forms that should appear in the first page are the principles, facts and **classification** (referring to the level 1 Process-Object Architecture Matrix) while procedure, process, structure and concepts can be linked from the first page when the website users look for further detail about each topic existing in the first page.

The information form "principle" for the SDM website should be presented in the following information objects: **SDM program overview** and **About SDM.** The information form "facts" for the SDM website should be presented in the following information objects: **About SDM** and **News and Events.** The information form "classification" for the SDM website should be presented in the following information objects: **Prospective Students, Current Students, Industrial Partner and Faculty and Staff.** With the prioritization of the information content, website users will not be overwhelmed with the information. Instead, they would find website navigation easier because they just need few clicks to access the desired information. The recommended website structure (representing in a form of menu bar including sub-menu) is shown below.
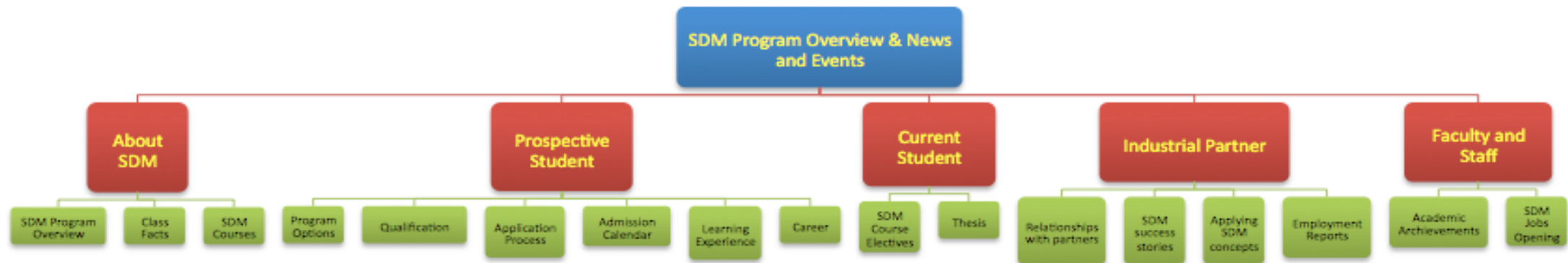
We really believe that the proposed website structure would help SDM website to become a user friendly website that offers a easy-to-use navigation system for all important stakeholders to access the desired information effectively as the website structure is designed based on the roles of the key SDM stakeholders and the content is organized in a way that those stakeholders will receive more relevant and specific information, leading to less distraction from irrelevant information.

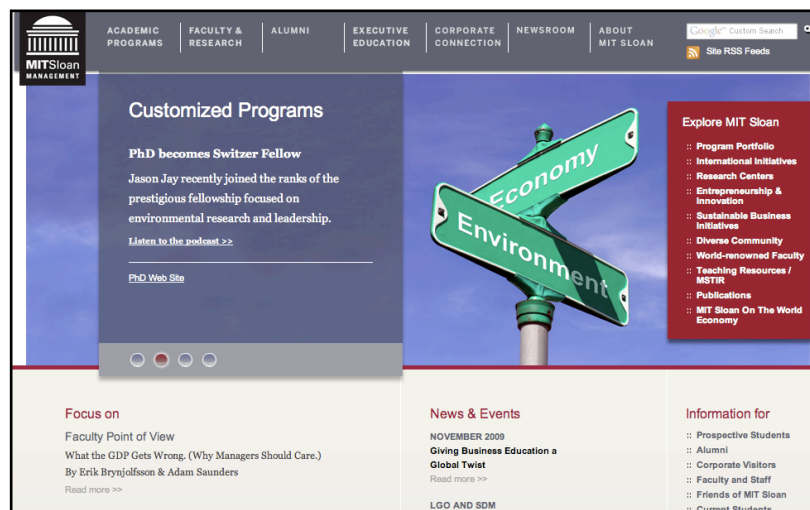## Appendix A: Mapping Concept to Actual Website

A list of website examples are identified to provide a clearer sense about each concept
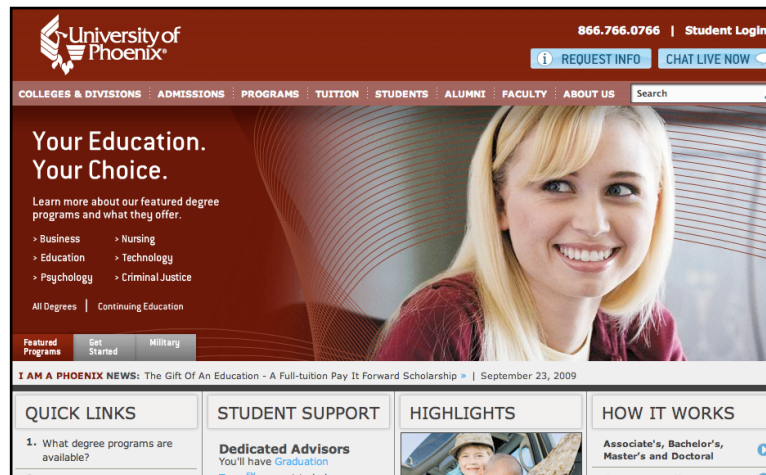
- Role-Based Website Structure – http://www.ischool.drexel.edu/

Note: The menu bar is designed according to the school stakeholders
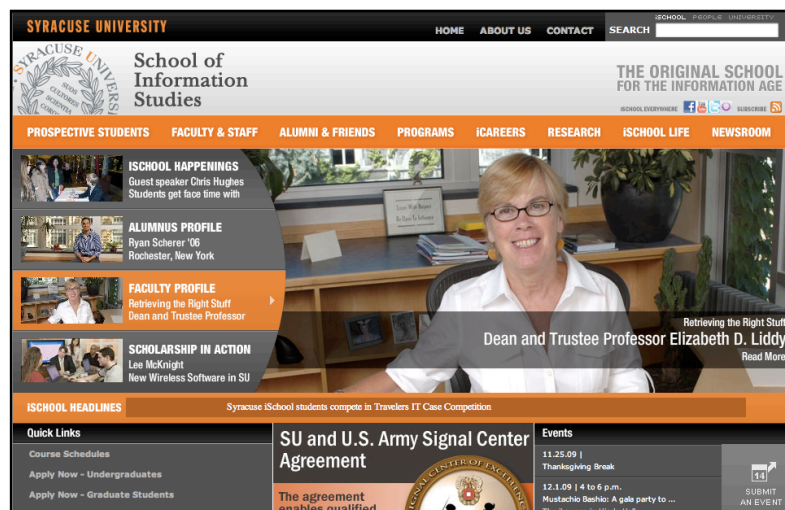
- Dynamic Website Structure – http://mitsloan.mit.edu/

Note: The first page is dynamically generated based on the current popular academic topics.

- Academic Product Website Structure – http://www.phoenix.edu/

Note: The main menu bar is designed according to the school products

- Benefit-Based Website Structure – http://ischool.syr.edu/

Note: The main menu bar is designed according to the school archievements