

Question 2: Choose some SI topic of particular interest to you, perhaps something you are doing you current research on, or might do a dissertation on. Draw on the breadth of readings in this course to articulate what ideas might be relevant to those topics. Be sure to identify things that you might have overlooked without being exposed to the material in this course.

Recently, I was assigned a research topic to pursue over the summer by my advisor – a new automotive informatics research collaboratory. The field of vehicle information informatics covers a broad range of issues, many of which draw relevance from the corpus of 701 literature.

To begin, I came into the program being aware of, but not knowledgeable about issues surrounding distance-based work and collaboratory structure. Starting with Olson & Olson and Kiesler, there will be a natural set of issues in creating the collaboratory, since automotive scientists from several companies will be directed to work together over a distance [1, 2]. Ideally, this collaboratory would be constructed to recognize the variability in local work routines and customs [3], and the detrimental effects of ignoring the motivations of individuals to participate in non-located projects. The principles introduced by Grudin in constructing groupware will be useful in guiding initial development and needs assessment in approaching the construction of such a collaboratory [4]. The companies and researchers involved in the project would also do well to understand, at a surface level, the pitfalls of past collaboratories – ranging from inadequate willingness to communicate to poorly designed interfaces and workflows [5-7]. For this research, I believe that simple awareness of past mistakes may (at least partially) mitigate making errors in the future, especially for those who are taking part in the collaborative work.

Second, the project will require significant understanding of organizational infrastructure and work habits within the member organizations. March and Simon give a structured way to break down organizations for consideration to begin [8]. Ruhleder and Star, in their analysis of the WCS, ask the important question “when is infrastructure,” implying that the construction of successful infrastructure is not necessarily in the framework, but in the enactment [3]. Kling also points out the transformative effects of IT in organizations, giving further perspective [9]. In addition, Robbins gives insight into different types of behaviors that arise within particular organizational and business cultures, which may be important to determining in/compatibilities in organizational styles [10]. Zuboff and Easton go on to describe in detail the disruptive effects of introducing new technology, having direct relevance to considering how to implement collaboratory activities into work groups [11, 12].

In addition to the construction of the collaboratory itself, the subject matter of research can derive benefit from perspective lent from the SI 701 literature. The transport and communications industries show a high level of complementarity. A major component of transportation research relies on the effective coordination of shipping materials between producer and procurer. The organizational infrastructure of transport systems can be traced in a similar way to Yates’ historical account of systematic management in

railroads and general industry [13]. Transport systems can be categorized into two models. First is a non-integrated carrier model, where a package changes hands through any number of entities between origin and destination. The second is an integrated carrier model, such as FedEx, where one system takes the package from beginning to end. These systems may be looked at as network structures with subcommunities and subsystems governing the process at different points. Insights provided by Newman and Granovetter provide models to better understand the nature of these networks, communities, and subcommunities [14-16]. Of course, transport infrastructure, like most successful infrastructure, is designed to be invisible. Bowker and Star's concept of infrastructural inversion gives methods for considering the components of these transport infrastructures, and understanding weak points for system improvement [17]. As these systems become more complex, issues of scale become increasingly important to coordinate multi-agent transactions [18].

Following on the topic of multi-agent transactions, the 701 literature on search algorithms, information economics, and incentive-centered design can enlighten development of more efficient systems in transportation. For example, algorithms that address NP-hard (or NP-complete) problems like the "traveling salesman" problem have direct relevance to cost structures in coordinating transportation routes. These types of search algorithms through large solution spaces are key to evolution of the field [19-21]. Further, the coordination of shipping materials can benefit from a number of branches in economic theory. For free-agent transportation professionals in the carrier model, there are strategic decisions regarding which bids to take for carrying freight, and which suppliers to engage in contracts. In this sense, payoff structures are attached to multiple choices, and making clearer (or intentionally engineering) those incentive structures to carriers may promote better control and efficiency [22-25]. For the integrated model (as well as some instances of the carrier model, where carriers have options to combine freight loads), the literature on auction theory can bring to bear significant insight on maximizing profit in allocating resources to be shipped. True, the product shipped is physical, rather than information-based; however, there is an information aspect to the decision-making process and allocation of information resources in assigning drivers, trucks, and routes to configurable bundles of freight [26-28]. Some aspects of the economics bundling literature may provide insight into better management of these resources, especially if bundled freight changes hands, or infrastructural convergence is difficult to achieve among companies [29]. In sum, the coordination of information about goods, as well as management of decision-making processes in transport can be effectively explored using information economic principles.

Finally, the literature from the 701 course has given me a broad range of exposure to one of the most important research skills – how to approach research problems and appropriately frame questions for inquiry. Combined with the literature from SI 840, the articles from the first year PhD program give extensive examples of multidisciplinary view in approaching information problems. For example, Machlup and Mansfield provide excellent delineation among issues in computer science, information science, and other fields [30]. Pettigrew also provides a discussion of frameworks in information sciences, contributing to the positioning of theory in describing information interaction behaviors

[31]. Awareness of the traditions that construct information science point to relevant and applicable bodies of previous research, methodologies, and traditions that are well-suited to breaking down complex issues and projects such as the automotive infrastructure research collaboratory.

(1005 words)

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