Challenges in the Information Sciences for Statisticians

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Information Sciences and Technologies areas are the fastest growing areas affecting almost every facet of human life. The statistics profession has played a visible role in areas like agricultural, demographical and biological sciences. However, the role of Statistics and the Statistics profession is not as visible in Information Sciences and Technologies at large. This paper argues that, to the extent that Statisticians are willing and able to expand their role beyond the standard modeling, sampling and designing roles, they will be enormously successful in this new field. However, if they do not take a larger view and think about unconventional problems and innovative solutions, they are likely to be left behind by experts trained in other Information Sciences related disciplines. As examples this paper describes two problems in Information Sciences and Technologies related to search engine technology and software testing technology. On the surface, traditional statistical theories do not have much to offer for solving them and Statisticians looking for conventional solutions would have not been successful in solving these problems. However, unconventional statistical thinking played a critical role in solving these problems.

1. Foreword It is a pleasure to be a part of this conference in honor of Professor W. J. Hall at the occasion of his 70th birthday. Jack Hall and I moved to University of Rochester in the same year. He came there as the chairman of the newly established Statistics Department and I came as a student. I was most impressed by Jack's interest in many different areas of Statistics and his willingness to supervise my thesis in an area outside of his primary research interest. He had a sharp eye for what was practical and doable. When I left Rochester, I asked him for a final word of advice. He mentioned that he was quite impressed by my curiosity about everything, and that continuing being curious will stand me well in my research life. This has become one of my maxims.

I embarked on my industrial research career at Bell Laboratories in 1980. Since then I have spent most of my career at Telcordia Technologies, a leading telecommunications research and development company formerly known as Bellcore. Much of my time is spent on Information Sciences. One of the great things about working in industry is that challenging problems abound. I have written this paper to describe of some of these "challenging" problems and suggest changes in paradigm for statisticians to be successful in the new Information Science industry.

2. Introduction To underscore the point of "challenging" problems, I would like to briefly describe a small sub-sample, two "challenging" problems that my colleagues and I have worked on at Telcordia Technologies. They are in the areas of

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