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Disintermediation and Reintermediation in the U.S. Air Travel Distribution Industry: A Delphi Reprise

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ABSTRACT

A group of industry experts was assembled as a Delphi panel in 1997-1998. They were asked to predict the effect that Electronic Commerce technologies and disintermediation and reintermediation would exert on the major firms in the U.S. air travel distribution industry in each of five major market segments.   The panel forecast that major disintermediation and reintermediation would occur and that there would be a sharp reduction in the number of traditional travel agents five and ten years in the future. The panel also identified a number of strategic threats and opportunities for the channel participants. This paper compares the panel's predictions to what actually occurred and describes technology-related developments that the panel did not foresee. In particular, the panel predicted a major reduction in the number of travel agent entities between 1997 and 2002, as well as in 2007.   By the end of 2002, the panel's forecast was very close to what actually occurred.   Our overall conclusion is that the Delphi method worked well as a predictor in this instance.

KEYWORDS: Delphi methodology, electronic commerce, disintermediation, reintermediation, cybermediaries, air travel distribution.

I. INTRODUCTION

With the advent of the World Wide Web and burgeoning e-commerce [EC] initiatives in the mid-1990s, it became clear that, for many traditional firms, it would no longer be business as usual. The U.S. Air Travel Distribution industry, in particular, stood out as one in which the impact of EC technologies might be swift and sudden, particularly on the traditional travel agent.

Travel agents' main source of revenue at the time was commissions paid to them by the airlines on tickets sold by them on the airlines' behalf.   Pressures to reduce costs in an increasingly competitive industry caused airline companies to look for ways to reduce their payments to travel agents. Initially, airline companies progressively capped the amount of commission paid to travel agents while, at the same time, they opened up new channels and expanded existing channels to reach travelers directly [e.g. Web sites and call centers]. Airline companies encouraged travelers

to use the direct channels by various means. For example, elite customers were given private telephone numbers where they received prompt and effective service. Any member of an airline's frequent flyer program, elite or not, could receive bonus miles by making their reservation on an airlines' Web site. It seemed clear that the airlines intended to disintermediate the travel agents in order to reap the financial and customer relationship benefits of a direct distribution model, and that traditional travel agents' income, and even survival, would be at risk.

Also during the EC boom of the mid-1990s, Internet entrepreneurs recognized that airline tickets [and other travel-related products and services] could be sold effectively and profitably over the Web. Many travel Web sites were established during this period, including some of the better known and still-surviving ones such as Expedia, Travelocity, and Priceline. Thus, traditional travel agents were threatened not only with disintermediation by the airline companies, but with reintermediation [i.e. new intermediaries] from Web-based competitors, or cybermediaries.

It was in this environment that a Delphi study was undertaken in 1997-1998 and published in 1999 [McCubbrey 1999]. [Please refer to Appendix II for a brief description of the Delphi Methodology]. The purpose of the study was to capture the predictions of a group of industry experts on the effects that EC-enabled disintermediation and reintermediation would have on traditional travel agents in the U.S. The expert panel predicted that major disintermediation and reintermediation would occur, and that there would be a sharp reduction in the number of traditional travel agents as a result. The panel also predicted that e-tickets would gain widespread acceptance as a replacement for paper tickets, an event that would also serve to work against the traditional travel agents' value to the traveler.

This paper is a follow-up to the earlier Delphi study [in which experts made predictions for two future time periods, 2002 and 2007] to investigate the accuracy of the experts' predictions. [Please refer to Appendix I for an explanation of the timing of this follow-up analysis]. The 1999 paper pointed out that the accuracy of the predictions made by the expert panel could be determined only with the passage of time, and that they were dependent on

- the expertise of the Delphi panel, and
- the reliability of the Delphi method [Brancheau, Janz, and Wetherbe 1996].

It was also noted that EC was changing so rapidly that it was not possible to take into account the possible emergence of a new disruptive technology or technique that could greatly affect the air travel distribution market, thus affecting the experts' predictions. What was not addressed in the earlier paper was the possibility of other unforeseen events that could [and did] affect the air travel distribution market significantly, including:

- The bursting of the "Internet Bubble" in 2000 which made it more difficult for EC companies to obtain the funding needed to start new businesses or to maintain/grow existing operations
- The September 11, 2001 terrorist attacks which was followed by a reduction in air travel and a financial strain on the airline industry.
- The slowdown in the U.S. economy.

This paper will not address all of the predictions of the panel, but will focus instead on its primary forecast of the popularity of the EC-enabled direct channels, of EC-enabled innovations such as e-tickets, and the resultant deleterious effects on the viability of the traditional travel agents' business model.

II. ACTUAL vs. PREDICTED RESULTS

DISINTERMEDIATION OF TRADITIONAL TRAVEL AGENTS

The 1999 study noted that the panel agreed with predictions by [Tapscott 1995], [Benjamin and Wigand 1995], and others that travel agents would be disintermediated. As shown in Table 1, the panel estimated that the total number of travel agency entities would drop from some 22,806 in

the US in 1997 to 17,030 in 2002. [Means of individual panelists' predictions were used in all instances].

Table 1. Estimates of U.S. Travel Agency Entities

Air Sales (Millions of $)	1993	1997	2002	2007
0-1M	14773	13408	7833	5334
1-2M	4600	5583	4267	2860
2-3M	1402	1900	1987	1933
3-4M	638	744	890	907
4-5M	316	421	633	663
5-10M	599	716	793	813
>10M	457	394	627	773
TOTAL	22785	22806	17030	13283

1. Source: Airline Reporting Corporation (1993 actual sales reports through ARC; 1997 projected based on first quarter1997 actual data). The data are used by permission. 1997 data may not be reproduced without the expressed written permission of the Airline Reporting Corporation.
2. Data for 2002 and 2007 are consensus forecasts of the Delphi panel.
3. Table reproduced from McCubbrey (1999)

The panel's prediction was not off by much. The Airline Reporting Corporation [ARC] reported 16,513 entities in the U.S as of December 31, 2002. The number of travel agency entities was within 3% of what the experts predicted.   The more salient point, however, is that the panel predicted a major reduction[>40%] in the number of travel agent entities between 1997 and 2007. By the end of 2002, the panel's forecast was very close to what actually occurred.

Even though the experts' prediction of the overall major contraction in the number of travel agent entities between 1997 and 2002 was fairly accurate, their predictions regarding the distribution of travel agent entities by sales volume was not as accurate. The panel predicted a shift away from smaller agencies towards larger, higher volume entities. As shown in Table 2, in 1993, 91.2% of the agency entities sold less than $3 million in air travel. The panel estimated that by 2002 that

Table 2. Actual vs. Predicted Number of Travel Agent Entities 1993-2002

Air Fares	1993	% off Total	1997	% off Total	2002 (Predicted)	% off Total	2002 (Actual)	% off Total
0-1M	14773	64.8%	13048	57.2%	7833	46.0%	12142	71.3%
1-2M	4600	20.2%	5583	24.5%	4267	25.1%	2109	12.4%
2-3M	1402	6.2%	1900	8.3%	1987	11.7%	734	4.3%
3-4M	638	2.8%	744	3.3%	890	5.2%	380	2.2%
4-5M	316	1.4%	421	1.8%	633	3.7%	205	1.2%
5-10M	599	2.6%	716	3.1%	793	4.7%	458	2.7%
>10M	457	2.0%	394	1.7%	627	3.7%	485	2.8%
TOTAL	22785		22806		17030		16513	

1. 2002 (Actual) Source: Airline Reporting Corporation. The data are used by permission and may not be reproduced without the express written permission of the Airline Reporting Corporation.
2. 1993-2002 (Predicted) are from McCubbrey 1999.

number would drop to 82%. It actually came in at 88%. Agency entities with sales of over $5 million were expected to more than double, from 4.6% in 1993 to 8.3% in 2002, but the actual total in 2002 was just 5.5%[1]

Note, however, that the largest category, representing sales greater than $10 million, was the *only* category to show an increase in the number of travel agency entities between 1997 and 2002, increasing from 394 in 1997 to 485 in 2002. Even though this increase was smaller than the 627 entities predicted, it still gives credence to the panel's prediction of a shift toward larger entities. It should also be noted that this category encompasses all entities with sales over $10 million, including entities with sales significantly higher, even in the hundreds of millions of dollars. In 1997, the over $10 million category contained the smallest number of travel agency entities. However, in 2002, the over $10 million category was the fourth largest category of travel agency entities.

DID REINTERMEDATION OCCUR?

The 1999 study noted that even though the Delphi panel predicted a substantial reduction in the number of travel agency entities, the reduction would not necessarily mean that the locations predicted to disappear would have been disintermediated. A reduction could result from other factors as well, such as a wave of consolidation in the air travel distribution industry, with larger agencies absorbing smaller agencies in an attempt to gain economies of scale. To explore the question of disintermediation further, the panel was asked to estimate overall market share of each of seven types of channels:

- National/Global Travel Agencies
- Independent Local Travel Agencies
- Airline Direct Services
- Computerized Reservation Systems [CRS]/Global Distribution Systems [GDS] Direct Services
- Cybermediaries
- Tour Package Specialists
- New Competition [Unspecified]

Since it was not possible to identify an accurate source of market share estimates for each channel in 1997 or 1998, the panel was asked to simply estimate the market share of each channel in 2002 and 2007. The notion was that if the market shares of airline direct services and cybermediaries were expected to increase, it would be evidence that reintermediation was anticipated. The panel's market share estimates are summarized in Table 3.

The panel estimated that by 2002, traditional travel agencies would account for 58.9% of the total market share. However, in 2002, only 47% of air travel in North America was booked through a traditional brick-and-mortar travel agency [Holly & Michels 2003], indicating that the panel underestimated the impact of online direct markets and cybermediaries.

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[1] No attempt was made to account for inflation or differences in airline fares.

Table 3. Overall Market Share Estimate for Each
Competitor [Channel Participant] in 2002 & 2007

Channel	2002	2007
National/Global travel agencies	33.5%	27.0%
Independent local travel agencies	25.4	19.7
Airline Direct Services	14.1	16.1
CRS/GDS Direct Services	5,1	6.6
Cybermediaries	11.9	17.3
Tour Package Specialists	5.4	6.5
New Competitors (unspecified)	4.7	6.7
Total	**100 %**	**100%**

Source: McCubbrey 1999

Table 4 shows the increase in the popularity of the Internet as a channel for making travel reservations, increasing from 5.3 million U.S adults who made travel reservations online in 1997 to 39 million in 2002. One of the reasons online bookings increased is because customers became more confident about their Internet transactions. At the end of 2002, for example, the Conference Board's Consumer Internet Barometer reported that Internet users' confidence increased to 33% by the end of 2002, up from 27% the previous year, indicating consumers believe their online purchases are safer [Glab 2003].

Table 4. Travel Planning on the Internet

	U.S. Adults Who Made Travel Reservations Online (millions)					
	1997	1998	1999	2000	2001	2002
Online Travelers	5.3	6.5	15.1	24.7	31.1	39.0

Source: Travel Industry Association of America (2002)

Supporting this general trend, Jupiter Research estimated that 34% of all leisure and non-managed-business airline ticket sales were made online by year-end 2003 [Wall Street Journal 2003a]. The same study reported that online ticket revenue was $16.8 billion and a 28% market share in 2002.   Jupiter estimated that online sales were about evenly divided between airline sites and on-line travel company sites and that about 90% of sales were for domestic flights. They did not quote sales made directly to travelers from airline call centers.   However, the Travel Industry Association of America [TIAA] reported that cybermediaries were beginning to draw more business than the airline direct sites, as shown in Figure 1. In 2000, 67% of online travelers report using airline-direct sites to book their reservations, while only 54% claimed they used cybermediaries. In 2002, however, more online travelers report using cybermediaries [61%] than airline-direct services [57%], indicating the increasing popularity of cybermediaries.

The Delphi panel estimated a 14.1% share for airline direct services and an 11.9% share for cybermediaries in 2002 for a combined share of 26% of all sales. However, the 14.1% for airline direct also contains sales from airline call centers.   Clearly, Jupiter's 28% share for online sales alone in 2002 indicates that the panel underestimated the impact online sales would have by 2002.
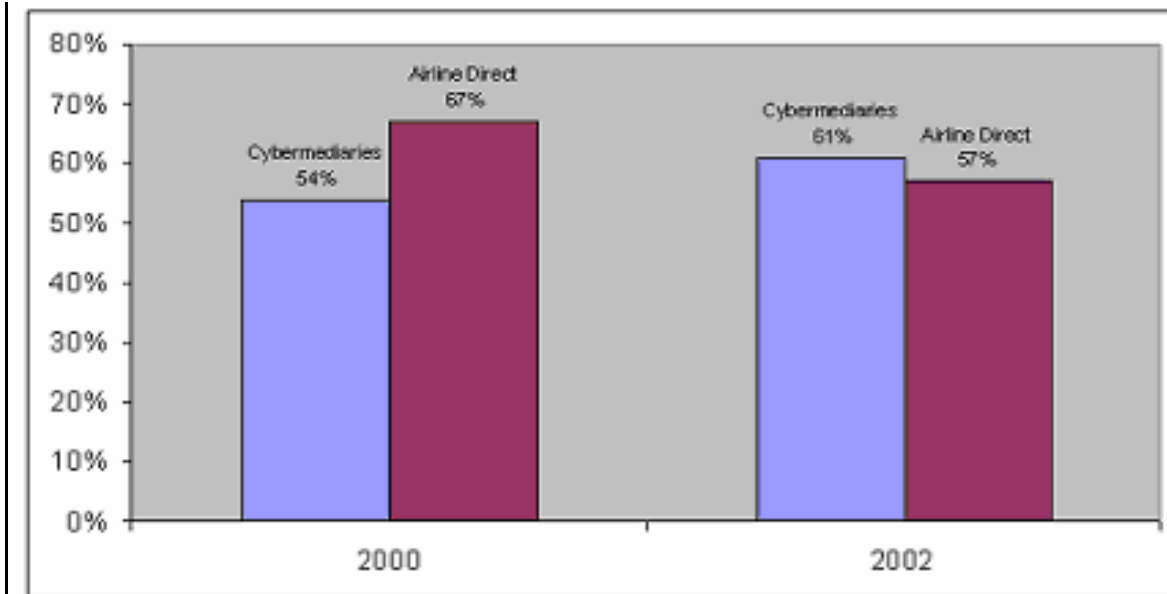
Source: Travel Industry Association of America (2002)
Based on 39.0 million traveles who booked travel online in 2002
Some travelers reported using both Cybermediaries and Airline Direct services resulting in a combined total of over 100%.

Figure 1. Internet Sites Used for Online Reservations

WHICH MARKET SEGMENTS WOULD BE MOST AFFECTED?

The 1999 study asked the panel to identify the market segments in which the traditional travel agents would be most likely to lose share to either airline direct services or cybermediaries. The market segments identified were:

- Large Corporate
- Small to Medium-sized Corporate
- Knowledgeable Business/leisure Traveler
- Occasional Leisure Traveler
- Package/adventure Tours

Because the panel was asked to provide market share estimates only for 2007. no attempt was made to compare 2002 data. It should be noted, though, that when the Delphi study was being conducted the Internet was being used more by the occasional/leisure traveler segment and the knowledgeable business/leisure traveler segment. According to Jupiter Research, almost 73% of unmanaged business travelers book air, hotel, and car rentals through online cybermediaries. Jupiter also reported that smaller corporate accounts already purchase 47% of their travel via online cybermediaries. [Glab 2003]. However, around 2002, cybermediaries began taking aim at the $100 billion U.S. corporate travel market. Expedia opened its corporate travel section in November 2002, followed soon thereafter by Travelocity and Orbitz [Michels 2002]. Prior to 2002, Expedia estimated that 15% to 20% of its total bookings came from corporate travelers. With their new focus on corporate business, Expedia set a target of $750 million in corporate bookings by the end of 2004 [Glab 2003].

WHAT ROLE DOES TRANSACTION COMPLEXITY PLAY?

The 1999 study concluded that travel agents would have an advantage over other channels for complex transactions, whether they were of high or low frequency. The results from the 1999 study on this issue are shown in Table 5.

Table 5. Relative Competitive Advantage of Channel Participants
By Transaction Frequency and Complexity

Complexity	**High**	Travel Agents Airline Direct Cybermediaries CRS/GDS	1.00 2.20 3.27 3.53	Travel Agents Airline Direct Cybermediaries CRS/GDS	1.00 2.47 3.20 3.33
	Low	Airline Direct Travel Agents Cybermediaries CRS/GDS	1.40 1.93 3.07 3.60	Airline Direct Cybermediaries Travel Agents CRS/GDS	1.93 2.40 2.60 3.07
		Low Frequency		High Frequency	

1=best, 4=worst
Source: McCubbrey (1999)

The panel's consensus was that travel agents would operate at a competitive disadvantage to both airline direct services and cybermediaries when the transaction complexity is low, again whether transaction frequency is high or low.   This prediction proved to be accurate, based on anecdotal evidence. The argument for this prediction being true is as follows.

At the time of the 1999 study, airline companies were in the process of reducing commissions paid to travel agents.

> *"In 1995, after a long period of promoting partnership style arrangements with travel agents since the deregulation of the industry in 1978, the carriers imposed a cap of $50 or 10% [whichever is lower] on commissions paid for a round trip domestic flight. The previous rate of commission had been 10% with no cap. Commissions on international flights remained unchanged at 10%.*

> *"In September 1998, airlines dropped commissions to 8% for both domestic and international flights and retained the $50 cap on domestic flights. In November 1998, the airlines imposed a cap of $100 on international round trip tickets. As a result of the commission caps and reductions, many travel agents began charging their customers $10 to $15 to help make up for the lost airline commissions. To make matters worse for the travel agents, most large airlines began to encourage travelers to bypass travel agents and book their flights with the airlines directly"* [McCubbrey 1999].

Since then, airlines continued to reduce commission payments to travel agents [including cybermediaries]. In March 2002, most airlines stopped paying commissions altogether. In 2002 only 26% of travel agencies received overrides on bookings, down from 37% in 2001 [McDonald 2003].   If they had not already done so, travel agents had no choice but to charge customers a fee [usually $20-$35 for an airline ticket] for their services, since they have no other source of revenue. [Many travel agents, however, receive overrides, or bonus payments, from preferred airlines based upon the revenue they generate] [Bly, 2002]. As discussed below, e-tickets made the revenue situation even more onerous for travel agents.

In 2002, to battle declining revenues, cybermediaries such as Expedia began charging a fee for their service [usually $5] [Travel Weekly 2002], but they do offer more services than airline direct such as the ability to compare fares, times, and frequency of stops. Cybermediaries are also increasing their services to offer consumers the ability to book hotel and rental car reservations on their sites, making for a "one-stop" shopping experience.

As a result of travel agents having to charge fees for airline tickets, many travelers see no need to use travel agents for simple transactions, such as buying a round trip ticket from one city in the U.S. to another. Why pay an extra $35 when you can buy the ticket from the airline directly or from a cybermediary? Plus, if you buy online or from a call center, you not only avoid the extra cost, but you can do business 24/7 and perhaps even garner an extra 1,000 miles for your frequent flyer account.   Travelers perceive travel agencies as providing the best customer service and being the most reliable, however cybermediaries are perceived as offering the best choices for flight options, being the simplest to use, and finding the lowest prices [Pfenning 2003].

TravelSense, a Web site maintained by ASTA, the American Association of Travel Agents, contains advice to consumers on the pros and cons of making air travel reservations online or not. It contains the following statement: "The Internet can be a powerful tool for researching travel. But when you're ready to buy, the Internet can't replace the expertise of a trusted travel counselor."   Later, however, it states "If you're accustomed to making all your own travel arrangements, the Internet can be a powerful tool" [TravelSense 2005]. Taking a slightly different perspective, another industry observer stated that

> *"Over the past several years, consumers have become very comfortable purchasing tickets and completing basic bookings online. Now we're seeing the next phase where consumers turn to the Web to research more complex travel needs."* [Oakes 2002].

Oakes stated that consumers did their research for more complex travel like international trips, adventure tours, and cruises over the Internet, but were more comfortable making their actual purchase from traditional travel agents. This behavior is not unlike that observed in auto buyers who use the Internet. Of those who do, most use the Internet to arm themselves with information so that when they visit a dealer to actually make a purchase, they can drive a harder bargain.

HOW WELL WOULD E-TICKETS BE ACCEPTED?

Finally, the panel was asked to forecast the acceptance of e-tickets in each market segment. The problem with e-tickets from the travel agents' perspective, of course, is that it makes it easier for the travel agent to be by-passed. One of the valued-added functions of the travel agents was to not only "write" the paper ticket, but also deliver it to the traveler's home or office. The elimination of paper tickets would obviate the need for delivery service.   Table 6 summarizes the panel's forecasts of the percentage of air travelers who would be using E-tickets by the year 2002:

Table 6. Percentage of Air Travelers in Each Market Segment Expected
to be Using E-tickets by 2002.

	Large Corporate.	Small/Medium Corporate.	Knowledgeable Business Leisure	Occasional Leisure	Package/ Adventure Tours
Percentage of Travelers using E-Tickets	87%	81%	83%	63%	51%

Source: McCubbrey (1999)

Table 6 shows that the panel believed e-tickets would gain a considerable amount of acceptance in all five market segments, in particular in both corporate market segments and in the knowledgeable business/leisure travelers segment.

It turns out, the panel was right on target in predicting that e-tickets would be wildly popular with travelers. The Airline Reporting Corporation [ARC] in March 2003, reports that airlines showed that over 80% of all airline tickets issued were e-tickets [ARC 2003].   At the time, it was expected that the percentage of e-tickets would continue to increase as many airlines began to charge a $20 - $25 fee to issue a paper ticket. In May, 2003, for example, American Airlines announced that it would no longer issue paper tickets when e-tickets are available. Paper tickets would only be available through travel agents who would be charged a $50 fee by American which, presumably, would be passed on to the customer on top of any other service fees. At the same time, American Airlines reported that about 84% of its customers use e-tickets, up from about 65% in 2002 [Wall Street Journal 2003b]. Later, UAL Corp's United Airlines announced that it would eliminate all paper tickets by the end of 2003 and would issue only electronic tickets worldwide for all eligible itineraries by January 2004 [Wall Street Journal 2003c]. As of June 2004, Delta Airlines reported that their e-ticket usage exceeded 90%, with a goal of 100% e-ticket usage by the end of the year [The Traveler 2004]. The International Air Transport Association [IATA] reports that paper tickets cost up to $10 to process, while e-tickets cost only $1. The IATA set a goal of 100% implementation of e-ticketing worldwide by 2007, which they estimate will save the air industry $3 billion per year [International Air Transport Association 2005]. According to reports by the ARC, overall e-ticket usage in the U.S. was approximately 90% at the end of 2004 [ARC 2004].

III. ADDITIONAL OBSERVATIONS

While the 1999 study attempted to anticipate the emergence of a disruptive technology or technique by specifically asking the panel to consider possible new competitors to the channels identified for the first round survey, only two were specifically identified as possibilities:

> 1. Personal travel management software which will empower individuals to make their own travel arrangements without paying transaction fees or commissions, and

> 2. Airlines exit the distribution business and sell significant numbers of seats to new, consolidator-like intermediaries. The new intermediaries assume the risk of unsold seats.

Neither of these two possibilities emerged to any great degree. The notion of personal travel management software serving as an intermediary for the individual traveler between the many choices available when purchasing travel was intriguing, but we could find no evidence that such an option surfaced. Perhaps the closest is the Webflyer site [www.webflyer.com] which keeps track of special offers and frequent flyer balances and options, among other services for the frequent flyer. Various sites used agent technologies[2] to "shop" for the lowest fares at other travel sites. A good example is Sidestep [www.sidestep.com]. Sidestep is a software program that is downloaded to the user's PC. When it detects that a search is being made on a travel site such as Expedia or Travelocity, it simultaneously launches a search on some 140 travel sites and compares the results.

IV. CONCLUSION

As noted in Section I, the purpose of this paper was to compare the predictions made by the Delphi panel on the impact of Internet technologies on the air travel distribution industry with what actually occurred. From the preceding discussion, it can be seen that the panel was quite prescient in predicting major outcomes, i.e. customer acceptance of IT-enabled direct distribution models which bypassed travel agents, customer acceptance of related IT-enabled business

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[2] Agent technologies are different than travel agents, as can be seen from the description of how Sidestep works.

processes like e-tickets, which exacerbated the predicament of traditional travel agents, and the resultant marked decrease in the number of travel agent entities. Our overall conclusion is that the Delphi method worked well as a predictor in this instance.

In 2005, the US Airline industry continues to be under financial stress, with major carriers operating under bankruptcy protection, others rumored to be nearing bankruptcy, and the rest just barely continuing to survive. In an environment of increasingly intense competition, the airline companies have to reduce their operating costs in many ways, ranging from obtaining payroll concessions from employees to charging for in-flight meals. IT, of course, continues to play a role in cost reduction initiatives. Many airlines reduced headcount at airport check-in counters by installing self-service kiosks and by permitting passengers to print out boarding passes on their personal computers. Some airlines now charge even their elite level customers $5 if a ticket is purchased from a restricted call center rather than from the airline's Web site. The economics of replacing human interaction with customers with IT interaction are compelling.   Forrester Research, for example, estimates that a self-service check-in costs $0.16 on average compared with $3.68 using human agents [Economist 2005]. The same article noted that airlines hope to use RFID tags to help reduce their $1 billion in annual costs for lost baggage. In such an environment, we can expect the airline companies to be early adopters of IT solutions that provide demonstrable business benefits. As a result, the airlines are an industry for researchers to continue to monitor, including through additional Delphi surveys. .

Another area for researchers to continue to watch is for spillover effects to other industries.   The effects of disintermediation and reintermediation are being felt in several other industries, ranging from music to financial services to automobiles, tax return preparation, and real estate. In some cases, such as real estate, the impact of the Internet is slower than predicted. In other cases, such as music and DVDs, firms in traditional channels would have been well served if they noticed trends in other industries. Had they done so, they might have anticipated the rise of competitors such as iTunes and NetFlix and not given the newcomers an opportunity to make the impact on their respective markets that they did.

Another interesting industry to watch, closer to home for academics, is the textbook publishing industry. If there is one thing learned in e-commerce, it is that commodity-like products sell best over the Internet and that digital products are the best of all [Haag, Cummings, and McCubbrey 2004]. Textbooks are digital products that, like music and software, can be bought and delivered over the Internet. Some nascent business models worth watching are Websites which rent textbooks, [e.g. Safarix Textbooks Online, [www.safarix.com]], Websites which facilitate self-publishing and online sales and distribution [e.g. Lulu [www.lulu.com]] and the movement towards open content publishing [e.g. wikibooks], [en.wikibooks.org/wiki/Main_Page]. Wikibooks, for example, offers 7066 modules, all written by volunteers, as of March 2005. One of these Wikibooks in the IS domain is the open content textbook on XML initiated by students at the University of Georgia under the supervision of Rick Watson [en.wikibooks.org/wiki/XML].

In summary, the lesson of the travel agents' failure to anticipate the impact that IT would have on their traditional business model, as well as the examples of other industries, should not be lost on managers and IT practitioners in any industry. Failure to anticipate technological trends and react to them can be fatal. The IT industry itself is no exception. For example, with the increase in offshoring systems development to low wage countries, IT practitioners in developed countries will need to place more emphasis on the design of innovative systems that give organizations a competitive advantage, [or just permit them to survive]. It is ironic that many IT practitioners who spent their careers displacing employees with IT now find *they* are being displaced because the Internet and integrated collaboration environments permit IT development to take place anywhere in the world where a highly-trained, but lower-cost work force exists. Should we have seen it coming?

Editor's Note: This article was received on March 17, 2005 and was published on April 9, 2005.

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EDITOR'S NOTE: The following reference list contains the address of World Wide Web pages. Readers who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that

> 1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
>
> 2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
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> 3. the authors of the Web pages, not CAIS, are responsible for the accuracy of their content.
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APPENDIX I. WHY WASN'T THIS PAPER WRITTEN IN 2003?

Comments by Don McCubbrey

The question asked of me during the review process was why this paper is so late. It's a good question.   My original paper, published in 1999, contained forecasts for the years 2002 and 2007. The follow-up paper should really have been submitted in 2003, comparing actual data from 2002 to the Delphi panel's predictions for 2002. Actually, that was my intention all along.

I started the "reprise" paper in 2003 but ran into difficulty in obtaining some of the comparative data I needed. With the press of other matters (e.g., teaching, other papers, textbook deadlines) I let time go by and little by little the paper slipped lower and lower on my priority list even though I knew that a follow-up on the panel's predictions would be useful to others who might be considering using the Delphi method. As time passed, I found myself saying that it would be too late to do any good.   Maybe I should just wait for 2007 data.

Indeed, the paper would have had to wait until 2008 had it not been for my co-author, Rick Taylor. Rick is a PhD student at the University of Houston. studying under Wynn Chin, Randy Cooper, Rudy Hirshheim, and Blake Ives. As a project in Ives' class he read the series of articles on the Debate on the Core of the Information Systems Field [Gray 2003], one of which was mine. Rick sent me an e-mail with some thoughtful observations, and, to make a long story short, Blake suggested that it might expand Rick's horizons to work on a research project with a faculty member from another institution. Since the terminal degree at the Daniels College of Business is the MBA, I jumped at the opportunity for some help in finishing the article. With Rick's solid contributions, the article was finished. In a way, it turns out that it is early, rather than late. Thanks a lot, Rick. I hope that collaborations like this can become more common.

APPENDIX II. COMMENTS ON THE DELPHI METHODOLOGY[3]

The Delphi method was developed at the RAND Corporation in the 1960's. The development was in response to a problem faced by the military. When, say, the Air Force, convened a panel of experts to forecast technology developments they found that the experts in the room deferred to the person who was most respected in the room (say Edwin Teller or Hans Bethe) or who made the most emphatic statements. The military concluded that these panels gave them one person's opinion, not the range of opinions present. They therefore wanted a procedure in which the responses are anonymous so that the most respected or the loudest voice did not dominate. Olaf Helmer, later of USC and Norm Dalkey, later at UCLA, led the research project that led to Delphi.

RAND opted for the Delphi method of predicting operational trends because it provided "the most reliable consensus opinion of a group of experts" [Dalkey and Helmer, 1963]. Even though the Delphi technique was originally applied by the RAND Corporation for technology forecasting, it is now used as an established research tool in many fields [Buckley 1995].

C.L Jain noted that the Delphi method is "most suitable when a long-range forecast is needed", and that "among its advantages is insight into undeveloped subject areas" [Jain, 1985].   He described the Delphi method as involving nine steps:

1. Define the problem –what is to be forecast and how will the results be used when available.
2. Select knowledgeable and willing participants as a panel to respond to a questionnaire. The participants do not know one another and never meet face to face.
3. Structure the questionnaire.
4. Select the medium to be used to contact participants[4].
5. Send the questionnaire (Round 1).
6. Compute the simple average[5] of the results.
7. Send a 2nd questionnaire (Round 2).
8. Compute the average from the 2nd round results.
9. Send a 3rd round questionnaire(Round 3) ….

Example: Consider a technology forecast about developments in nanotechnology. The initial questionnaire may ask the panelists about the earliest, most likely, and latest date for achieving

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[3] We are indebted to Paul Gray of Claremont Graduate University for some of the information about Delphi history and methodology

[4] Initially, conventional mail was used to send and respond to the questionaires. Today, most Delphis use e-mail.

[5] Experimental results by Dalkey and others show that the median usually results in a better forecast

each of several milestones. The panelists have the option of saying 'never' if they believe the milestone will not occur, of pointing to existing research that shows the milestone is already reached, or specifying a time period when the development will occur.

At the end of the first round, the panel will reach consensus on some items and disensus (disagreement) on others. Only the disensus questions are repeated. Often, the persons with outlier answers (earliest, latest) are asked to give their rationale for their answer. After all, they may be privy to information that others are not. These outlier responses (with the individuals not identified) are fed back to the group as is the median or mean value of the panelists. This procedure tends to converge by the 3rd round or shortly thereafter. For some items, only disensus occurs. For these items it is usually clear what additional investment in data or experimentation is required. Note that variations other than time of occurrence are often sought such as estimating the cost of a project or the probability of occurrence by a certain date. Forecasts can involve both events (e.g., occurrence of a breakthrough) and trends over time (e.g., the value of the dollar relative to other currencies, interest rates).

Investigating the effectiveness of the Delphi technique, Czinkota and Ronkainen [1997] concluded that the Delphi method is "quite a powerful forecasting tool". They noted, however, that "the key aspect of this type of research will remain the selection of the experts, since their level of knowledge and degree of enthusiasm in participating in such a research venture vitally affects the quality of the output".

REFERENCE

For readers seeking to gain expertise in Delphi, Murray Turoff of the New Jersey Institute of Technology made the definitive study, a book by the late Harold Linstone available on the web. The URL is: www.is.njit.edu/pubs/delphibook. It is the complete book "The Delphi Method: Techniques and Applications" by Harold A. Linstone.

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Rick Taylor is a PhD Candidate at the University of Houston. Prior to his academic endeavors he worked in the information services industry serving as a technology executive for The Walt Disney Co., Los Angeles Police Department, and a start-up e-Commerce organization. His current research interests include information security management, strategic information systems, and electronic commerce.