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# **The Evolution of Food Distribution Cooperation Through Technology**

by

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Direct store delivery is a prime area of opportunity in the grocery industry for achieving operational savings for both supplier and retailer and, in turn, the consumer. The estimates are that there are over 500 million such deliveries annually to food stores in this country, involving close to 10 billion line transactions. Even tiny savings per transaction can generate very large savings in total, both for individual companies and for the industry as a whole.

The enhancement of UCS to handle and facilitate DSD transactions presents by far the most significant and exciting opportunities for achieving such savings. How much will be saved necessarily depends on how well individual participants take advantage of these opportunities, as well as on how advanced their systems have been prior to the implementation of UCS. The recently released study from which this speech quotes estimates that potentially available direct benefits come to \$330 million for retailers and \$175 million for DSD suppliers annually. Indirect benefits can be even larger. Those for suppliers may total as much as \$430 million. For retailers, indirect benefits in the form of automated accounting may be equally large, and those from improved item-level merchandise management may exceed \$1 billion.

This study was directed by the Uniform Communications Standard/Direct Store Delivery

Task Force and, in turn, was supported by the following four organizations:

- UCC: Uniform Code Council
- FMI: Food Marketing Institute
- GMA: Grocery Manufacturers of America
- NAWGA: National-American Wholesale Grocers' Association

The study was unanimously approved by all members of the Joint Industry Task Force and the sponsoring organizations. The study has had high level participation and is co-chaired by Byron Allumbaugh, Chairman, C.E.O., Ralphs Grocery Company; Charles J. Chapman, President, Nabisco Brands, Inc.; and Robert Schaeberle, Chairman Emeritus, Nabisco Brands, Inc.

The history of cooperation in technology begins with the joint adoption of the Universal Product Code in 1972. A companion report issued seven years ago in April, 1980 was entitled: "Electronic Data Interchange for the Grocery Industry - Feasibility Report." It laid the foundation for the Uniform Communications Standard (UCS), which makes possible the computer-to-computer exchange of routine, transactional messages, such as purchase orders and invoices, between grocery manufacturer and distributor. Excluded from the scope of

that study as well as from UCS to date have been messages related to direct store delivery (DSD) transactions. Computer-to-computer interchange in the grocery industry leads all other industries with these types of transactions. A handbook was jointly reissued by FMI and GMA in June, 1982 to promote standard paperwork at the store door.

In early 1985, the UCS/DSD Task Force was formed to extend UCS to handle DSD in addition to warehouse transactions. This group worked first on messages between the offices of DSD suppliers and retailers, such as item authorizations, multi-point purchase orders, and statements. Once good progress had been achieved in this area, the group turned to activity and data interchange that take place at the store level, and commissioned a study by Arthur D. Little, Inc. in cooperation with Abell Automation Consultants.

This DSD Store-level Study had as its objective the development of recommendations for reducing retailer and supplier costs by means of improvements in DSD delivery/receiving systems and operations at the store level. To achieve this objective, the study addressed two improvement opportunity areas:

- Using UCS to generate and exchange sales and other data more efficiently, and
- Improving store door delivery/receiving operations.

In summary form, some of the findings and recommendations are as follows:

While DSD delivery/receiving has historically been a business interface with examples of tension and adversarial behavior, the situation is improving today. Direct Product Profitability (DPP) is showing that DSD products and supplier-provided services are key sources of profitability. Joint industry efforts have been initiated to improve DSD operating performance, with the DSD Handbook and Voluntary Guidelines for DSD documentation having been positive steps.

The DSD Handbook and Voluntary Guidelines provide very useful suggestions and re-

commendations for managing DSD and for formatting paper delivery invoices. The industry should continue and strengthen its support of these recommendations and guidelines.

The most important trend affecting DSD operations has been the development of improved delivery/receiving systems and procedures. However, both retailers and suppliers have been developing their own systems and procedures independently and incompatibly. Some receiving system features designed to cope with "problem" suppliers are creating inefficiencies for all suppliers, both good and bad, and for the retailer as well.

UCS/DSD offers a means for eliminating these conflicts and incompatibilities between delivery and receiving systems and for improving productivity more generally.

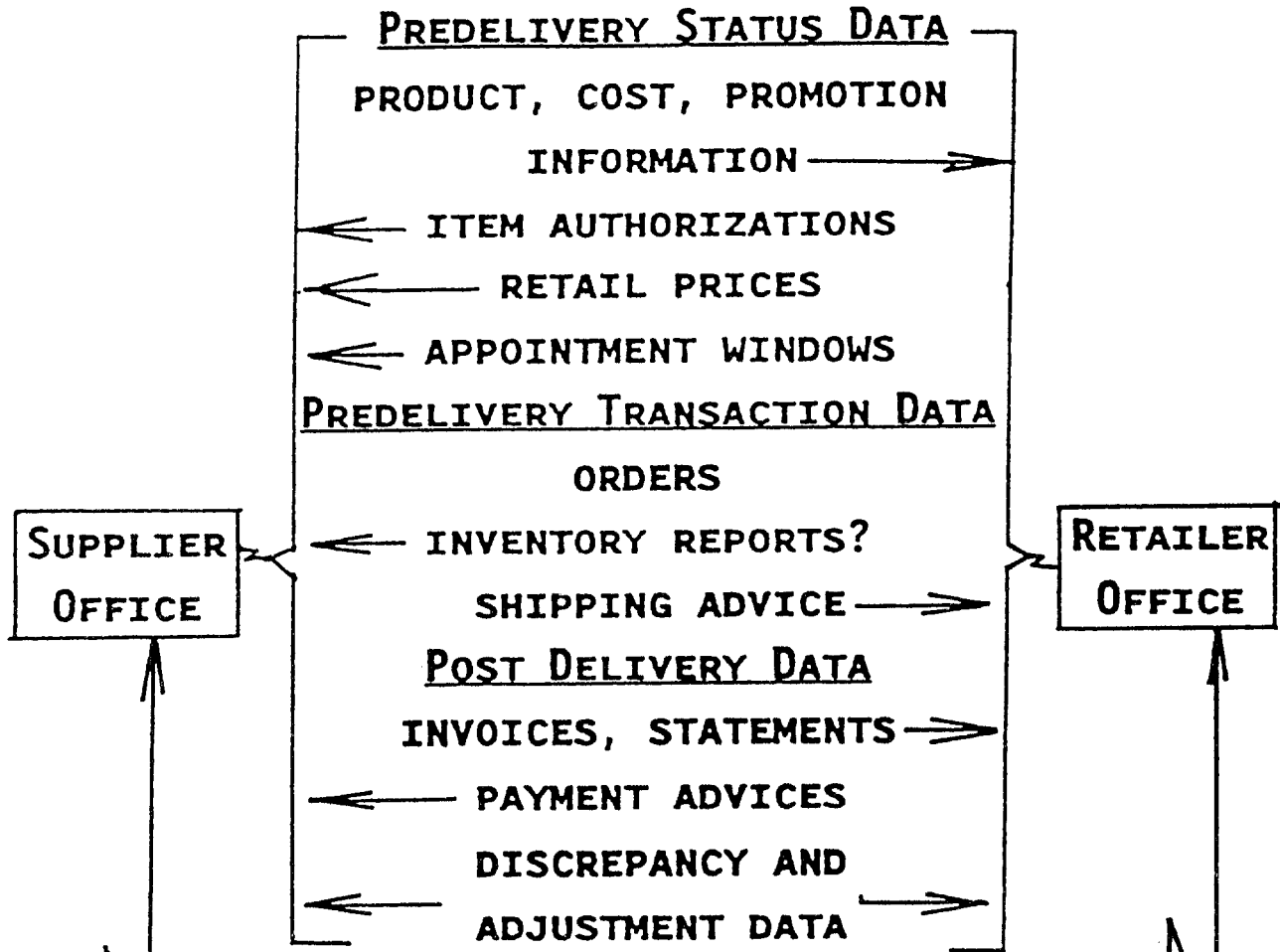
UCS/DSD must be designed not as a separate system but as an enhancement to UCS so that it can accommodate tomorrow's technology as well as today's. Figure 1 illustrates this enhancement:

- Office-to-office data interchange is expanded to handle DSD transaction sets such as statements and multi-point purchase orders. We use the term NEX/UCS (for Network EXchange) to designate this form of UCS data interchange that takes place over telephone networks.
- Store-level UCS is introduced to handle data interchange that takes place there, fact to face between agents of the seller and buyer. We use the term DEX/UCS (for Direct EXchange) to designate this general form of UCS that takes place directly between the electronic devices of such agents.

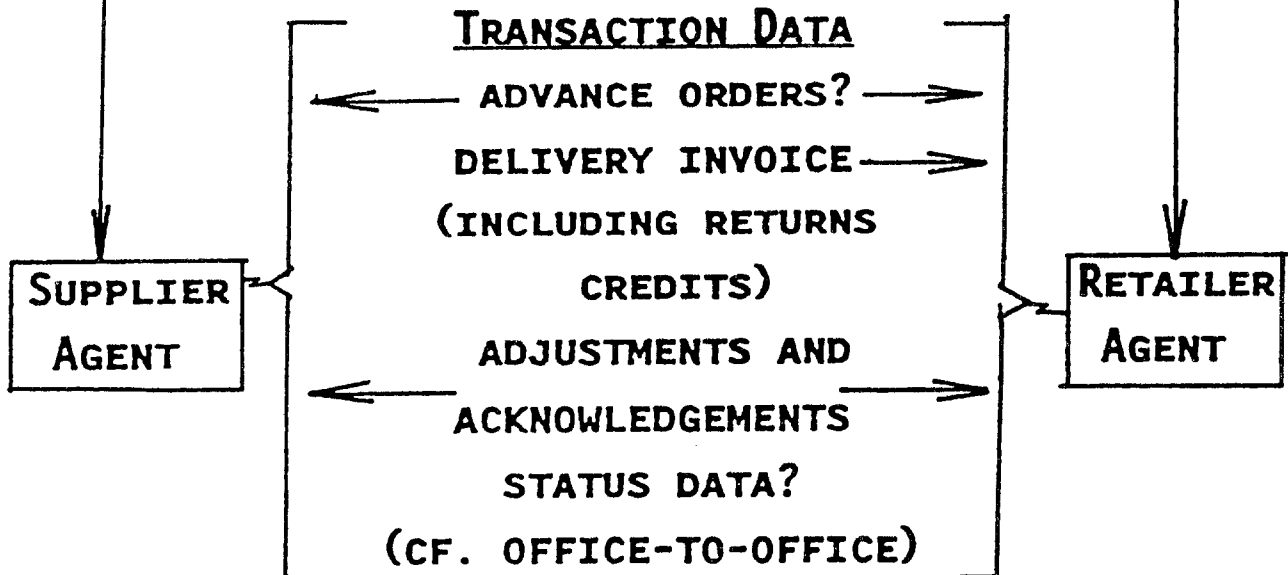
Just as NEX/UCS has been expanded to handle more than just warehouse transactions, DEX/UCS will be able to handle more than just DSD transactions. With proper design, it will extend to handle drop shipments, warehouse-to-retail, and even supplier-to-warehouse deliveries.

Figure 1. Enhanced UCS

OFFICE-TO-OFFICE INTERCHANGE VIA NEX/UCS



STORE-LEVEL INTERCHANGE VIA DEX/UCS



Over the next decade, I anticipate that DEX/UCS will grow to the point where it becomes the predominant means for exchanging delivery data at the store level in the grocery industry. This evolution will take place as follows:

- Even without DEX/UCS, I anticipate that computerized on-board and in-store DSD delivery and receiving systems will become increasingly common because of the significant direct benefits each provides to its respective users. Without DEX/UCS, these systems would develop incompatibly, creating conflicts and degraded operational productivity. DEX/UCS offers a means for not only eliminating these conflicts but for achieving substantial productivity gains.
- DEX/UCS will initially provide the means for users with existing computerized delivery and receiving systems to interface them with each other. These users will already have benefits that justify their own systems. DEX/UCS will put frosting on the cake, offering additional benefits through compatible, device-to-device data interchange.
- As DEX/UCS becomes well established, other retailers will begin to install receiving systems to capture DSD data electronically. Such systems will enable many retailers to carry out control, payables accounting, and merchandise tracking at the item level of detail for the first time. For these retailers, DEX/UCS enables them to enjoy the cake as well as the frosting.
- Such retailers only gain the main benefits of computerized receiving from DEX/UCS capable suppliers. Included among such retailers will be chains that operate large numbers of small stores and see DEX/UCS as a means for economically capturing item-movement data without incurring the much larger cost of installing more elaborate, on-line receiving systems or front-end, POS scanners. The cost for a DEX/UCS device may be a fifth of the cost of a full DSD system. These com-

panies will have a major influence in encouraging most DSD suppliers to implement DEX/UCS capable delivery systems.

- The widespread use of DEX/UCS by DSD suppliers will, in turn, enhance its spread among retailers of all sizes, including the very small.

DEX/UCS offers very significant potential benefits to the grocery industry, including both retailers and DSD suppliers.

- Direct retailer benefits depend in part on the type of receiving system employed, and can be realized in the form of better and faster error identification, key entry savings, automated accounting, elimination of statements, archiving savings, and the elimination of the need to wand items to identify them to on-line receiving systems. Direct benefits per delivery range from 39 cents for retailers with simple, ticket-oriented systems to 73 cents for retailers using off-line, item-oriented receiving systems.
- Potential direct retailer benefits total to \$330 million annually for food stores, a figure considerably larger than that offered by warehouse UCS, even when inflation above 1980 estimates is considered. As a percent of DSD sales, these benefits range from about 0.14 percent for supermarket chain stores up to 0.56 percent for convenience stores. The larger percentage for smaller stores results from the smaller value per DSD delivery for them. On a per store basis, annual direct benefits typically fall into the \$2,000 to \$4,000 range, with the small range reflecting the relatively small range in number of DSD deliveries per week for stores small and large.
- One year's annual direct benefits to a retail store will easily pay for the cost of the equipment needed to support DEX/UCS, especially for retailers who have already invested in on-line receiving systems.

**Table 1. Estimated DSD Delivery and Sales Volumes**

<b>Retailer Format</b>	<b>Number Of Outlets</b>	<b>Millions of DSD Deliveries Annually</b>	<b>Annual DSD Sales Per Outlet</b>
Chain Grocery	17,600 <sup>1</sup>	92	\$2.51 M
Independent Supermks (\$2 million plus)	13,300 <sup>1</sup>	79	\$1.93 M
Other Food Stores (Under \$2 M)	78,000 <sup>1</sup>	203	\$0.45 M
Convenience Stores	45,400 <sup>1</sup>	142	\$0.38 M
<b>TOTAL FOOD</b>	<b>154,300</b>	<b>515</b>	
Retail Drug Stores	21,300 <sup>2</sup>	61	
Independent Drug Strs	28,200 <sup>2</sup>	44	
GM / Variety Stores	18,200 <sup>3</sup>	76	
Discount Stores	8,250 <sup>4</sup>	54	
<b>GRAND TOTAL</b>	<b>230,250</b>	<b>750</b>	

**SOURCES:**

<sup>1</sup>*Progressive Grocer Annual Report, April 1986.*

<sup>2</sup>*Chain Store Guide: 1986 Directory of Drug Stores*

<sup>3</sup>*Chain Store Guide: 1986 Directory of GM/Variety Chain.*

<sup>4</sup>*Chain Store Guide: 1986 Directory of Discount Stores.*

*Other: Arthur D. Little/Abell Automation estimates.*

- Retailers with ticket-oriented receiving systems stand to gain the largest benefits from DEX/UCS, primarily because of its ability to enable the economical implementation of item-oriented receiving systems. Included in this category is a vast number of smaller stores. The major benefits for these retailers fall into the indirect category. Of these, automated accounting could save upwards of \$430 million annually. Item-level merchandise management benefits are harder to estimate and depend heavily on the dedication and skill of the persons using the data provided via DEX/UCS. Potentially, these benefits could exceed those available from automated accounting. Excluded from these estimates are the additional benefits that such retailers gain by being able to check the accuracy of their delivery invoices in detail.
- DSD suppliers stand to gain substantial benefits as well. Total potential industry direct benefits to suppliers approximate \$175 million annually, excluding additional benefits from using DEX/UCS with non-food store customers. The annual direct benefit for the average DSD route works out to approximately \$1300, or about 0.18 percent of sales to food stores. This annual savings is large relative to the incremental cost of upgrading a computerized route delivery system to accommodate DEX/UCS. While suppliers not having such systems would have to invest in one, we have not included the added benefits provided by such a system in the above figures.
- DSD suppliers stand to gain an even bigger indirect benefit from DEX/UCS through its potential for averting the widespread proliferation of retailer systems and practices that reduce supplier productivity. We estimate that without DEX/UCS, such proliferation might increase DSD supplier costs by as much as \$430 million per year.
- In the future, automatic replenishment and inventory control over DSD items will be handled via DEX/UCS and

NEX/UCS providing additional substantial benefits to both parties. These types of transactions are already in use by a few sophisticated retailers and suppliers.

- The key feature of DEX/UCS is the industry controlled authentication which will allow for true paperless transactions and a mutual trust between the business partners. This may result in further uses of DEX/UCS devices such as the purchase of scanning data at store door or the distribution and payment of electronic coupons to a store.

Some technical features of DEX/UCS are as follows:

- DEX/UCS employs the same transaction set architecture as NEX/UCS. As a result, any message type or transaction set that can be interchanged by NEX/UCS can also be interchanged by DEX/UCS, and vice-versa. Of interest here might be the exchange of item authorizations and price lists by DEX/UCS, or the exchange of DSD delivery record by NEX/UCS as backup to a prior exchange at the store level.
- Drafts of the DSD Delivery/Return transaction sets have been developed by a working group of the UCS/DSD Task Force. These transaction sets have the following features:

There are two DSD delivery/return transaction sets: the Delivery/Return Base Record, and the Delivery/Return Acknowledgement/Adjustment Record.

The transaction sets can be used to handle either deliveries or returns, to make and record adjustments, to maintain a full audit trail of these adjustments, and to accommodate digital signatures in order to permit paperless DSD.

The base record is prepared by the supplier and contains all of the data that needs to be furnished by him to the retailer.

**Table 2. Types of DEX/UCS Benefits to Users**

**Direct Benefits**

**Indirect Benefits**

*Ticket-oriented Receiver Benefits:*

- |                                          |                         |
|------------------------------------------|-------------------------|
| - Better and faster error identification | - Automated accounting  |
| - Elimination of statements              | - Item-level management |
| - Key entry savings                      |                         |
| - Archiving savings                      |                         |
| - Automated accounting                   |                         |

*Off-line, Item-oriented Receiver Benefits*

- |                               |                                                                                                 |
|-------------------------------|-------------------------------------------------------------------------------------------------|
| - Faster error identification | - Automated discrepancy identification (these firms already have access to item-level DSD data) |
| - Elimination of statements   |                                                                                                 |
| - Key entry savings           |                                                                                                 |
| - Archiving savings           |                                                                                                 |

*On-line, Item-oriented Receiver Benefits*

- |                               |                                                                                                                |
|-------------------------------|----------------------------------------------------------------------------------------------------------------|
| - Faster error identification | - Automated discrepancy identification and processing (these firms already have access to item-level DSD data) |
| - Elimination of statements   |                                                                                                                |
| - Reduction of wandering      |                                                                                                                |
| - Archiving savings           |                                                                                                                |

*Supplier Benefits*

- |                                                             |                                                                                                                                   |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| - Faster error identification                               | - UCS may produce additional supplier savings by removing the incentives for the further spread of incompatible receiving systems |
| - Elimination of statements, including country club billing |                                                                                                                                   |
| - Elimination of turnaround documents                       |                                                                                                                                   |
| - Reduction of wandering                                    |                                                                                                                                   |
| - Archiving savings                                         |                                                                                                                                   |



As its name implies, the acknowledgement/adjustment record is used to make changes or adjustments to the cumulative record, if required, and to attach a signature to it.

Acknowledgement/adjustment records can be transmitted by the receiver to supplier and vice-versa, in any sequence. The delivery/return record consists of the combined set of base record plus all acknowledgement records.

Encryption techniques for generating digital signatures will allow computer-stored delivery records to be used for audit and proof of delivery purposes, thereby permitting the elimination of paper or microfilm archives and their attendant handling and storage costs. Based on technical investigations, we have concluded that such techniques are feasible. The choice of the specific set of encryption algorithms to be employed in DEX/UCS should be based on tests and evaluations carried out in the latter phases of the development program to follow this study.

Two methods for interfacing the computer devices of supplier and receiver were identified as the most promising for use in DEX/UCS: a direct connect interface and an indirect interface employing a smart card as the means for data transfer. The direct connect interface employs an electrical plug connection and requires that both supplier and receiver have their computer devices in the same place at the same time in order for data interchange to take place. A smart card is the size of a credit card. It contains a computer chip providing both a memory and computer logic to control access to this memory. With it, there is no need for both the supplier's and receiver's computer to be brought together. For example, the supplier can load the smart card with delivery data at his warehouse. Then, the data can be transferred from the smart card to the receiver's computer, and the receiver's acknowledgement and signature can be transferred back into the smart card at the time of delivery. (The supplier can then take the smart card back to his warehouse for downloading and subsequent reuse.) The delivery person will need to carry some form

of terminal device with him, however, in order to enter his own adjustments and signature.

The study recommends that a mixed system employing both interfacing methods be used when DEX/UCS becomes operational. With this approach:

- Each DSD supplier is free to employ either a direct connect system or a smart card system.
- Retailer receiving systems must be able to interface with both of these systems.

By this means, suppliers will be able to choose the form of system that best suits their type of delivery system and operational needs.

There are several possible mixed system approaches. The particular choice should be based on the findings of the development test program.

A draft interface specification has been developed for use in the development program. It employs a particular mixed system approach in which the direct electrical connection serves as the common denominator. With it, any data carrier acceptor device (the device that talks to the smart card) will itself attach, in turn, to the hand-held or store computer by means of the direct connect specification. This approach is particularly suitable for the development program because it provides program participants with the flexibility to test a variety of data carrier options as well as the direct connect method.

DEX/UCS offers substantial benefits to the food and other distribution industries that use the Universal Product Code and receive product through non-owned vehicles. This is also a world wide standard as it was developed with International Standards Organization guidelines with UPC and its European Article Numbering system equivalent, EAN, taken into consideration. I expect that groups in Europe and the Pacific Rim will study the results and implement a similar standard.

I and the rest of the food industry are excited about the prospects for this program.

