Resounding confirmation....

....of the linkage of wireless technology with transportation applications was demonstrated on November 15 by the <u>Texas Instruments</u>' acquisition of <u>Savi Technology</u> (Mountain View, CA).

Savi was founded in 1988 by President/CEO Robert Reis. Current annual revenues are approximately $15 million. The company designs and manufactures radio frequency identification (RFID) equipment almost exclusively for the US Department of Defense for asset tracking in warehouses, transportation hubs, manufacturing facilities and other locations.

In 1994, Savi won a three-year, $70 million DOD contract -- claimed to be the largest RFID contract "ever awarded" -- for the "world's first wide area RFID tracking system." The Savi system is comprised of radio tags, omnidirectional transmitter/receivers and a central computer (*SCAN* July 95).

The Savi Tag, about the size of a deck of cards, incorporates a miniature radio transmitter, radio receiver and micro-computer in a strong, tamper-proof, compact case. The unit has a memory capacity of up to 128,000 bytes. Omnidirectional "Interrogators" (transmitter/receivers) are used to locate and identify the tagged items from up to 300 feet away. Each Interrogator can read, write and activate a tag's beeper, making the tagged asset easier to isolate.

TI focuses its TIRIS radio frequency identification technology on markets such as automotive security, highway toll collection, vehicle access, public transportation management, and waste management. TIRIS systems have been most visible on automatic fee collection systems on toll roads, with large test installations up and running in California. Recently, TI's anti-theft "vehicle immobilizing systems" have been installed in many Ford and Mitsubishi models. These systems utilize small RFID transponders molded into the head of ignition keys that communicate with the RF reader in the car's steering column.

In the transition following the merger, Savi will become part of TI's Systems Group -- a separate TI division that is not involved with TIRIS applications, but which concentrates on US government defense business. This division had

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recently teamed up with Savi on government programs related to the "DOD's Total Asset Visibility (TAV) logistics management initiative." TI has been exploring ways to move defense technology and applications into commercial markets and views Savi's capabilities as complementing that effort.

The terms of the TI/Savi agreement were not disclosed. Savi will continue to operate as a separate unit at its present Mountain View location under the direction of its current management.

A potpourri of....

....notable corporate events occurred this past month:

- The deeper the auditors probe, the more troubling the news coming from <u>Norand</u>. In September, the portable computer systems company in Cedar Rapids reported that it had taken an $8.2 million charge against earnings as a result of "sales reversals, bad debts and inventory write-offs attributed to irregularities" in its Italian subsidiary (*SCAN* Oct 95). The stockholders reacted by dropping the price of the company's shares by fifty percent in one day, to $17.

   In November, Norand issued a cautionary announcement that it planned to restate its financial results for both 1994 and 1995 fiscal years (ended August 31). The company also postponed its December shareholders' meeting because of delays in completing its investigation into the Italian unit's losses. On this disclosure, the stock fell again, this time to $13.

   On December 15, the bad news continued, when Norand announced that it expects to report a loss of at least $4.2 million ($.55/share) for the first quarter of this fiscal year (ended November 30). This additional loss was attributed to new problems uncovered by auditors at the company's Italian subsidiary. The already weakened stock held fast at about $13. However, there is still no indication that all of the Italian problems have been totally uncovered.

- <u>Telxon</u> plans to raise between $75 million and $86 million through the sale of convertible subordinated notes in a private placement to "institutional investors and non-US investors." These special securities bear interest at 5.75% and are convertible to common stock $27.50/share. The convertible notes will not be registered with the SEC or available to the public.

   The private placement of notes will provide the necessary resources to fund the company's aggressive growth plan. It was recently rumored that Telxon was positioning itself to raise more capital by spinning off one or more of its subsidiaries -- such as Aeronet, the fast-growing division devoted to selling RF retail systems -- but this new financing move will presumably obviate the need to divest itself of any operating units.

   > [Telxon is enjoying a successful fiscal year. Six months sales (9/30/95) were $210 million (up 17%) and earnings were $.31/share (up 72%).]

- Continuing its acquisitive ways, <u>Peak</u> <u>Technologies</u> purchased <u>Mandata</u> <u>A/S</u> (Oslo, Norway) on October 25, further enhancing Peak's sales coverage of the European ADC market. By our informal count, the purchase of Mandata is Peak's sixteenth corporate acquisition since its founding in 1988 -- its third in Europe.

  Peak's first move into Europe was just one year ago when it bought Endata, a leading UK reseller (*SCAN* Nov 94). Two months ago, Peak expanded its presence in the European market when it acquired Numeric Arts, another UK systems integrator (*SCAN* Oct 95). Mandata -- Peak's first move into Europe's mainland -- represents leading ADC vendors (including Symbol Technologies and Zebra) in the Scandinavian market. Peak is the world's leading reseller for both Symbol and Zebra.

  > [Peak posted record nine months sales ($105 million) and earnings ($4.9 million or $.66/share) suggesting they must be doing something right.]

- <u>Printronix</u> (Irvine, CA) and <u>Datamax</u> (Orlando, FL) announced a strategic alliance to develop, manufacture and sell direct thermal/thermal transfer printers into the rapidly expanding worldwide market for on-demand bar code label printing. Datamax will combine its capabilities as a leading designer and manufacturer of thermal printers for the bar code market with Printronix's application expertise and worldwide distribution channel.

  Datamax, with $70 million in annual sales, has shipped over 170,000 thermal printers for bar code applications in a wide range of industries. Printronix, with revenues of $150 million, has shipped more than 400,000 matrix, laser and thermal printers for a variety of commercial and industrial applications.

- <u>Zebra</u> announced a two-for-one stock split, payable December 28, 1995 to stockholders of record as of December 15. With its shares trading at close to their all time high, Zebra's CFO Randy Whitchurch stated: "A 100 share lot of Zebra stock costs over $6,500. This makes ownership of Zebra an expensive proposition for the small investor. We are interested in developing a larger retail ownership base."

<u>Picking up where</u>....

....we left off last month, the new products introduced at <u>SCAN-TECH</u> <u>95</u> in Chicago (Oct 23-26) were a mixed bag.

The special <u>New</u> <u>Products</u> <u>Showcase</u> area, which was set aside to feature only items that were launched at this show, was a disappointment. The showcase included twenty-four countertop exhibits of hardware, software and supplies -- but many items turned out to be merely upgrades of existing products.

A panel of judges was enlisted to evaluate the entries. They selected the following winners, based on innovation, significant benefit to end users, ease of implementation, and cost:

- <u>Auto</u> <u>Image</u> <u>ID</u> (Mt Laurel, NJ) took first prize with its ID3100 Two

Dimensional Scanners. According to the company, a standard CCD video camera module captures the bar code or matrix code image for decoding by the Auto Image ID Processor. President Jim Hahn stated: "Typical vision systems require expensive arrays of high-powered micro-processors to support fast, reliable scanning. The ID3100 uses a unique combination of dedicated hardware and software that eliminates the need for using high-powered multi-processor arrays, making it the performance-price leader."

Hahn told *SCAN* that the ID3100 will be priced at $5,000. "Our unit will be capable of reading 2-D codes at production-line speeds of up to 500 feet per minute," he said, "comparable to scanners selling at many times that price."

- <u>DataSouth</u> <u>Computers</u> (Charlotte, NC) demonstrated a direct thermal portable printer that took second place. This small (two pound), versatile unit will also handle linerless labels.

- <u>Worthington</u> <u>Data</u> <u>Solutions</u> (Santa Cruz, CA) introduced an inexpensive RF terminal that was awarded third prize. The unit operates in the narrow 915 Mhz frequency band with sixteen user-selectable frequencies. Up to 32 terminals can operate from a single base station. The base station costs $740; RF terminals are $1,095 each (exclusive of scanners).

Comment

We suggest that the SCAN-TECH management should make a stronger effort to monitor the New Product Showcase at future exhibitions. There were three basic problems:

1. The majority of the products were neither new or innovative. A new model of an old printer with added features, or the next version of a software package, should not qualify.

2. A greater effort is required to "sell" the New Product Showcase concept and convince other vendors to include their new introductions. Many of the new products which were displayed on the exhibit floor were superior to those in the "Showcase" this year (see below).

3. The Showcase area should be administered more carefully. Display signs contained errors; new product exhibitors listed on the program were not present; late-entry products were displayed, but never included in the directory.

We were more impressed....

....with some of the innovations that were <u>not</u> presented in the New Products Showcase at SCAN-TECH 95 than with those items that <u>were</u> displayed.

We found the following sampling of particular interest:

- Printers continue to come down in price, while offering new features and improved performance. <u>TEC</u> <u>America</u> demonstrated a four-color Process Thermal Printer for on-demand, short-run, color labels (for products,

cartons and garment tags). The TEC Model CB416 employs four printheads, each mounted with a color ribbon (cyan, yellow, magenta and black) to produce up to 260,000 process colors in a single pass. At 305 DPI, the unit runs four-inch wide labels at six inches per second.

- A completely different approach to printing multi-color, bar-coded labels was introduced by Standard Register (Dayton,OH) with its patented Thermacolor heat-activated system. The Thermacolor labels are "preprinted" in block areas with heat-sensitive inks which are "invisible" until activated by any standard thermal printer.

  The label can hold up to six colors from a palette of ten, with no color ribbons required. According to the manufacturer: "Thermacolor is cost effective for large users or large quantity shippers that have approximately 50,000 or more packages per month being shipped." Standard Register maintains that its system allows color label inventories to be kept to a minimum; the labels can be printed in short runs and formats as needed from a single label stock, with the colors activated on demand.

- Intermec introduced a new family of direct thermal and thermal transfer 400 dots per inch printers in 2.5-inch and 4.4-inch print widths. These printers combine high registration capability with the 400 DPI high resolution to produce quality small labels for special market applications: e.g., electronics and telecommunications manufacturing; health care; pharmaceutical; and retail.

  According to Sprague Ackley, Intermec Principal Engineer: "For the first time ever, bar code printer users will have the ability to print very high quality and density [2.5 mils 'X' dimension] linear and two-dimensional bar code symbols, while at the same time printing extremely small fonts, smooth graphics and gray scale photographs on the same label or tag."

  [We questioned Zebra President Jeff Clements about Intermec's significant quality breakthrough. "The improved resolution and registration of the Intermec unit are attractive," he replied, "but there is no current demand and no need to jump ahead of the market. Zebra will duplicate this capability if and when we have to."]

- PSC announced its newest miniature bar code reading engine, the DI-1000, measuring 0.76" x 1.55" x 1.00" (1.2 cubic inches) -- about the size of a match box. This new model offers performance similar to PSC's existing 5303 scan engine (3.5 cubic inches) and can read at distances in excess of 30 inches. According to the company: "The DI-1000 achieves exceptional durability and reliability through the use of resonant flexure elements which eliminate the need for a conventional motor and advanced MID (Molded Interconnect Device) and MCM (Multi-Chip Module) technology."

  The PSC engine is aimed at the OEM market, as an integral component of portable data collection devices, hand-held portable computers and other products which require bar code data capture. PSC reported that it has booked orders for "thousands of units" from a number of customers.

- Datamax introduced the DMX 2D100, the industry's first apparatus for analyzing and grading the PDF417 two-dimensional symbology. The hand-held "point and shoot" unit analyzes PDF417 data and error correction formats

to ensure readability. The analyzer downloads data to a PC, which provides graphical feedback to the user by mapping the symbol and by color coding the scannable areas highlighting any bad areas which contain erasure or substitution errors.

- TEC America demonstrated its MR-200/210 two-dimensional area CCD readers, which are designed specifically to decode the Data Matrix symbology. According to TEC, these units are the first one-piece, area CCD readers with an integrated decoding capability for reading Data Matrix. This area CCD has 440K pixels that can view the entire code with a single touch and is capable of reading Data Matrix from any angle of rotation. The small, lightweight, hand-held units have a maximum reading area of 26 mm square (104 x 104 Data Matrix cells) and will decode a 250-character cell in 0.8 seconds.

We were reminded....

....at SCAN-TECH 95 (Oct 23-26) of the famous scene in the 1967 film, *The Graduate,* when a friend of the family leaned over and whispered to Benjamin (Dustin Hoffman's character), "Plastics." This hushed confidence was supposed to be the magic word for the future. At Chicago's McCormick Place, the two words that were creating the current ADC magic were "Wireless" and "Transportation."

And they are intertwined. Wireless is driving the ADC business more than any other current technology; transportation is the application that has blossomed because of the major advances in RF for local-area (LAN) and wide-area (WAN) wireless network capabilities.

There is obviously a great deal of solid business currently available that neither involves RF nor is only dedicated to moving packages from one location to another. It just seemed to us that wireless (in retail, manufacturing, warehousing, health care and distribution) and transportation dominated all of the large contracts and joint ventures announced just before or during the Chicago show. For example:

- Siemens appointed LXE as its RF vendor for conventional and automated logistics and warehouse management systems. LXE is providing the wireless RF backbone for Siemens' recently announced SICALIS application software.

- Symbol Technologies teamed up with Ericsson to provide the "first wide area wireless bar code solution that works nationwide -- in metropolitan areas from coast to coast."

- LXE shipped more than two hundred 2.4 GHz RF terminals to ANC, one of the top five express package delivery services in England. The major contract called for LXE to install units at 70 ANC sites.

- Telxon was selected to be the 2.4 GHz wireless, spread spectrum supplier to Ford Motor worldwide. Ford will be using this wireless technology for a variety of applications, including quality-based solutions, material handling and inventory control. (A few months ago, Telxon also was awarded a major contract by Kroger -- the largest US supermarket chain --

to supply wireless data communication systems for Kroger stores, distribution centers and manufacturing plants.)

- Telxon's <u>Itronix</u> subsidiary is supplying mobile, wide-area wireless systems to <u>GTE Telephone</u> and <u>Sears Repair Services</u>.

- <u>Symbol Technologies</u> was awarded the largest contract in the company's history by <u>American Freightways</u>. (Although no figures were announced by the two companies, *SCAN* has learned that this award is valued at $26.5 million.) The sale includes two major components: 4,000 of Symbol's PPT 4600 pen-based terminals (each of which integrate a laser scan engine, a 486 DOS computer and a PCMCIA card-based local or wide area network radio); and 3,000 in-truck computer systems.

  The American Freightways contract comes on the heels of two other major transportation awards given to Symbol: from <u>UPS</u> -- for miniature ring scanners, for hands-free parcel sorting; and from <u>Roadway Package System</u> -- to implement RPS's Multicode System to scan Codes 128 and PDF417.

This list was just from the current crop of deals that surfaced in October. Every major trucking company and parcel-delivery operation (certainly including the largest of them all, the US Postal Service, and the postal services of many other countries) is exploring or implementing automation. By all indications, hundreds of millions of dollars in transportation contracts are yet to come. The total potential for all wireless applications runs into the billions.

Although no one can be certain....

....exactly where the <u>two-dimensional symbology</u> market is headed, or how quickly it will develop, few ADC companies want to be left behind.

On October 24, at SCAN-TECH 95, <u>PSC</u> and <u>Telxon</u> announced a strategic alliance whereby PSC has purchased a minority investment in <u>Metanetics</u>, a wholly-owned Telxon subsidiary. As part of the deal, PSC has obtained rights to manufacture and sell Metanetics' 2-D bar code reader and decode products. (Although terms were not announced, *SCAN* has learned that PSC's stake is 10% of Metanetics.)

Metanetics (Fort Myers, FL) was founded in 1992 by Ynjiun Wang, previously one of the inventors of PDF417 while he worked at Symbol Technologies. Wang left Symbol to start his own company that would develop additional opportunities in 2-D symbologies. When Metanetics needed financial support to finance its product development, it was bought by Telxon early in 1994.

Last October, at SCAN-TECH 94, Metanetics introduced a new 2-D symbology called SuperCode, a "stacked" bar code similar in its basic concept to PDF417. According to Wang: "SuperCode is backwardly compatible with existing printer and scanner technologies....Most end users will be able to upgrade their operations from 1-D bar coding systems to 2-D systems by simply upgrading their software."

Telxon also announced at SCAN-TECH the appointment of <u>Impact Technologies & Systems</u> (W. Palm Beach, FL) to market Metanetics products. Impact will be

seeking global trading partners, including high-volume, end-user organizations and distribution channels.

Impact was founded in 1994 by President John Doherty, VP Marketing Jim Bagley and VP Sales Tom Schaefer -- all of whom had worked for Symbol Technologies at one time (Bagley was also with Norand). The company was to be "solely focused on the sales and market development of two-dimensional symbology systems" (*SCAN* Jun 95).

At SCAN-TECH 95, Impact had its own booth showcasing only Metanetics products, including a new digital image scan engine -- suitable for integration into terminal products -- to read 2-D symbologies. Bagley also demonstrated the new hand-held Metanetics reader based on CCD-array technology. "The rocket science is in the handle," Bagley explained, "which has a very small decode mechanism." (Surprisingly, SuperCode was not available for scanning at the Impact demonstration; Bagley said the company will be featuring that symbology in their ongoing marketing program.)

In an interview with *SCAN* on October 25, Telxon's President William Murphy clarified his company's interest in 2-D symbologies. "Scanning is peripheral to our basic business," he explained. "We are ready to sell more of Metanetics to other partners. We are not married to any one symbology, but we will be pushing SuperCode because we think it is the best available. We will be ready to read all symbologies and expect our scanners to autodiscriminate. We want to see all 2-D technology placed in the public domain -- including Metanetics' SuperCode."

Metanetics' Wang told *SCAN* that he visualizes the sale of portions of his company to create a "consortium of interested manufacturers, distributors and people" who have additional technology to contribute. "Our plans for future products," he added, "include fixed-mounted presentation readers and a line of accessories and software for encoding and printing all major 2-D symbols."

Another company intent on keeping up with 2-D developments is Welch Allyn, which announced the Series 4400, its newest version of a 2-D image reader. Last year, W-A introduced its Model 3400 linear CCD reader, which reads PDF417 by swiping the symbol. The Model 4400 will be a full CCD-array imager which will autodiscriminate all of the major symbologies -- including the "AZTEC" code, a new matrix symbology developed by W-A. (A company spokesman told *SCAN* that the AZTEC code was intended for experimental purposes and may never be released for general use.) The new W-A imagers will be in field test during the first quarter of 1996, with full production slated for late that year.

As we start down....

....the back slope of this final decade of the second millennium, we want to extend to all of our friends, associates and subscribers our best wishes for a happy, healthy and prosperous new year.

We are looking forward to continuing to share with you the exciting news of the vital and growing ADC industry.

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