Manufacturing and Technology Principles

Carl W. Brannon, CFC, CFSP – Vice President, Essociates Group, Inc.

The best analyzed forms and the best designed forms, whether paper for electronic, are useless unless they can be manufactured correctly (paper) or deployed effectively (electronic). Behind the detailed specifications are a series of principles (mostly just good logical sense) that serve as the guiding context for action.

Forms Manufacturing

Production of a physical medium reflecting the analysis and design of the paper form should use the most appropriate materials and techniques available and be executed in the most economical way possible. After all, the "container" (the blank form) is not an end unto itself; rather, it is a tool, a means to an end: that is, the gathering, recording and transmission of information.

- **Products**

  Selection of a forms product for each form should meet this test: does it serve the purpose of the form in the best way possible? Inappropriate product selection can confuse the users and severely lessen the effectiveness of the form's processes. Example: a wired tag is not as appropriate a mailing device as a window envelope.

- **Materials**

  Similarly, the decision regarding materials can be critical. Consideration should be given to the location and conditions surrounding typical use of the form. Where will the form be used – in an office or outside in a snow storm? What writing device will be used? What transmission method will be employed? How with the form be handled and filed by the ultimate recipient(s)? What is the expected life cycle of the form? All these (and other) factors will help to determine the appropriate materials to be used.

- **Methods**

  Individual manufacturing facilities may employ their own customized methods, procedures and event sequences for forms production, but, in the end, the resulting product will likely meet long-standing industry standards.

  - Pre-press refers to all the activities necessary to prepare for the production of paper and ink forms. These activities include creating a negative from the artwork, stripping that negative, transferring the image from the negative to a plate, loading the plate on the press; setting the numbering head(s), positioning perforation wheels, drill bits, bar coding and/or MICR numbering devices; setting up multiple paper and carbon webs; and any other activities that are pertinent to the finished product.

  - Press operations include (among other activities) printing the image onto the medium, controlling press speed, inking levels, rewinding or folding printed sets at the end of the press, managing consecutive numbering (red or MICR) - especially if "no missing numbers" has been specified, assuring that alignment between parts is maintained, and adhering to run length standards (plus or minus 10% of order quantity).

  - A number of off-line operations, in what is called the bindery, may be completed after the print run comes off the press. These typically include such things as drilling, binding, gluing into books or pads, and trimming.

  - MICR numbering, kitting with other forms, adding blown-on labels, packaging, labeling, shipping, updating inventory records, invoicing and other such actions are considered post-processing activities.

Electronic Technologies

Production for electronic forms differs in many ways from the paper world. For example, electronic forms may remain electronic during their entire life cycle and never be reduced to paper. Many devices and techniques are available when there is a need to create a paper copy of the form.

- **Digital Demand Imaging**

  Print-on-demand simply means that an electronic form may be transferred to paper when the need arises. From another perspective, the "printing" of a paper form may be accomplished through the use of equipment using digital demand imaging in place of a traditional printing press.

- **Recogintion Systems**

  Recognition systems are handy devices that support either the machine reading of data from a completed form or the automatic pre-filling of data onto a form.

- Magnetic Ink Character Recognition (MICR) is most easily recognized when used in banking transactions. The E-13 B font contains only numeric (0-9) and special characters to designate a "transit number field," "amount field," "on-us field," and "auxiliary on-us field." MICR inks (usually black, but also available in green, brown and red) contain iron oxide pigments which can be magnetized after printing. These magnetized characters are read by electronic recognition equipment.

- Optical Character Recognition (OCR) is a system whereby characters written onto a form are read by machines. Special non-reflective "read" inks and reflective "drop out" or "non-read" inks, along with special OCR papers which improve contrast and enhance image clarity, enable the OCR scanning equipment to differentiate data characters from form structure.

- Optical Mark Recognition (OMR) systems employ scanners that read marks located in very specific positions (OMR response grids) on the form. These positions are controlled by "form ID marks" and "timing marks" printed on each page. OMR forms, often referred to as bubble forms, are filled in (marked) manually by the user.

- Bar Codes are available in many formats, but all use a reader to interpret symbol, not usually readable by the human eye. Bar codes may be two dimensional, with relatively simple content, or three dimensional, where content is comparatively complex. Uses vary widely from Universal Product Codes (UPC) used in grocery stores to the Face Identification Marks (FIM) used by the U.S. Postal Service.

- Optical Character Recognition (OCR) readers recognize human readable characters as opposed to marks and bar codes. Several OCR fonts are currently in use.

- **Post Processing**

  Post-processing includes activities such as printing of paper copies for signatures, emailing of data captured by the electronic form, filing and faxing operations, and interfaces to databases and other systems.

- **Data Merge Printing**

  Data merge printing is a method of joining data captured by a form with data contained in another medium, such as a database, to produce a combined document.

Systems Architecture

One of the major advantages of electronic forms is their role as one component of an automated system made up of various functions and equipment types. These inherent connections, the system architecture, support complex workflows.

- **Hardware**

  The most physical of the four components of any architecture is the hardware it uses.

  - A host is any computer on a network that is a repository for services available to other computers on the network.

  - A server is a computer running a program that supports processing actions by individually connected PCs.

  - A client is a software program that is used to contact and obtain data from a Server software program or another computer, often across a great distance. Each Client program is designed to work with one or more specific kinds of Server programs and each Server requires a specific kind of Client.

  - A printer is a device connected to an individual PC or to a network that transforms screen images to paper-based images.

  - Peripherals are associated devices, such as terminals and routers, that are connected and configured to serve specific purposes.

- **Operating System**

  The operating system is the basic organizing technical foundation for running any computer. It contains the code needed to cause actions to happen, connections to be made, resources to be accessed and retained and the results to be displayed for the human operator.

- **Networks**

  Networks are structured groups of computer hardware components that support the communication and sharing of data and equipment among multiple computer users. The connections among the components may be hard-wired or virtual.

- **Communication Systems**

  Communication systems employ specific protocols to facilitate the connections among computers and their users. Email is one of the most obvious examples.

- **Application Software**

  The use of various application software products provide complementary support for an organization's forms, whether in paper or electronic format. Selection criteria for these products must focus upon need, applicability to the specific situation, and compatibility with the overall system architecture.

  o Records retention requirements may call for keeping the original transaction document (form), or a copy of it, for some specified period of time. In lieu of retaining the space-consuming paper forms, an imaging system is often employed, through which a photographic copy is retained either digitally or on film.

  o Forms composition, whether in paper or electronic format, is facilitated through the use of software products specifically intended for that purpose. Such products may provide the tools necessary for managing exact spacing, insertion of text and graphics, field mapping, and the ultimate interface with users, printers, servers and other application software, such as databases.

  o Forms automation software may be as narrow in its function as simply supplying a catalog or portal through which users may obtain the forms they need. Or, it may be much broader in scope, including form specifications, a request channel for new or revised forms, catalogs, form-group data, forms kits, inventory control, deployment schemes, costs, development of metrics regarding form users and usage patterns, and various additional reporting functions.

  o Communication of information is an integral function of electronic forms. Managing the various methodologies used to transmit that data to the appropriate recipients is accomplished through messaging technology.

    · Vendor Independent Messaging (VIM) provides a generic path, not associated with any specific software product or technology, for moving data from sender to receiver.

    · When it is appropriate to transmit information collected on forms to various recipients or associated business applications for further processing, the needed methodologies and mechanics are established and implemented through messaging application programming.

    · When completed electronic forms are to be converted to email or in some other way made available to other systems for further processing, software is needed to manage those processes. That software is referred to as a message handling system.

  o A database is a repository where the data collected by business forms is recorded, organized and manipulated into useful information. Databases may also serve as the source of known, previously collected data that can be added automatically to a form to help complete a transaction. Whether formatted as stand-alone tables or more complex relational interpretations, databases serve to provide usable meaning to otherwise disparate data elements.

    · Open Database Connectivity (ODBC) is a standard method for third-party programs to access common databases.

    · Structured Query Language (SQL) provides a standardized method for extracting and reporting useable and meaningful information from a database.

  o Software that is shared by multiple members of a working unit is called groupware. It supports online collaboration for teams, projects & communities.

  o Workflow is 1) a sequence of processes (automated or manual) which are subject to specified business rules; and 2) the analysis and optimization of business processes. Completing a form is usually only the beginning of a longer process with varying steps that justify the collection of data and supply the results to one or more systems that are

then able to make use of the information. Studying existing workflows often expose hidden opportunities for improvement by merging, eliminating, or reassigning process steps. By using such studies, processes are often speeded up, strengthened and their costs reduced.

o A natural extension of the capabilities of electronic forms is their use as the facilitators of <u>electronic commerce</u> – buying and selling goods and services electronically – usually through the Internet. Special care must be applied to the analysis and design phases when developing forms that are to be used in electronic commerce to assure that all necessary and required functions are adequately served. Security, mathematical calculations, electronic signatures, database interfaces, and encryption may be individually or severally appropriate.

o <u>Security</u> (prevention of data tampering by a third party) and <u>encryption</u> (encoding the data to require the appropriate key for access) are safeguards that are usually required for electronic commerce and may be needed in other environments. Various techniques, some hardware-based and some software-based, are available to support these challenges.

o Depending upon implementation parameters, the form may need to be deployed in more than one format (as <u>multimedia</u>) – that is, as a paper form and as an electronic form– to facilitate its use in disparate situations and environments.

o <u>Document management systems</u> are used to organize and track form deployment, availability, usage, revision, version control and system interface points.

Standards:
- Forms design standards are formalized models dictating acceptable use and placement of form design elements.

- Manufacturing standards help clarify the technical and physical requirements for manufacturing forms.

- Electronic form standards identify platforms, software products, system interfaces and output methods.

Note: This information may be useful to a forms professional preparing for the <u>Certified Form Systems Professional</u> examination offered by Business Forms Management Association. http://www.bfma.org/certification/CFSP.html