

# Mobile Computing – ADC – ERP

## What they mean and how they work together

**Mobile Computing** in its most general sense refers to the use of any computer that is not hard-wired to the central or host system with which it needs to interact. The required interaction occurs through a wireless, real-time connection, a batch synchronization procedure, or a combination of wireless and batch.

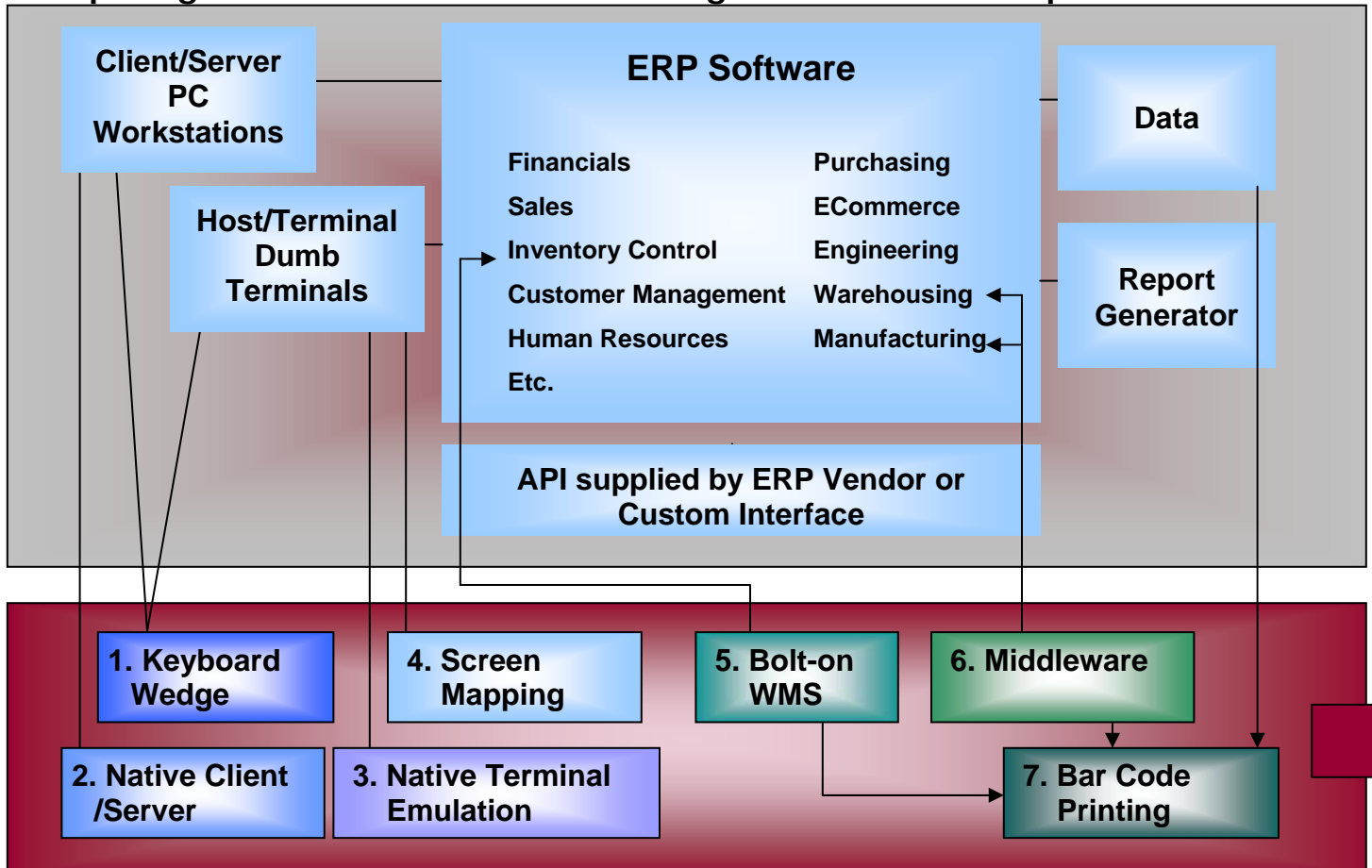
**ADC, the acronym for Automatic Data Collection**, refers to data entry methods and technologies that do not use a standard desktop keyboard. The most widely known ADC technology is bar coding. RFID is an emerging ADC that uses electronic labels or tags to broadcast data about the items to which they are affixed. RFID readers detect the signal and relay the data to the ERP software. Readers may also write updates to tags. ADC can be implemented with older, legacy systems as well as ERP systems. ADC and Mobile Computing commonly overlap in the world of manufacturing, distribution and service enterprises.

**ERP (Enterprise Resource Planning) Systems** are modern software applications that integrate the diverse functions necessary to operate the enterprise.

### Mobile Computing and ADC Components

- Mobile computers that may incorporate bar code scanning. Typical models are:
  - Handhelds (also known as PDAs (Personal Digital Assistants))
  - Full-screen mobile PCs
  - Vehicle-mounted devices
  - "Wearable" devices
- Dedicated, rugged stationary devices for use where full workstation PCs are not appropriate.
- Bar Code Scanning
- Bar Code printing
- RFID Reading
- RFID tag and label generation
- Wireless RF Networks (Described in separate document)
- Middleware
- Screen Mapping

The following diagram illustrates various methods for integrating Mobile Computing and ADC with a manufacturing/distribution enterprise.



1. **Keyboard Wedge.** This is the simplest, least expensive and least flexible method of bar code scanning. The wedge resides between the keyboard and the CPU/terminal. It decodes the bar code and sends the data to the cursor position on the current screen. Scanned and keyed data can be entered simultaneously. The wedge's limitation is that it requires a logged-on workstation running a standard ERP screen.

**Physical Connectivity**

**Wired:** A Y-cable interfaces the wedge between the keyboard and the PC or dumb terminal.

**Wireless RF:** RF wedges allow wireless scanning to the current screen approximately 50 feet from the CPU

**Batch:** A wedge interface is sometimes used to transmit data collected and stored in a portable batch device to a mainframe system via a dumb terminal screen.

2. **Native Client/Server.** Some ERP vendors offer mobility within their client/server software products. This trend is likely to accelerate with the emergence of both standardized wireless protocols and mobile devices running standard operating systems like Windows and Windows CE.. Each device is simply another network node. A system seat or log-on license is required for each device. No Middleware (as defined herein) is required.

**Physical Connectivity**

**Wired:** Rugged, small footprint dedicated data collection devices would replace client PCs on the existing network.

**Wireless RF:** Access Point radios connected to the existing network communicate with mobile (and stationary) devices similar to a cell phone network.

**Batch:** Portable batch devices can collect data where no wired or wireless service is available. They upload to the host ERP system, preferably via an API, in a separate process from the Native Client/Server Data Collection process.

3. **Native Terminal Emulation.** A host/terminal system can integrate dedicated, mobile data collection using the terminal emulation software available on most mobile devices. Depending on the screen design tools on the host system, creating screens for the devices can be a complex or simple chore. A system seat or log-on license is required for each device. No Middleware (as defined herein) is required.

**Physical Connectivity**

**Wired:** Rugged, small footprint dedicated data collection devices would replace terminals on the existing network.

**Wireless RF:** Access Point radios connected to the existing network communicate with mobile (and stationary) devices like a cell phone network.

**Batch:** Portable batch devices can collect data where no wired or wireless service is available. They upload to the host ERP system, preferably via an API, in a separate process from the Native Terminal Emulation Data Collection process.

4. **Screen Mapping** software programs reside on a mainframe host or a dedicated server. They select relevant fields from the terminal screens and reformat them for data collection devices. No Middleware (as defined herein) is required. Screen mapping is useful on a mainframe system where tools and/or resources are not available to employ terminal emulation. (See No. 3).

**Physical Connectivity:** A dedicated data collection network, separate from the host network, is required to link to the Screen Mapping program.

**Wired:** Rugged, small footprint dedicated data collection devices connect to the dedicated data collection network.

**Wireless RF:** Access Point radios connected to the dedicated network communicate with mobile (and stationary) devices like a cell phone network.

**Batch:** Portable batch devices can collect data where no wired or wireless service to the data collection network is available. They upload to the host ERP system, preferably via an API, in a separate process from the Screen Mapping system.

5. **Bolt-ons Systems.** ERP systems must address those business functions with the widest appeal. It is simply impossible for them to integrate all valuable functionality and technologies. "Bolt-on" is shorthand for software / hardware systems that add specialized functionality to ERP systems. There are many types of Bolt-on Systems. Typical of those that relate to manufacturing and logistics are Warehousing (WMS), Manufacturing Execution (MES), Manifest and EDI.

They are installed on a server and "bolt" to the ERP system as a replacement for one of the ERP modules. In the diagram, a bolt-on Warehouse Management System replaces the ERP's Warehousing module.

Bolt-ons typically integrate relevant ADC components.

6. **Middleware** is required where mobile data collection is not included with the ERP software. Middleware is third-party software that runs on a dedicated server or on the host server. It manages a data collection network that typically incorporates **wired, wireless and/or batch devices**. Middleware systems generally include:

- An application generator to program the data collection devices,
- A communications program to manage the data collection network traffic,
- A program to format and organize the data for validation by and transfer to the ERP system,
- A bar code printing utility.

Middleware typically mimics the transactions in the ERP system, but distills the ERP system's complex menus and screens into the essentials for specific tasks. Middleware can usually add limited functionality to the ERP system. Complex additional functionality requires a Bolt-on system.

**The Middleware System in the diagram extends the functionality of the ERP Warehousing and Manufacturing modules to a data collection network on the warehouse and shop floors.**

The most reliable and supportable way for middleware to "talk" to the ERP system is through an ERP system-certified API, which assures that data entered to the ERP database complies with the system's business logic. A certified API also insures that ERP upgrades and system modifications will be supported by the data collection system. The alternative method of middleware writing directly to the ERP database requires custom programming to incorporate the business logic and reprogramming to accommodate changes or version upgrades.

7. **Bar Code Printing.** Some ERP systems support the printing of bar coded data such as part numbers, PO numbers, etc. on system-generated documents. The printing of labels on a dedicated bar code printers is generally not supported by ERP systems, but can be accomplished with specialized software. **Middleware and Bolt-on Systems** generally contain bar code printing utilities.

**Physical Connectivity:** Bar code printers can be networked or driven by client PCs the same as document printers. They can also be connected to a wireless RF network.