Rugged Tablet Selection Criteria – Evaluating for Business Applications

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Executive Overview

The widespread use of tablets in the consumer market has created a demand for their use in business environments. Typically, IT departments have the responsibility for evaluating traditional computing devices as well as tablets that will be used for business purposes.
The evaluation criteria for tablet computers in the business environment are completely different from those for the desktop computer. Desktop computers are evaluated for processing power, memory, support, disk drive storage, and price. Tablet computers can be evaluated on these criteria but more importantly, need to be evaluated with respect to the user's environment.

Tablet computers are going to be carried most of the time. This makes weight and size important considerations. Ruggedness should be considered, as tablets are often carried and thus run the risk of being dropped. Tablet computers are not typically used on desktops but rather at remote locations. This makes it essential to test usability in the actual environment the tablet will be used in.

This document describes some of the criteria that should be considered when selecting a tablet computer. Remember, the tablet computer is supposed to make your employee more productive. If you do not discover a usability issue until a unit is deployed to the field, it may cost you in productivity. Do the legwork up front and test the device in your user environment before making a device decision.

Physical Specifications

Size

With tablet computers physical dimensions are in direct relationship to the size of the display. It is important to consider display size, as it can have a direct impact on the applications that are being used.

Weight

Rugged tablets are still portable devices. Depending on the application, the tablet will often be carried while it is being used.

Rugged tablet devices weigh between two and five pounds compared to consumer grade devices which typically weigh around 1.5 pounds. The extra weight on rugged tablets comes from the additional material required to “ruggedize” the unit. These materials include larger batteries, multiple batteries, etc. The addition of other options such as a bar code scanner or smart card reader also adds to the weight.

The weight posted on the data sheet is normally the weight of the base configuration. Check to see what the weight is when the tablet is configured with your required options.

Ruggedness

The required ruggedness of the device has everything to do with the end use of the tablet. Compare the following parameters to the environment in which you will be using the tablet computer.

Temperature

Operating Temperature

Users need to make sure that the device being considered will operate in any temperature that may be encountered by the device.

Storage Temperature

The temperature in which the tablet will be stored is essential in the selection of the device. For example, does it get put in the trunk of their car? What temperature does it get to in the trunk? How hot does it get in the summer and how cold in the winter? The answers to these questions will have a direct impact on the performance and selection of your rugged tablet.

Sealing

The IP rating is a common standard used by tablet computer manufacturers for describing the level of protection that a device has from the exposure to dust particles and water. The IP standard IEC 60529 was developed through the International Electrotechnical Commission (IEC). For tablet computers, a two digit IP rating is typically used. There are extensions to the original two digit standard that are used more for other electrical equipment.

A typical IP rating will be presented as follows:

Example - IP54 Where the 5 indicates the devices protection against solid objects and the 4 indicates the protection against liquid.

First Digit – Protection against solid objects

0	No special protection
1	Protection against solid objects over 50 mm
2	Protection against solid objects over 12.5 mm
3	Protection against solid objects over 2.5 mm
4	Protection against solid objects over 1 mm
5	Protection against harmful dust
6	Dust-tight

Second Digit – Protection against Liquids

0	No protection
1	Protection against vertically falling drops of water
2	Protection against direct sprays of water up to 15o from the vertical
3	Protection against direct sprays of water up to 60o from the vertical
4	Protection against water sprayed from all directions
5	Protection against jets of water from all directions
6	Protection against strong water jets from all directions
7	Protection against the effect of temporary immersion in water
8	Protection against the effects of continuous immersion in water

The tests for IP rating allow water to be present in the device as long as there are not any harmful effects.

Drop / Shock

Commercial drop specifications are sometimes difficult to quantify and compare. Vendors will make statements such as “multiple four-foot drops onto concrete.” This leads too many questions about how the test was conducted, such as: How many is considered multiple drops? Was the device dropped on all sides?

The most common standard used for testing the ability for a device to withstand shock is the U.S Military standard for shock MIL-STD-810G METHOD 516.6.[1]

Tablets that have been tested to this MIL Standard will continue to operate when the device is exposed to any shocks that it may encounter.

Battery

Batteries never have enough life and tend to go dead at the most inopportune times. It is important that you manage those expectations. A few questions that you should consider are:

1.	What is the expected life of the battery?
2.	Is the battery replaceable?
3.	Is the battery able to be hot swapped?
4.	How long will I be using the tablet without charging it?
5.	How long is the tablet user’s shift?
6.	Will I have spare tablets for users to utilize?
7.	What happens to the data / application when I replace the battery?
8.	Does the cradle have a slot to charge a spare battery?

Published battery life is OK for comparison purposes, but your actual battery life will be affected by many things including but not limited to:

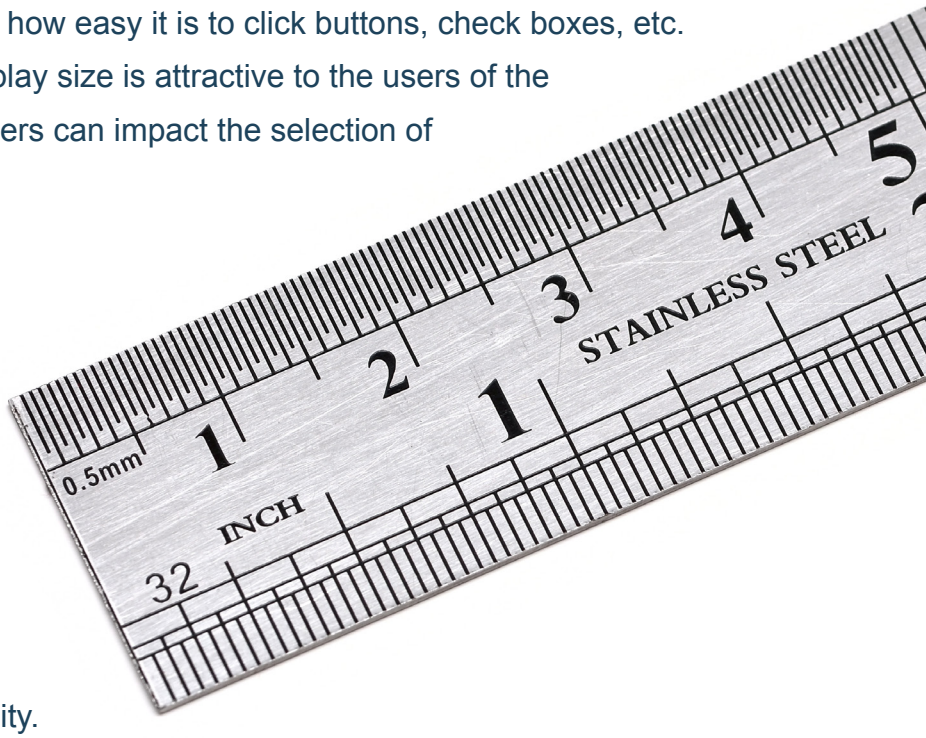
1.	The temperature that the device is used in.
2.	How frequently the wireless communication will be used.
3.	Whether the backlight is on and at what brightness.
4.	The frequency of use for the bar code scanner and other installed options.

Batteries have a finite life in which the capacity decreases over the life of the battery. Ideally you would get a shift of work out of a battery before it needs charging, but you should evaluate spare battery options when selecting a tablet device.

Screen / Display

Size

The display size is directly proportionate to the size of the tablet. Organizations should select a display size that enhances the applications as well the environment in which it will be used. Check the readability of the display, how easy it is to click buttons, check boxes, etc. Additionally, make sure that the display size is attractive to the users of the tablet. Different demographics of users can impact the selection of tablet screen size.



Remember to test the display in the environment in which it will be used. Testing the tablet will ensure that your display will have optimal performance in the field. This type of testing is critical in both outdoor and dark deployments, as the lighting can dramatically impact the display quality.

Digitizer (Touch Screen)

Resistive vs. Capacitive vs. Projective Capacitive

Resistive touch screens rely on pressure on the screen to change the resistance at a specific location. The pressure can come from almost any object and will operate with gloved hands.

Capacitive touch screens rely on the change of capacitance at a specific location when the screen is touched with the human finger. A capacitive touch system probably won't work with gloved hands or other objects. There are styli designed specifically for use with capacitive displays that will work as well.

Projective Capacitive works with a change in capacitance, but the actual touch screen can be covered with a protective layer to increase the life of the touch screen. Projective touch devices will work with a gloved hand.

Capacitive and Projective Capacitive touch screens are sensitive to moisture on the screen. Gorilla® Glass is a product made by Corning that helps to protect the display of many tablet computers. Learn more about Gorilla®Glass at *http://www.corninggorillaglass.com/*.[2]

Operating System

Tablets are available in different operating systems. The three most common are Microsoft Windows, Apple iOS and Android. Windows has a strong foothold in business platform and productivity. iOS is primarily a consumer market operating system but has some acceptance in the healthcare and retail industries. The Android operating system also has strong roots in the consumer market, but is beginning to gain business market share.

There is not a “best” operating system for tablet computers. Some of the considerations for selecting an operating system are:

1.	Are there corporate standards for an operating system?
2.	Does the application for which the tablet computers are being purchased support the operating system?
3.	Can I support the device with my existing network / mobile device management software?
4.	Can I secure the device to meet company and compliance security mandates?
5.	How many applications will I be running?

Processor and Memory

Most tablet applications are not processor or memory dependent. If you have an application with scientific or heavy graphic rendering processes, processor and memory are critical decision-making factors. When evaluating products, you will want to time a specific transaction or operation and compare the results.

Storage

Storage is either going to be hard disk drive or a solid state drive and is application specific. Right now, as a general rule of thumb, solid state drives cost more and are generally more rugged than hard disk drives. The deciding factor between the two types may be how much data you will need to store on the device before you connect and upload that data to your business system.

Camera

Tablet computer vendors offer cameras facing the front and/or the rear of the device. The importance of this option is application dependent. You may be deploying a maintenance application where the front camera can be used for video communication to a support desk. You may be a package delivery company that may want to use the rear camera for taking a picture of a package for damage reporting.

Users need to test the camera location with the application to make sure that the camera location meets the business need.

Input Options

There are many integrated input options available for rugged tablet computers. Some common options include:

- One-dimensional barcode reader
- Two-dimensional barcode reader
- High frequency (HF) RFID reader
- Ultra high frequency (UHF) RFID reader
- Smart card reader

These options are specific to the use of the rugged tablet and will be dependent on the requirement of the application. Make sure to test the automatic identification input with the intended application. For example, if there is barcode scanning and manual entry, is it easy to switch between scanning and typing on the virtual keyboard? The same question would apply to RFID readers.

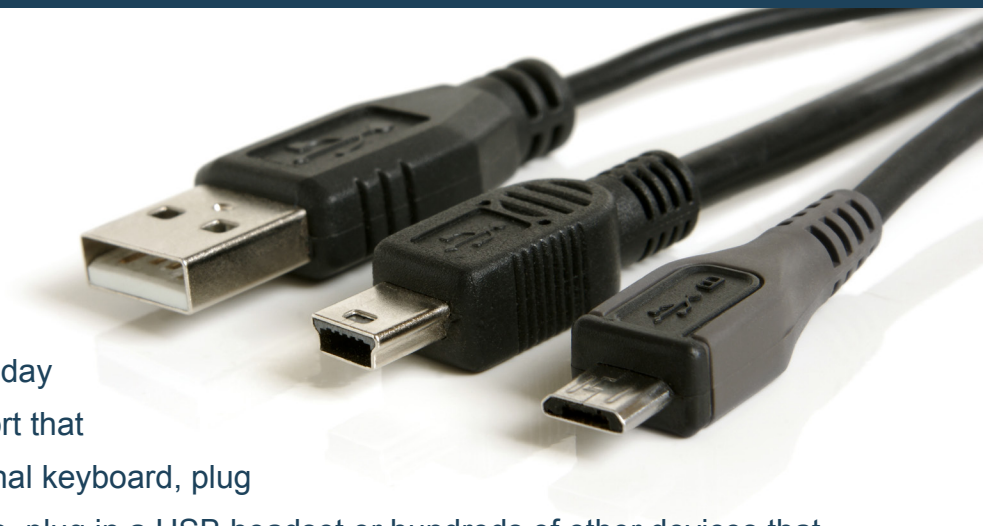
Network Connectivity

All devices need connectivity to the business system at some point. Typically the network connectivity requirements are dependent upon where the tablet will be used.

When the device is going to be used inside the four walls of your facility, more than likely an 802.11a/b/g/n Wireless network adapter will work for you.

If you are going to use the tablet in the field, outdoors or in your vehicle, you will need a wide area network card. You will need to know two important factors about the wide area, including which carriers are supported and on which networks. Of course you will want to confirm that the carrier that you choose has coverage at all of the locations where you will be using it.

Other Options



USB

USB or Universal Serial Bus is one of the most common interfaces in use today on computers. This is the port that you would connect an external keyboard, plug a memory stick in for backup, plug in a USB headset or hundreds of other devices that have a USB interface. Most devices will have at least one of these. Look at how many are available on the device as compared to how many that you may actually need. Also look at where they are physically located to determine if they are going to be ergonomically acceptable for the device that you are plugging into it.

Bluetooth

Bluetooth is often mentioned with the 802.11 network because it is a wireless communication protocol. The Bluetooth interface is typically used to connect devices such as headset or other short range communication devices to the tablet computer. This interface can be used to communicate to printers, barcode scanners, mice and keyboards. There are many others that are not mentioned here.

Serial Ports

The serial port or RS232 port is a legacy interface. Some rugged tablet manufacturers have included this interface. It might be used to connect to a piece of equipment. For example if you are an EMS technician, you may have equipment in your ambulance that has a serial (RS232) interface that you need to connect to the tablet computer for collecting some vital data.

GPS

A Global Positioning System (GPS) gives you the ability to collect the location of the field worker without the user having to input any data. This option has great value in public safety for reporting the current location of an emergency responder. With an inspection application or any other application, you can confirm that the user was at the location that they claimed to be.

Charging / Docking Options

A charging station is a place to insert the tablet computer and charge the battery. An important consideration us whether it will also charge another (back-up) battery?

A cradle usually (but not always) has a connector to communicate to the tablet device from another computer. This may be via a USB connector or may be an Ethernet connector. This is where you usually dock the tablet when it is pulled out of the box for deploying the application that you are going to run on it.

Considerations, depending on the application needs, are whether you need cradles for charging batteries on the desk or in the vehicle.

In some environments you may be interested in a gang charger that keeps many batteries charged, allowing users to swap out batteries as needed.

Application Considerations

If you can evaluate the device before purchasing, make sure that you test the application in the environment that it is going to be used. If it is outside, test it outside. If it is in a cold environment, test it in a cold environment. Try using it with gloves on your hand just like a user would. If you test it at your desk, it is going to work most of the time. Find the environmental issues before the users do. Always remember when introducing new technology to users that it needs to be easier than the “old” or manual system. When it is easier than the old system, the technology is more quickly accepted.

Here are some questions to consider:

1.	What happens when there is no connectivity to host?
2.	Does the device switch to a batch mode?
3.	What happens when connectivity is re-established?
4.	What happens when the battery goes dead?
5.	Can I swap the battery and resume my task where I left off?

Security

The tablet computer enables field workers to automate many of the data recording tasks that once were left to pen and paper. What happens if the tablet is lost or stolen? Consider the data that may be stored on the device. This may be private company or customer data. Does it need to be encrypted? Does the tablet vendor or tablet operating system give you the ability to secure the tablet from unauthorized access?

On Consumer Grade Devices

Everyone loves the iPad® user experience, but consider the deployment of an application in a rugged environment.

1.	What happens when the battery goes dead? Can I replace it with a charged one?
2.	What if I drop the device? Will it survive a drop to concrete?
3.	Can I use the device if I have gloves on my hands?

If you are considering a consumer grade device, the most important thing to remember is that this is the interface to your business system. Is it going to be able to perform in the physical environment of your users?

About Lowry

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Reference

1. Department of Defense test method standard (MIL-STD-810G)
2. *http://www.corninggorillaglass.com/*

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