The Life Cycle of a Fire Alarm System

Good morning everyone. I have been told that I only have about ten minutes to discuss a topic which could take the entire day, so I want to get right into it, give you the reader’s digest version and leave enough time for questions at the end. I am also available afterwards if anyone would like to discuss this topic further.

So to start it off – I have three very simple questions that I would like to ask everyone here today to try and put this topic of “The Life Cycle of a Fire Alarm System” into some kind of perspective.

Question number 1: How many people here own a computer? (The fact is that most people own multiple computers)

Question number 2: How many people perform regular scans, install system updates, perform regular maintenance and ensure that there computer is stored in a fairly clean, dust and dirt free environment?

Question number 3 which is a multiple part question: How many people have owned their computers for more than: 5 years? 10 years? 15 years? 25 years?

That last question is the one that should be the one that everyone realizes is what puts things into perspective here as a fire alarm system is essentially a computer with multiple components that report to it and subsequent actions are taken depending on how this system is programmed. How about your car? How many people have owned their vehicle for more than 5, 10, 15 or 25 years and how did you maintain that car over its life span?
The life span of a computer or car for that matter is usually directly proportional to how well it is serviced or maintained. A fire alarm system requires at the very least the same attention, maintenance and care that most people give their computer at home. After all, a fire alarm system can save your life when it is taken care of and subsequently performs correctly in a fire condition.

So the answer to the million dollar question is that “typically” a Fire Alarm System’s Life Cycle is 15 to 25 years depending on how it is looked after. Some systems can last upward of 40 years or more but as systems become older the main thing that has to be considered is: “will they still operate as intended after that period of time or will they fail when needed the most?” Does anyone have a 40 year old home computer that is still operating properly?

If a Fire Alarm System or the devices attached to them are located in a dirty environment and not properly maintained then you are probably at the low end of the scale which can cost more in the long run than a system which is properly maintained and is likely to last a lot longer.

There are numerous other factors that also have to be considered which affect the life cycle of a fire alarm system and whether a system needs to be upgraded or replaced. System modifications due to code or occupancy changes of a building are likely to occur over the years as codes are upgraded and building usage or ownership changes and the existing system capacity may not be able to accommodate these modifications. Additional networked panels tied to the existing system may be a way to overcome this dilemma. The addition of sprinklers or other fire suppression systems to protect building assets, the new B44 Elevator Upgrade requirements, the addition of maglocks, door holders or visual signalling devices, integrated systems such as HVAC, smoke control or building systems are just a few of the things that affect the decision on whether to upgrade or replace a fire alarm system. Also the type, condition and quality of wiring can play a significant role in this decision as ground faults, open circuits, water leaks, and other damage to system wiring can sometimes be the main reason a system needs to be upgraded or replaced.
So as a fire alarm engineer and former Building Owner I have had to deal with these multiple questions over the last 30 years and believe me when I say that there is no straightforward answer to this question. Every situation is unique, every building and system is different and is driven by multiple factors such as building, system or code changes and the inherent costs associated with a fire alarm system. The biggest problem is that there is no return on investment when it comes to the monetary costs of fire alarm systems. The only return is the safety of building occupants when a system work as it is intended to and occupant’s safety evacuate a building in a fire condition.

Next to cost, age is probably the most significant factor as not only do systems or components start to fail more often as they get older but the maintenance and replacement parts become more costly and difficult to obtain once the system manufacturer no longer supports the installed products. As systems or components start to fail and cause false alarms the local fire departments start to charge a fee for every non-fire call that they have to respond to and will only tolerate this situation for a short time before the Owner receives and “Order to Comply” to fix or replace the failing system. So reliability now becomes a key factor deciding when a system has to be upgraded or replaced.

Smoke detectors are a fire alarm device that usually only last about 10 to 15 years because their sensitivity deteriorates over the years; especially if they are not properly cleaned and maintained. Dust, insects and humidity are common sources that cause these devices to initiate a nuisance alarm in a fire alarm system.

As indicated earlier, system wiring also can cause problems as it degrades over the years and may not meet today’s code requirements. So when replacing or upgrading a system wiring has to be looked at very closely as it can sometimes become the most costly part of the whole system replacement. The size and quage of wiring, how it has been installed and protected with armoured sheath, conduit and boxes, if it is exposed to water, leaks, moisture or weather are all factors affecting the life cycle of a fire alarm system.

That all being said cost is usually the key factor when considering what approach is to be taken when deciding whether an existing system can be reused or upgraded versus a total system replacement. However, sometimes trying to reuse existing components of a system
without warranties or manufacturers support can prove to be a much more costly endeavour versus installing a completely new system with full warranty. One never knows when a system or parts can fail especially after an extended period of time which can lead to replacement under an emergency condition which usually means substantially increased costs.

One more thing that has to be factored into any decision that is made is what current codes and the Authorities Having Jurisdiction will allow when deciding whether to upgrade or replace an existing fire alarm system. Codes and Authorities may allow what we refer to as a “device for device” replacement, which may allow a fire alarm control panel replacement, without going to the extent of replacing the entire system, but compatibility of the existing system components with the new control equipment must also be addressed. Typically old system devices are not ULC cross-listed with new systems and devices. Usually existing fire fighter handsets are not compatible with new voice communication systems and some older smoke detectors may not work with the new control equipment especially if another manufacturer is used when replacing system components. As such, the non-compatible equipment would also have to be replaced when the control equipment is replaced and the price increases.

It is always best to hire a knowledgeable, qualified consultant or contractor who is in the fire alarm business to do a complete evaluation of the condition of the existing system, make recommendations and give budget pricing for what is required to do an upgrade or replacement and to obtain multiple quotes for the work.

Typically, any time this type of work is performed a building and electrical permit is required which also requires engineering stamped design drawings from a professional engineer so always check with local authorities before doing any work on your existing systems. Usually the installing contractor offers an annual service contract once you update your existing system but you should have the initial inspection done about a month before the warranty period expires in case any problems are encountered that are can be covered under warranty.
Once you complete the installation of a new system or upgrade your existing one that is not the end of the process. It is actually the beginning, as the life cycle of a fire alarm system starts all over again.

So to summarize:

NEW SYSTEM / INSTALLATION (START LIFE)  ACCEPTANCE TESTING / SUBSTANTIAL COMPLETION  REGULAR INSPECTION TESTING & MAINTENANCE  SYSTEM SERVICING & UPGRADES / UPDATES  END OF LIFE CYCLE

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Questions?

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