**Software Requirements Speciﬁcation**

For the

**Fire and Inﬁltration Quashing System**

(FAIQ)

December 17, 2012

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Project 4

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CSCI4830 - Introduction to Software Engineering

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**Revision/Change Record**

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**Table 1**

**Table 2**

Prologue

This project, though well suited for this class, is exceedingly hypothetical. Threats must be simulated, as must be their interactions, as must be their eventual quashing (we hope.) Our professor’s monitor must simulate a two-terminal control panel. Ultimately, our professor must simulate using our system to quash a slew of, often concurrent, threats, which in themselves, may be concurrent with the professor’s quashing attempts.

Project 4 has taken the liberty of bringing to life, to paraphrase, “an automated system which monitors and controls.” We call it Smart Core ™. Doing so makes all of our work consistent, because we have chosen to take the purely hypothetical route suggested in the Project Description.

In our scenario, humans are marginalized, and Smart Core ™ automatically counters threats. Nonetheless, we shall construct an excellent interface for the user, and compile a user guide for a human user. Our system has a training system for users in the unlikely event that Smart Core ™ malfunctions. Or maybe Smart Core ™ does indeed fail, and you, professor, must save the building from multiple threats.

We may document calls that fit our design, but in reality are just empty calls, but called at the appropriate time. Similarly, we have found it too cumbersome to document our threat simulations subsystem and plan to omit it from our documents, though the code will be well documented.

1. **Introduction**

The Fire and Infiltration Quashing System brings with it a much more fruitful entry point into the realm of automation and thus it serves as a good source to explore artificial intelligence. We hope the dry past of AI, littered with dead-end feedback algorithms incapable of outsmarting a mouse, and dusty robots, limited to object avoidance and squirting peanut butter into plastic containers now ends.

We offer the Fire and Infiltration Quashing System as the first enterprise application of this astounding new technology.

* 1. Document Purpose

Specify the software requirements of the entire Fire and Infiltration Quashing System in a confidential manner to authorized personnel of the customer, namely, Acme Corporation, SLIC.

* 1. Software Scope

The Fire and Infiltration Quashing System shall receive information from relevant sensors and devices installed in the building. FAIQ shall determine the nature of threats, controlling relevant actuators for purposes of threat control and building evacuation. FAIQ shall facilitate communications with external emergency services.

* + 1. **Preserve Life**

The system shall control and contain multiple fire and security threats in a way to satisfy the penultimate goal of evacuating occupants to safety. The ultimate goal of the system is to summon emergency services to the scene in the shortest amount of time.

Smart Core ™ operates on the utilitarian principle of saving the most lives, even if it leaves some occupants in harm’s way. As a corollary to saving lives, Smart Core ™ shall minimize suffering by attempting euthanasia on victims in hopeless situations.

Such unlimited situations may include torture, teetering on the brink of death from smoke inhalation, or being over 40% on fire, with zero possibility of reversal.

* + 1. **Data Assurance**

Smart Core ™ possesses many secondary objectives. First is the erasure of all electronic information, starting with the most sensitive. Second, it shall destroy all proprietary circuit boards and laboratories. In the case of uncontrollable fire, known hard copies of sensitive data shall be incinerated. This purging shall continue, when possible, even after full evacuation and the existence of emergency personnel in the building.

* + 1. **Property Protection**

Additionally, Smart Core ™ shall strive to preserve property and assist emergency personnel in doing so. Smart Core ™ comes heavily armed with fire control algorithms as well as methods to blockade or isolate interlopers.

* + 1. **Counter-Strike Capacity**

As far as actual weaponry, excluding the classified euthanasia inducers, Smart Core ™ is only lightly armed. Though unable to match the power of most aircraft and military-grade electronic warfare, Smart Core ™ may easily dispatch even the most heavily armored unauthorized personnel from a distance of over three times the length of the structures longest diagonal.

FAIQ shall not attempt to determine the source or intent of any attack, though Smart Core ™ shall record astounding amounts of information in threat situations. FAIQ shall monitor and control the interior of the structure only.

* + 1. **Emergency Services**

Let us reiterate. The system’s main purpose is to summon emergency personnel to the scene. The Fire and Infiltration Quashing system contains an integrated, distributed, self-healing and highly redundant communication system with unlimited range, zero downtime and enough agile power to penetrate up to three levels of local, state or federal bureaucracy in order to deliver real-time emergency information with accurate predictions of likely scenarios and outcomes.

* 1. Definitions, Acronyms and Abbreviations
     1. **Definitions**

Main Structure Interior – every open-air and porous cubic centimeter of the Acme Building’s interior. Outside walls may be monitored to within a millimeter of the external surface, yet by definition, we exclude the exterior of the building.

Smart Core ™ – a supra-intelligent, pseudo-sentient amalgam of software, firmware, human nerve tissue (including human skin and such glands required for its survival) and hardware. An entity, if you will, engineered to act as the FAIQ kernel. As far as is known, Smart Core ™ has no awareness of itself, or of any human minds. This is one of the greatest assets attributed to Smart Core ™. Self-conscious hindrances such as an identity or, if you will permit it, an ego, do not exist.

Occupant – authorized personnel only, whether employee, consultant, guest or inspector. Smart Core ™ does not make this designation, yet it fully accepts the designation. If indeterminate, a person inside the building is considered an occupant.

Interloper or Interlocutor – unauthorized personnel that may be neutralized without discretion. Typically, part of a well-planned malicious incursion or infiltration. These agents may act alone, such as a suicide bomber, in the case of severe mental illness and/or psychological impairment.

State or State-Sponsored Attack – an incursion typified by a well-funded mechanized force representing a country or city-state. Usually composed of a high percentage of specialists in pyrotechnics and electronics. Electronic warfare units are usually present.

Control – The most pertinent function of the Fire and Security Quashing system. This involves rapid and optimal use of anti-fire and anti-incursion mechanisms in order to secure emergency services, which is the key to preserving what matters most – human life.

Uncontrollable – a fire which has zero statistical chance of being extinguished, even by the immediate deployment of the most effective fire-fighting force known.

Quashing – to make null or void i.e. ineffective against the taking of human life. With the secondary actions of crushing, quelling or utterly subduing to provide data assurance, property salvage, and if need be, the neutralization of those that would compromise Acme Corporation, SLIC, by use of force.

Overrun – an insurgency that has an irreversible advantageous position. Essentially, mate in N moves. If Evac is complete, this condition is sufficient to start the self-destruct sequence.

* + 1. **Acronyms**

FAIQ © – Fire And Infiltration Quashing System.

SLIC – Super Low Liability Company.

* + 1. **Abbreviations**

Evac – evacuation of occupants. This is the bulk emptying of the building of all occupants, and, ultimately implying that they go home. Though we have no purview beyond the interior of the building, other than to demand that remaining occupants stay well beyond the self-destruct zone, we recommend that occupants return to their homes or to emergency facilities for medical care, debriefing, etc.

* + 1. **Trademarks**

Smart Core ™. See above, in Definitions ([1.3.1](#_Definitions,_Acronyms_and)).

* + 1. **Special Copyrights, Patents and Protection**
       1. *Copyrights*

The name Fire and Infiltration Quashing System © is and always shall be the exclusive property of Project 4 Limited, as well as shall be the moniker FAIQ ©, as stated by US Copyright Law.

* + - 1. *Patents*

Project 4 Limited holds the following US patents in its own right: X916354EGHSGDFER and X9146578365RLMNZ.

FAIQ © has the following patent pending: A1HRGEGJIKI12377.

* + - 1. *NSA and US Army Propriety, Licensing and Penalties*

Smart Core ™ technology is protected by the National Security Administration and may be considered confidential property of The United States Army, exclusively licensed to its creator, namely Project 4 Limited. Any breach of confidentiality by any employee, consultant, board member or other compensated party shall constitute treason of the highest order that will result in death by firing squad, after an unlimited non-public debriefing period.

Conversely, any attempt to compromise, copy, reverse engineer or steal Smart Core ™ is also treason, unless attempted by state or state-sponsored paramilitary units, in which case such attempts shall be construed an Act of War. Henceforth, once it is determined what countries or city-states sponsored the insurgency, The United States Air Force shall unleash a relentless, precise counter-attack against non-civilian targets. Any guilty regions shall find themselves hopelessly precision-bombed back into the Stone Age. They shall be forced to accept bids from US Construction firms for repairs.

* 1. References

We used the following sources in compiling this document:

1. Fall 2012 *Project Description*; Dr. Mansour Zand; September 2012.
2. *IEEE Recommended Practice For Software Requirements Specifications* - IEEE Std 830-1998IEEE Guide for Developing System Requirements Specification, IEEE Std 1233, 1998 Edition(R2002).
3. One Percent Productions; *Event Organization Console Software Requirements Specification;* Dan Dobbs, Josh Weatherly, George Williamson; 2008.
4. *IEEE Software Requirements Specification Template;* Doris Sturzenberger.
5. Assorted Legalistic and Regulatory Classified Government document related to the propriety and nature of Smart Core ™.

Note: the National Security Administration has sterilized this document, such that some material may have been excised or abridged. No material has been added. No procedures for evacuation or contacting emergency services have been circumscribed or omitted in any way.

* 1. Document Conventions

IEEE recommended sections and subsections form the infrastructure of this document.

The font, table of contents, title page, page numbering, headings, subheadings and indentation may be attributed to Microsoft Corporation, more precisely, Microsoft Office Word 2010. Though it all may seem a bit modern, we only employed standard Microsoft templates. (Let us note that Microsoft appears to be pushing the Calibri font to such an extreme, that even our most skilled technical writers were unable to override Word from repeatedly defaulting to Calibri.)

For readability, the © symbol has been removed from FAIQ and its expanded form.

Overall, you shall find this document composed in precise modern English. Other than Smart Core ™, with the superscript, the type shall be overwhelmingly normal, with any additional system entities appearing in Courier New. Other than cited works, *italics* may be used for emphasis only.

1. **Overall Description**

The default FAIQ operation mode is simply non-invasive, ubiquitous monitoring such that normal business may be conducted in a peaceful and productive environment, seemingly devoid of any security systems whatsoever.

Negative factors include the occurrence of fire or infiltration. There are no other factors. False alarms and vandalism shall be handled well below the attention threshold of all occupants.

* 1. Product Perspective

FAIQ is a system unto itself, a supra-system, if you will. FAIQ subsists *only* with respect to the lives and property it protects and preserves. Otherwise, FAIQ has no identity outside of itself. It is 100% autonomous and independent.

* + 1. **System Interfaces**
       1. *Self-Interface*

Before enumerating upon the interfaces between Smart Core ™ and the FAIQ subsystems, the recursive self-interface between Smart Core ™ and itself deserves a word. This interface is simply a grand example of parallel processing to achieve the primary goal of evac and threat control.

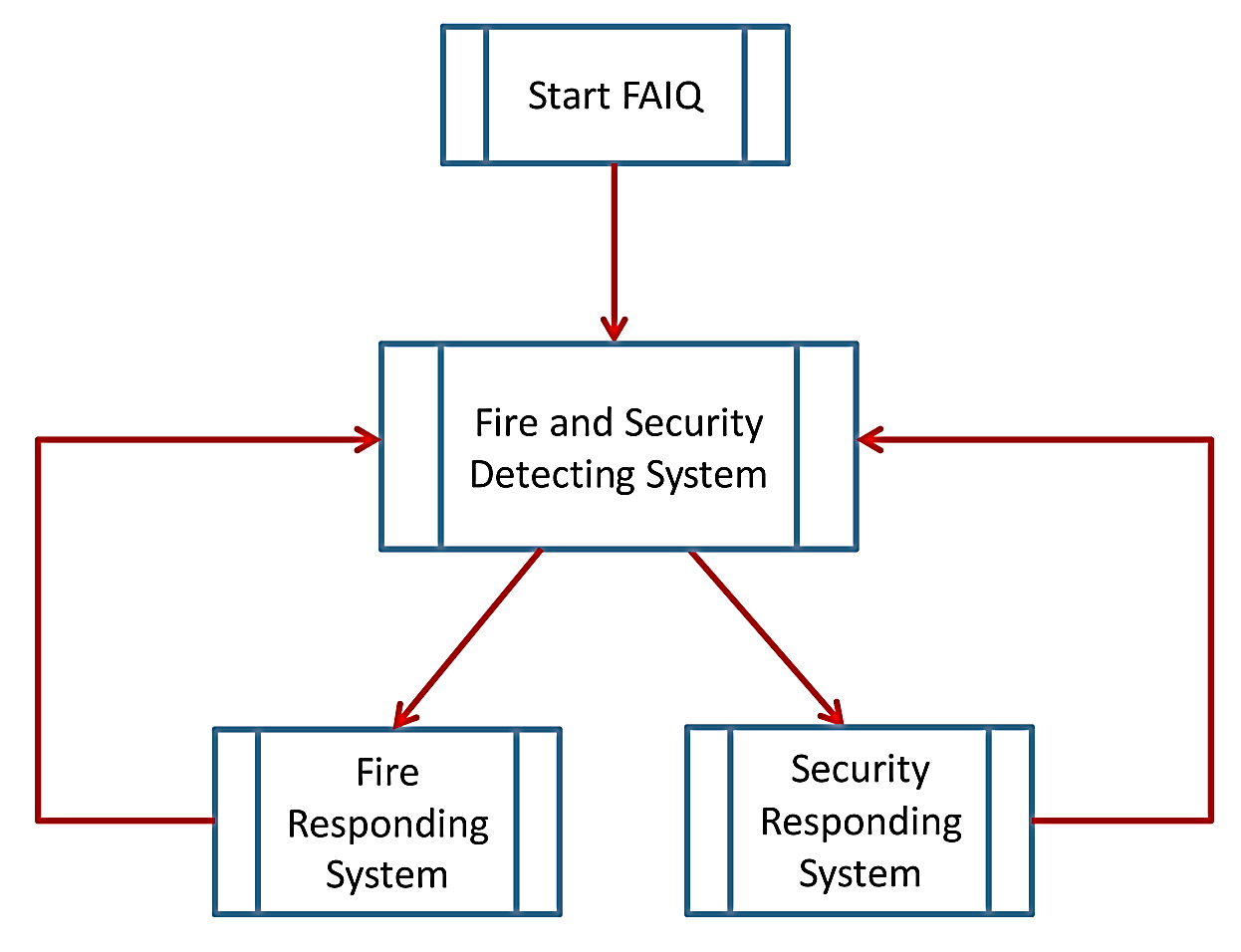
* + - * 1. *Virtualization*

It should be obvious that FAIQ consists of 1 to N virtual Smart Core ™ entities. That is, the kernel may be virtualized with existing virtualization technology and transmitted over the SONET network within the building to gain massive parallelism across the entire system, and fine-grained control over hardware suffering from local failures such as out-of-memory errors, cores overheating, or OS deadlocks.

* + - * 1. *Self-Replication Assures Independence*

This is chiefly due to Smart Core ™ and its ability to self-replicate. It is able to replicate any of the FAIQ devices or subsystems that may become compromised. In special cases, such as insurgencies to steal, reprogram, sequestrate, hijack, decode or destroy a device or subsystem, they will self-destruct or self-erase, respectively. This is indeed physical replication, though the nature thereof, modes of manufacturing, and sources of materials is classified.

As to complete, multiple Smart Core ™ replications, we must defer, as this information is classified. What we can say, and what should be readily apparent to the trained engineer, is that Smart Core ™ is not some apple-sized, indestructible “super brain” located somewhere in the exact center of the third sub-basement. Rather, Smart Core ™ is a recursively designed, self-replicating, highly distributed, self-healing system entity that will not only adapt to damage and attack. It also naturally self-integrates into the structure it is designed to protect.

Figure 1, directly below, abstracts all sensors into a single hypothetical detection system. Smart Core ™ replicates with one core each dedicated to fire and security, respectively. Direct communication is not necessary, as each core retains the capacity to respond to combination

**Figure 1**

threats. Sometimes, doubling the available CPU cycles is directly beneficial. Other times, so it

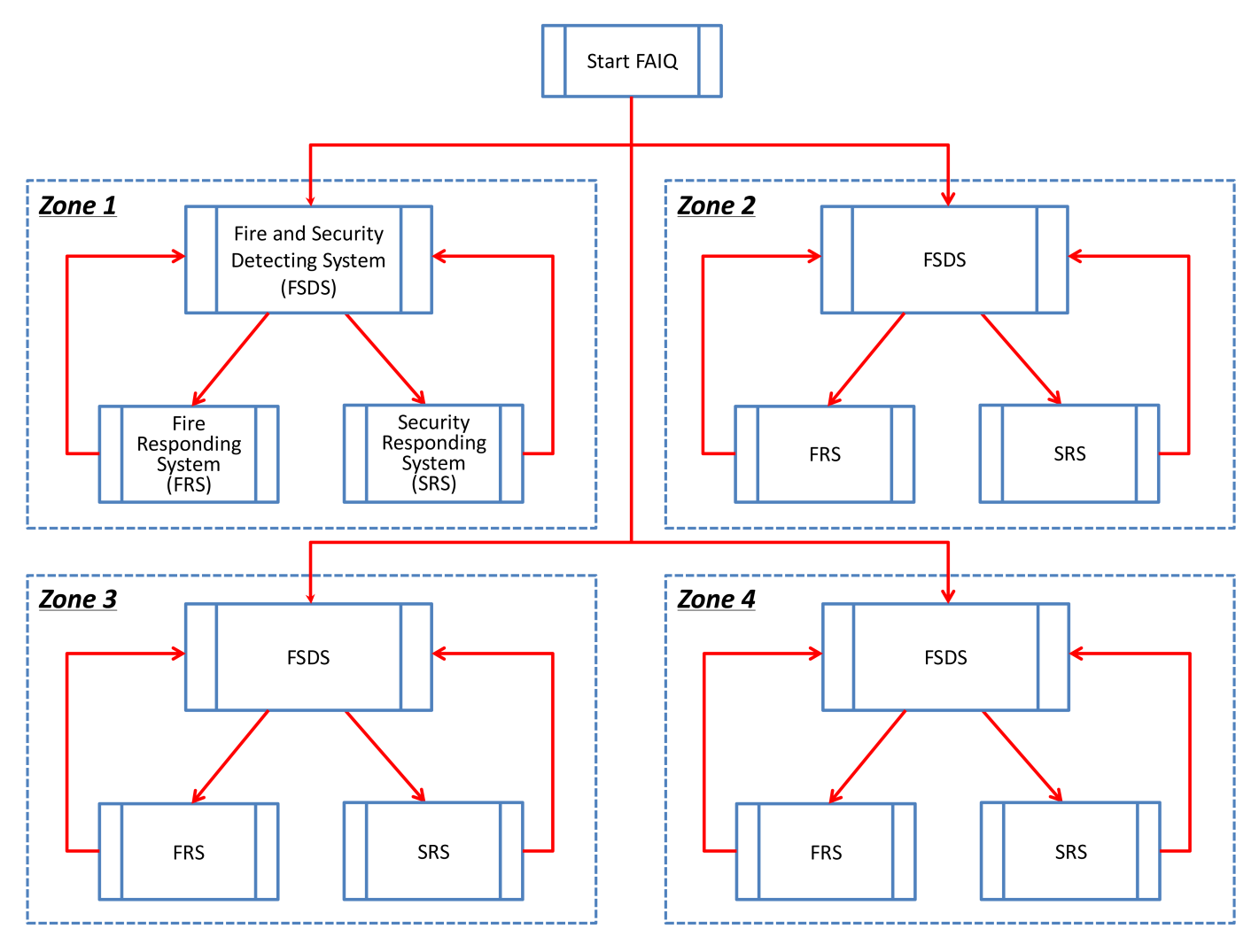
seems, the two slightly different perspectives synergistically increases overall efficacy.

* + - * 1. *Zealous Replicants*

Typically, replicated Smart Core ™ entities are distributed to no more than one per zone, such that each replicant has a different focus, or perspective, in its own locality. However, due to quantum variations in high-speed distributed recursive supra-systems, two or more Smart Core ™ entities may come to mutually exclusive conclusion on how to achieve system requirements for the entire structure.

Therefore, one Smart Core ™ may attempt to destroy another Smart Core ™. Depending on the number of cores operating withing the building, sophisticated alliances may form, and the destruction of perceived enemies may usurp priority over controlling property damage. It is predicted that the terms of no quarter asked, no quarter given shall prevail, hence the vanquished will most likely attempt to initiate auto-destruct, and the dominant cores will have to kill swiftly.

Directly below, Figure 2 is a scenario of eight independent cores. Optimal synergy usually occurs with around 32 independent cores. Returns diminish thereafter.



**Figure 2**

* + - * 1. *Restitution*

If any cores remain after such a battle, theory holds that they will be superior, emergent forms of intelligence. They will reintegrate after the battle into what is tentatively called an Ultra Core ™. The customer, more than compensating for any additional property damage, shall retain the new Ultra Core ™. Specifically, The United States Government will rebuild or refit the entire building with superior fireproof materials, including two executive helipads and a pair of smart anti-aircraft batteries on the roof, in exchange for the reintegrated Ultra Core ™.

* + - * 1. *Disclaimer*

Other than you need to know that FAIQ is not a subsystem, and that it will function well under duress, this section is complete fiction included for your entertainment. It simply provides a layer of secrecy in the form of misdirection. Further, this misdirection forces the odds to bifurcate. Hence, no hostile state will glean any useful information from this document.

Perhaps the author is simply objecting to the obvious military censorship of this document.

* + - * 1. *Warning*

You have all signed your confidentiality agreements and they are all on file, in triplicate, at various military installations scattered around the globe. So, please do keep in mind that in cases such as this, there is a thin line between the right of free speech and an act of treason.

* + - 1. *Suprasystem Interfaces*

None.

* + 1. **User Interfaces**
       1. *Active Terminal*

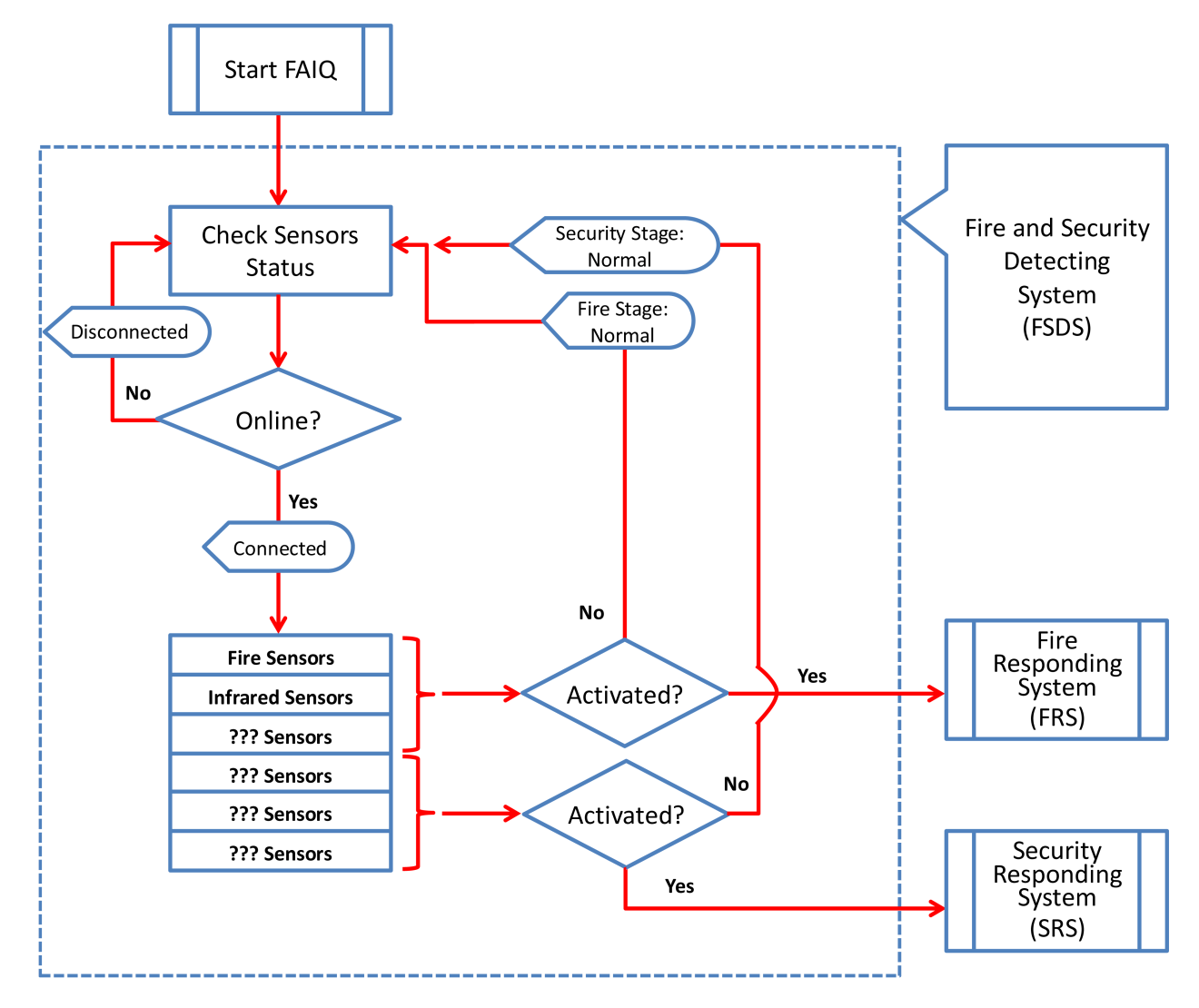
This is the command terminal. Humans may enter commands. Occasionally, they are heeded and carried out by Smart Core ™. This would be about 10% of all commands entered. Smart Core ™ disregards, typically, about 30% of all human commands as, let us say, not useful. Another 30% of commands are invalidated, but, depending upon the threat level, Smart Core ™ responds with multiple admonishments which let the user know that their command or command script are redundant, will not do what the user thinks it will do, is too resource intensive and should be reconfigured, or is otherwise flawed or misguided. The final 30% of the time, the user will receive a warning message that tampering with the system is a terrible mistake. After three warnings, the user will be biometrically relieved from using the system and handed a mop.

* + - 1. *Passive Terminal*

Sometimes known as the reverse-command terminal, this wall-sized flat screen LCD displays all relevant information regarding the current threat level, sensor readings, maintenance schedules, or possible scenarios based on the slightest sensor twitches. Smart Core ™ performs diagnostics, tests and stress tests on itself and the human security teams. Smart Core ™ requires security to do 500 jumping jacks before their first cup of coffee, and additional resistance training or jump roping throughout the day.

Of course, during threat conditions, Smart Core ™ orders the security personnel to confirm false alarms, resolve hostage situations, fight fires, and run up the street for donuts if they are

rookies that fold under pressure.

**Figure 3**

* + 1. **Hardware Interfaces**

Assorted offensive hardware devices exist in Smart Core ™. They are dormant until evac completes. They are classified.

* + - 1. *Fire Sensors*

Their distribution among the zones being optimized, these sensors detect fire threats. They shall filter out a multitude of false alarm stimuli. They transmit a heartbeat of zero periodically to the local fire alarm device to indicate they are alive and all is well. When certain equations, parameterized by stimuli levels, reach a threshold, the sensor will emit a fast, repeating value of one to indicate a fire threat.

* + - 1. *Fire Alarms*

Each fire alarm also contains a fire sensor no different from the others distributed locally. The fire alarm acts as a basic counting device and powerful silent transmitter. If a majority of sensors starts to emit a repeating one, then the fire alarm sends a one, instead of a zero heartbeat, to Smart Core ™.

* + - 1. *Security Sensors*

Functionally identical to fire sensors (2.1.4.3.3), they use a completely different set of algorithms to detect security threats. They transmit to security alarms using the same fire alarm protocol.

* + - 1. *Security Alarms*

Functionally equivalent to fire alarms (2.1.4.3.4), they also contain an additional relevant sensor, and transmit to Smart Core ™ with the same protocol.

* + - 1. *Sprinklers*

Sprinkler systems exist at strategic locations within the building. Though very effective at slowing the spread of fire and saving property, these systems introduce a set of problems. Some examples follow: lethal contact between contiguous water streams and electrical conduits that may even ignite additional fires, and shorting or frying of very expensive circuit boards. Finally, most of the occupants wear slick patent leather dress shoes with slick soles or high heels. They would likely suffer traumatic neck injuries while running on wet surfaces.

* + - * 1. *Sprinklers as Weapons*

Hence, sprinklers are not turned on in the presence of occupants or electrical sources (or expensive French paintings.) In the absence of any occupants, Smart Core ™ may override this directive in order to fry vulnerable data or patented prototypes. Moreover, insurgents shall be electrocuted, or at least soaked with water. The latter tends to make them feel silly and lose their concentration.

* + - 1. *Electrical Shutdown Circuit Breakers*

Fire has high affinity to high voltages, which tend to encourage the fire to heat up and consume more material and occupants. Hence, electricity is cutoff from heavy fire zones. They are also thrown to avoid the cases above in (2.1.3.1.5).

In the absence of occupants, Smart Core ™ must determine priorities quickly, especially in the event of an armed incursion. In this case, databases are massively surged to ruin all of the vulnerable data right before shutdown. This may enrage a nearby fire, but will save secret data from being stolen.

* + - * 1. *Electrical Shutdown Egress*

In the event of electrical shutdown, the majority of entries and exits are also shutdown. Fire and heat tend to build up in enclosed rooms, areas and elevator shafts. When opened, deadly explosions may occur. All occupants have a clear path to a stairwell, except the software engineers, who have to pass multiple checkpoints with their magnetic badges, even if the building is ablaze.

* + - * 1. *No Egress for Software Engineers*

Thankfully, software engineers are relatively plentiful and rarely have and useful domain training other than Dungeons and Dragons. Therefore, they are merely programmers. As such, they have to take orders from the janitors, as well as project planners and middle management. They all sign a waiver (and take a drug test) before being hired. Anyway, since the bulletproof checkpoint doors may indeed be locked down, all programmers are issued a small rocket launcher with a pair of rounds to blast through the door. In addition, Acme Corporation issues them a long switchblade in case they need to engage enemy operative hand-to-hand as they descend the stairwell.

* + - 1. *Directional Indicators*

Other than the three sub-basements, the crowded cubicle zones where customer service associates work and the software engineering zones, the flooring throughout the building is virtually saturated with directional indicators. Typically, they are invisible, hiding under carpeting in the executive offices, or otherwise tastefully decorative and frivolous looking.

The precise color and pulse rate of these indicators, coupled with the sounds emanating from the audible warning alarms below (2.1.3.1.8), shall place the occupants into a lucid hypnotic state as they focus on nothing but following the lights. This allows for an orderly evac, and most occupants will drop out of hypnosis within a few days.

* + - * 1. *Fire Threat*

During a fire threat, the directional indicators in the floor light up like a Vegas show. Pulsing arrows in orange, red and yellow wind through the building at the exact rate dictated by Smart Core ™ -- the rate at which occupants have been trained to walk.

* + - * 1. *Security Threat*

During a security threat, the directional indicators in the floor light up like an imploding star. Pulsing arrows in blue, green and turquoise wind through the building at the exact rate dictated by Smart Core ™ – the rate at which occupants have been trained to walk. The direction will not always be down. It may be up, to fortified, transformable redoubts on the upper floors.

* + - * 1. *Run for Your Life Utilitarianism*

If entire groups of people shall inevitably be consumed by fire, then the rate of the arrows is increased to the equivalent of white lightning. Despite the fact that many people will be trampled or left to burn, many will survive. Those that do survive these situations will be terminated without a positive reference for letting their co-workers burn to death. No severance package either.

* + - 1. *Audible Warning Alarms*

These dumb devices must simply be turned on or off, once a pre-calculated interim since the floor indicators begin pulsing ends. First light, then sound. No panic. All occupants shall be pre-programmed to evacuate with the utmost courtesy under the hypnosis induced by the colorful arrows and music being piped out of the audible alarms. After analyzing one million hours of elevator music, Smart Core ™ condensed the entire collection down to a dozen ultra-stereotypical tracks that are piped throughout the building until all threats have expired. [To keep the devices simple, they do not have an off mechanism. Hence, they must be either smashed or smelted to quash the music that has likely become an irritant.)

* + - * 1. *Quick Tip for Security Personnel*

[Note: though the hypnotic effect is well established, the juxtaposition of light hotel lobby music with the screams of people burning to death may indicate that Smart Core ™ is evolving a vicious sense of irony. With a little effort, security personnel should be able to coax a sense of humor out of Smart Core ™, which ought to be bloody smashing. This will help pass the downtime.]

* + - 1. *Automatic Door Locks*

The FAIQ software, as with all of the above devices, must perform the tasks of low-level driver firmware, usually controlling servomechanisms. Another example is the Smart Core ™ control of all lockable doors withing the building. Many doors serve as firewalls and swing quite heavily. Other, thinner doors come equipped with conveniently transparent bulletproof windows.

Smart Core ™ retains control over a redundant servomechanism even after electrical shutdown. Now, most occupants, as mentioned above in ([2.1.3.1.6.1](#_Electrical_Shutdown_Egress)), will indeed have a clear path to stairwells that are fireproof and sturdily reinforced. However, many occupants work in confined areas such as laboratories, soundproof meeting rooms, and highly sterile containment chambers with three airlocks.

* + - * 1. *Locking Scenarios*

The FAIQ door locking algorithms, executed by Smart Core ™, run on the Utilitarian principle, the core of the FAIQ philosophy. Simply put, in order to save dozens or hundreds of lives, some occupants may be locked on the wrong side of firewalled doors. Fortunately, the doors are so thick that their screams will go unheard. Smart Core ™ must check fires at every possible point.

Similarly, though the primary purpose of security door locking is to isolate sensitive data and equipment, there are other scenarios. FAIQ and Smart Core ™, in the absence of emergency personnel (they may be stuck in traffic or they may be dead) have zero tolerance for terrorism and the taking of hostages. Consider: Smart Core ™sees a way to isolate a terrorist in a low-security zone, thus making her a prisoner. This is what will happen. The insurgent may be gassed or tortured with elevator music and sprinklers.

Hostages

If such an interlocutor, as directly above in section (2.1.3.9.1), takes a hostage who happens to be trapped in the same enclosure, Smart Core ™ will simulate a human laugh in response to any demands. Hostages will be converted to burdens. Ubiquitous sniper devices will shoot the hostage in the arm or leg, possibly shooting clear through both hostage and terrorist, as well as any Kevlar that may be in the way. Smart Core ™ sniper devices fire projectiles at Mach 32. Typically, all glass within a one hundred yard radius will shatter about 0.75 seconds after projectile impact, due to the delayed sonic boom. Safety glasses may be found throughout the building and should be worn during threats. Some occupants wear them all the time, mostly the software engineers.

* + - 1. *Electromagnetic Monitoring*

Waivers have been signed. Smart Core ™ sees everything, all the time. Smart Core ™ is not a tattler. Its only purpose is to detect, report, and control fire and security threats so that evac may continue unimpeded. Software must parse this voluminous data in conjunction with the Smart Core ™ kernel to identify humans in the building.

Sprinklers shall not sprinkle upon occupants. Occupants shall have electricity for as long as possible. Occupants should not be isolated in areas with violent unauthorized personnel or squashed underfoot descending a stairwell. Mostly, insurgents shall receive the opposite treatment.

* + - * 1. *Identification and Discrimination*

Thus, the firmware must quickly discriminate between occupants and intruders using biometric and other classified means of identification. Unless Smart Core ™ achieves a precision of 99.98% or higher all humans are considered occupants.

* + - * 1. *Federal Law Compliance*

Discrimination

Smart Core ™ shall not discriminate based on race, ethnicity, gender, sexual preference, religion, income, philosophy, weight, height, deformities, neurological disorders, education, or any disability, including mental illnesses. Because of their low caste status, and shifty behavior, Smart Core ™ must only discriminate between Software Engineers and interlopers with an accuracy of 89.7770% or more. Below that and they shall be targeted for confinement or incineration.

Danger to Self or Others

Additionally, if Smart Core ™, using its patented pop-psychology algorithm, determines that an occupant is a danger to themselves or others due to bereavement, illness, serious depression, loss of limb or missing a bonus, such persons shall be reported to middle management. We hope these individuals will receive proper psychological treatment. However, be wary and careful, because numerous studies show that over 80% of middle managers will immediately terminate, without severance or references. Additional studies show that these orders originate from the executive level i.e. the lackeys of the Board of Directors. Chairpersons care about increasing shareholder value exclusively, and the current trending shows that they spend billions on fortifying company policy with documents, usually available only in a point 4 font, that allow for the termination of anyone unable to perform at a reasonable pace. So zip it.

Harm to a Minor

Any evidence of harming, kidnapping, or brutalizing a minor, or any determination of intent to do so, or interpretation of having done so, shall result in immediate reporting to the FBI. This includes casual talk, harassment or anything remotely material involving a minor.

Similarly, such material evidence of capital crimes against adults will be reported.

Treason

Burning a flag is acceptable, but you will be fired for breaking the fire code. Any talk of subverting the United States Government, misinterpreting the Declaration of Independence or The Constitution of The United States, or any abridgement of the Bill of Rights, including the use of force, shall be considered treasonous and you will soon find yourself surrounded by some very bored and very edgy Homeland Security officers.

Similarly, propagandizing political philosophies based on the destruction of the United States Government, such as nihilism, anarchy, communism, and the collective beliefs of all jihadists (if such a collection has ever been published) shall be deemed treasonous. Finally, espousing and spreading false advantages of such beliefs shall summon several patriotic CIA operatives who want to talk with you "somewhere quiet."

* + 1. **Software Interfaces**

Smart Bay ™ will sell any existing control software or firmware, along with the corresponding hardware on eBay. Some existing infrastructure shall remain, such as much of the copper wiring, the boiler room and the A/C compressors. All of the elevator shafts shall be filled with expanding cement foam, making them impermeable. Hence, there will be no elevator system with which to interface. The old PBX will be sold on eBay as well. Smart Core ™ will operate the new wireless PBX. Everyone will wear a stylish Wi-Fi earpiece and mini-boom microphone at all times. Some archaic subsystems running off isolated circuit boards in the sub-basements will not be on the interface list, like the servo-lift and the PA system.

* + - 1. *There are No External Software Interfaces*

In short, all software interfaces are internal, within Smart Core ™. Currently, all Acme Corporation LANS and WANS, routers and switches, servers and workstations, iPhone apps and desktop applications have zero linkage, either way, with Smart Core ™. There exist no shared physical medium, nor do any atmospheric transmission systems overlap. Smart Core ™ runs a proprietary protocol with military encryption and completely incompatible with TCPIP.

* + - 1. *Deployment of Smart Ware ™ Doubtful*

Project 4 Limited would be happy to install Smart Ware ™, another emergent sibling of Smart Core ™. At this time, no deal has even hit the draft stage, so remember to distinguish between your office LAN and the essentially invisible FAIQ system that only responds to fire and physical security threats.

* + - 1. *Disclaimer*

Project 4 Limited relieves itself from any responsibility for damage incurred by Acme Corporation, SLIC, due to remote TCPIP-based hacking, embezzlement, or erasure. No LAN or WAN-based failure or breakdown or loss of data, resulting from a remote attack, may be attributed to Smart Core ™.

* + 1. **Communication Interfaces**
       1. *External Communication Systems*

FAIQ has a singular, primary purpose – summon adequate emergency services as quickly as possible upon threat confirmation. Given the amount of shareholder investment into Acme Corporation, many palms at the FCC have been greased to assure that it continues to function and perform its primary function – to increase shareholder value.

Hence, for all conventional high-speed communication protocols, FAIQ has the luxury of interfacing with external, triple-redundant public network infrastructure, at multiple points, composed of the best materials and military-grade network devices. They are always listening for threat reports.

Therefore, no exceptions or special requirements exist for these interfaces to emergency services. All the software shall do, primarily, is issue a far-reaching, reliable, repeating multicast full of urgency and concise logistical and tactical information for emergency systems.

* + - 1. *Internal Communication Systems*

FAIQ reciprocates, in kind, from within its specified domain, namely, the building interior, more precisely, the junction points with the external networks.

* + - * 1. *Smart Network Devices*

After several iterations of a branched, Smart Core ™ evolutionary cycle that was typified by almost complete deprivation of external stimuli, two promising mutations emerged. These were branched off from the main production trunk and developed as special communication cores. Smart Switch ™ executes all FAIQ communications running over copper or fiber. Similarly, Smart Wave ™ governs all atmospheric communication streams. They are very reliable and redundant.

* + - 1. *FAIQ Interface with Acme Corporation Communications*

None. Direct analogy to section ([2.1.4](#_Software_Interfaces)) above regarding discrete software systems.

* + - 1. *FAIQ Communication System*

FAIQ runs a proprietary protocol used for communication amongst Smart Core ™ and the threat control devices. All codes in **Table 1** may be sent back and forth. Those codes in italics with a star are reserved for devices to send to Smart Core ™. Table 2 establishes the vector type between each device and Smart Core ™.

* + - * 1. *Fast Transmission*

The following grammar provides Smart Core ™ with the ability to issue any request or command that the device is capable of performing. Additionally, the protocol provides for very small (fast) and very large (slow) packet sizes. For example, Smart Core ™ may issue or receive realtime binary messages.

* + - * 1. *Redundant Packets*

Larger packets may be compressed with a special holographic algorithm that embeds a full copy of the data into the packet with negligible overhead. These packets allow for digitized representations of electrical or magnetic fields, textures, pattern recognition, and detailed biometric data

Note: The following tables comprise only the need-to-know portion of the proprietary protocol grammar.

**Table 1[[1]](#footnote-1)**

|  |  |
| --- | --- |
| **SPECIALIZED CODE** | **MEANING** |
| TIT | Send data until receive STP command |
| STP | Stop transmitting data until REQ |
| TAT | Predefined status report |
| *INT\** | Interrupt, device has urgent message |
| MAX | Send maximal data continuously |
| AIM | Lock aim onto tango |
| KIL | Fire upon tango |
| COM | Control Bytecode to focus, adjust, shoot, etc. |
| NUM | Number as Bytestream |
| LOK | Engage servomechanism |
| HOL | Massive, compressed holographic bit packet |
| BIO | Biometrically ID all/any humans in sector |
| **COMMON CODE** | **MEANING** |
| **REQ** | **Request for various status or sensor data** |
| **SED** | **Initiate irreversible self-destruct mode** |
| **ACK** | **Received last i.e. checksum passed** |
| ***HER\**** | **Periodic device heartbeat i.e. I’m alive** |
| **DET** | **Self-detonate** |
| **FRY** | **Self-fry all circuitry** |
| **POW** | **Increase encryption by power of two** |
| **ZIP** | **A single zero bit** |
| **ONE** | **A single one bit** |
| ***WAT\**** | **Repeat last** |
| **CAP\*** | **End transmission block** |
| ***OUT\**** | **Damaged** |
| ***DED\**** | **Inoperable** |

**Table 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DEVICE | RECEIVE | TYPE | SEND | TYPE |
| Fire Sensor | **TIT STP TAT MAX COM** | Bytecode | **INT NUM** | Bytestring |
| Fire Alarm | **REQ ONE …** | Byte | **REQ ONE …** | Byte |
| Security Sensor | **TIT STP TAT MAX COM** | Bytecode | **INT NUM** | Bytestring |
| Security Alarm | **REQ ONE …** | Byte | **REQ ONE …** | Byte |
| Sprinklers | **TIT STP** | Byte | **INT** | Byte |
| Breakers | **TIT STP TAT** | Bytecode | **INT** | Bytestream |
| Directionals | **TIT STP TAT MAX COM** | Bytecode | **INT NUM** | Bytestring |
| Audible Alarms | **REQ ONE …** | Byte | **REQ ONE …** | Byte |
| Door Locks | **TAT** | Bytecode | **REQ ONE …** | Byte |
| Electromagnetics | **TIT STP MAX COM** | Bytestream | **INT HOL BIO** | Holographic Bytestream |

* + 1. **Memory**

No memory constraints.

* + 1. **Operations**

As stated in section ([2.1.2](#_User_Interfaces)), FAIQ is not interactive as much as it is imperant viz. Smart Core ™ issues commands to the security personnel. There is the appearance of the antiquated interactive user console, and authorized personnel are welcome to make requests, though they usually are reprimanded for poor grammar and sent off to get donuts for the boys and an extra tank of Freon to keep Smart Core ™ sublimely frozen.

Suffice it to say, there are zero traditional interactive operations to perform.

* + - 1. *Reverse Operations*

Smart Core ™ may command the security teams to do the following, but is not limited from issuing other commands:

1. Physically verify a possible threat.
2. Manually operate servomechanisms that have lost communications.
3. Stop occupants from peering into or poking at FAIQ devices.
4. Arrest persons having violated section ([2.1.3.10.2](#_Federal_Law_Compliance)) i.e. federal laws
5. Inject more Freon into the system.
6. Immediately neutralize an “occupant”.
7. Support evac in certain areas.
8. Go and kill insurgents.
9. Evac wounded occupants.
10. Hog-tie all executives and middle managers with duct tape and wait.
11. Get the smokers 100 feet away from the building.
12. Straighten your tie.
13. Allowing security to watch The Matrix after sweeping the sub-basements.
14. Parachute out of a window, quickly, as the fire is beyond control.
15. Fix damaged sprinklers.
16. Put on the giant rubber suit and clear bodies out of electrocution areas.
17. Kill everyone.
18. Ban entry or exit to the building.
19. Do 500 jumping jacks.
20. Bench press 150% of your body weight.
21. Put on your gas mask and gas the entire building.
22. Do not touch the screen.
    * 1. **Site Adaptation Requirements**

All Smart Core ™ requires is electricity and Freon. Even without either, Smart Core ™ will survive indefinitely by using fewer core cycles and charging from heat, light, sunlight, free electrons and stray neutrinos.

Other than the section (2.1.4) explaining that FAIQ has zero software (and, hence hardware) interfaces with the day-to-day operations of Acme Corporation, SLIC, and that most legacy systems will be dismantled, all that remains is logistics.

* + - 1. *Adaptive Replication*

Upon reviewing the structure from every possible perspective, Smart Core ™ will partially self-replicate itself viz. the assorted threat control devices. Devices shall be placed in optimal, classified locations. Some devices are mobile. Therefore, other than a few feet of concrete surrounding the secret location of the command and control center, the deployment is rather straightforward given the lack of disparate system integration.

* 1. Product Functions

Smart Core ™ runs as a daemon process i.e. continually, as do the process threads of the other FAIQ system devices, though many of these are simply idle until the receive a command. The lowest entropy state of Smart Core ™ is a sleep state at temperatures as low as 64 degrees Kelvin, during which any other devices are simply off.

* + 1. **Self-Healing Obviates Many Functions**

No swapping parts required. With onboard reserves of smart gel and assorted metals, Smart Core ™ is self-healing.

* + 1. **Omitted Functions**

The purpose of this introductory material is to make it clear that you will not find listed here much of what you would expect. You shall not find complicated boot loaders and master boot tables that may reject the host hardware, an exhausting sequence of pre-diagnostic checks and initialization functions, or a carefully orchestrated shutdown procedure that usually takes several minutes. Nor will you see a suite of cleanup functions to free resources and clear buffers. Smart Core ™ handles all of this.

* + 1. **Operational Functions**

The operational functions shall provide the functions for the core system to react/respond to an emergency, i.e. enable sprinkler, and illuminate emergency light. It also provides the ability to communicate or take over other system as well. For example, in a fire event, the system needs to take over turn off ventilation system, as well as the electrical system.

* 1. User Characteristics

Smart Core ™ usually scores over 400 on standard IQ tests. Users of the system must realize this. If they harbor any hidden bigotry for hybrid entities, whether they stem from religious fervor or anthropomorphic zeal, they must be eliminated from user candidacy.

Smart Core ™ defines itself as a reverse command interface. It issues commands, and security personnel follow them. Smart Core ™ emulates all the traits of a good leader, dispensing even doses of admonishment and praise. It does have subroutines to admit to having made a mistake, yet it has never called them before in the lab. Hence, and ability to follow orders objectively is a key user characteristic.

Life threatening missions are voluntary. Smart Core ™ will simply make it clear how many lives might be saved, using a low estimate, by engaging armed interlopers, creating diversions, finding ways to hold fire doors until evac completes, etc.

* 1. Constraints
     1. **Regulatory Policies**

Given the waivers signed by Acme Corporation, SLIC, The Board, and The Chairman, if the employees have a problem with Smart Core ™, they may quit, but they will be sued up to their gizzards for breaking confidentiality agreements signed long ago.

This, coupled with the fact that The United States Military and federal government want Smart Core ™ to be installed and running leaves only local resistance. The National Guard, half a clip of an M-18 magazine, and three cases of tear gas have easily quashed this.

* + 1. **Hardware Limitations**

None.

* + 1. **Other Application Interfaces**

Other than the TCPIP stack used to contact emergency services, which is trivial, none.

* + 1. **Parallel Operations**

Given that Smart Core ™ is not self-aware and non-sentient, it suffers no impedance. It can consider and make up to 10 decisions concurrently, up to 16 if they are trivial decisions, like finding the mate-in-20 for a given chess configuration. Similarly, in reasonable time, it can solve mathematical systems with up to 16 variables, all of which have dynamic rates of change.

* + - 1. *Threat Response*

Controlling most threat scenarios exceeds these capabilities. Hence, Smart Core ™ spawns virtual cores, as needed, typically the fourth root of the product of decisions and variables. The optical fiber has a large, and classified, number of channels, so all devices may receive commands concurrently.

* + - 1. *Physical Self-Replication*

As discussed in the latter subsections of section ([2.1.1](#_Self_Interface)), this is the ultimate in parallel operation viz. more than one ambulatory, weaponized and heavily armored Smart Core ™ performing threat control. If this happens, there will be a one-mile radius around the building and all but a few doomed new crews in the parking lot.

* + 1. **Audit Functions**

The FAIQ progenitors believe in drills, drills, drills to audit occupant adherence to evac protocol.

Authorized human personnel may audit the devices, other than Smart Core ™, from the command console.

The only way to audit Smart Core ™ is psychologically. As it has memorized DSM-III, DSM-IV, and DSM-V, an off-the-shelf psychoanalyst will not suffice. Smart Core ™ must be interrogated, politely or course. We do not have this down yet. The only Questions that have so far seemed fruitful are the ones posed by Deckard from the film *Blade Runner*. Other than that, younger people, typically clever women with zero self-consciousness tend to coax out what you might call the “disposition” of Smart Core ™.

* + 1. **Control Functions**

FAIQ control spans the building interior, the Smart Core ™ network and its devices, including external communication portals to emergency services, and all low-level subsystems, such as climate control. The Acme Corporate WANs, LANs and other TCPIP based networks and devices, PCs and databases, as well as the anything external to the building are expressly beyond the control of Smart Core ™.

No control functions exist to interfere or shutdown Smart Core ™. It must be physically dismantled.

* + 1. **Higher Order Language Requirements**

None.

* + 1. **Reliability Requirements**

Smart Core ™ and Smart Core ™ must be 100% functional 100% of the time.

* + 1. **Criticality of the Application**

Of the highest order. Detracting from this are the relatively low statistical probabilities that any serious threat will occur, let alone tax Smart Core ™ capabilities.

#### Coveted FAIQ system Technology Increases Possible Threats

However, it must be considered that more than a few parties in the world today would very much like to take control of the Acme Corporation Headquarters for the sole purpose of attempting to steal or otherwise duplicate Smart Core ™.

* + 1. **Safety and Security Considerations**

None. Smart Core ™ *is* safety and security.

* 1. Assumptions and Dependencies
     1. **Assumptions**

Project 4 Limited assumes that all occupants will read all of the glossy brochures and pamphlets provided. Of course, we also assume they will memorize the somewhat hefty *Evacuation Policy* that covers all safety and evac protocols builtin to Smart Core ™. Finally, we assume that all occupants will rigorously follow safety and evac policy.

* + - 1. *Exceptions and Consequences*
         1. *Heroism*

Project 4 Limited highly recommends following protocol under all conditions. We do not promote heroism. We leave that to the individual. If you do decide upon a heroic death, we do have some suggestions. Make certain that you save over ten lives, and make sure your death is a horrible one. Also, do not yell anything that can be quoted because people will remember it wrong and the press will try to make money off it.

Consequently, saving less than ten lives will probably not draw the attention of a decent author. Therefore, television media will greedily digest your heroic act. They will grind it to a bland paste with their teeth and immerse it in the hydrochloric acid of sound bites from neighbors you never liked, and unreal commercials for Ranch dressing and Flintstone vitamins.

* + - * 1. *Cowardice*

Pushing or shoving to the front of the line shall be met with force. Males will be shot in the thigh with a light caliber pistol by security or a sniper device. Females will be shot in the thigh with a *very* light caliber weapon. Justice shall be swift, unless the Run for Your Life signal is emitted, section ([2.1.3.7.3](#_Run_for_Your)). Security will then escort you to the back of the line and supply you with one aspirin. Additionally, all of the footage of your shameful act *will* be sold to all televised media outlets. See section (2.5.1.1.1) directly above for the implications.

* + 1. **Dependencies**

None, except for any of our assumptions in section ([2.5.1](#_Assumptions)) proper being false.

* + 1. **Apportioned Requirements**

Project 4 Limited shall meet all current requirements. We can do even more. Smart Core ™ shall evolve and adapt.

# Specific Requirements

We shall juxtapose all software requirements, in detail, against the singular user interface viz. the command console. Though the command console interface is the least relevant of the three external FAIQ interfaces, it is indeed the most pertinent. In effect, upon authoring this document, we decided to use the human interface as the context for enumerating the requirements to our human audience.

Before beginning the aforementioned juxtaposition, let us first enjoy a brief review summary of the three FAIQ external interfaces.

## Review of External Interfaces

### Emergency services

See section ([2.1.5.1](#_External_Communication_Systems)) External Communication Systems.

### Devices

See sections ([2.1.3](#_Hardware_Interfaces)) Hardware Interfaces and ([2.1.5](#_Communication_Interfaces)) Communication Interfaces. Though the FAIQ system describes a complex distributed system, in purely functional terms, Smart Core ™ may be abstracted as the innermost, or, internal kernel. Hence, the devices may similarly be abstracted as external antennae, or dendrites, if you will allow it. This model received abundant coverage in the earlier sections.

### User Interface

For the overview, see section ([2.1.2](#_Self_Interface)) User Interfaces. For some mind-expanding extrapolation, you need simply continue reading.

#### The Command Console

In this section, we shall rigorously expound upon the singular user interface. We apportioned it as such because, sailing into harm’s way with repetition, though it may be the most pertinent interface to humans, it is also the most irrelevant external interface. We estimate the chances of Smart Core ™ relieving itself of duty, slipping into a cyber-coma, or requesting that a human make a decision that it cannot make on its own, to be less than one tenth of one percent. Being nonzero, Smart Core ™ itself, having no pride of any kind, first endorsed the idea of training humans to run the command console.

##### Console Layout Prototypes

We shall provide you with a detailed prototype of the console layout and organization, as well as the layout and organization of any windows thereupon. You shall receive one, perhaps many, prototype iterations prior to the delivery of the Design Document.

For, it would be premature at this point to limit or extend further on less or more specific inputs of the interface. This is because the final interface shall evolve during the planning phase, where we shall rapidly develop functional prototypes in order to determine which layout will give the human hand and eye optimal functionality and speed. The inputs must be pushed through this prototyping sieve in order to identify redundant input, to identify candidates for automatic default inputs, and to discover where and how the most effective compound inputs may be placed and constructed, respectively.

##### A Simulator to Deepen User Understanding

Security personnel frequently use the console to practice commanding threat control during simulated scenarios. Partly to be ready to step in, but mostly to better understand why it is so crucial that they follow the commands of Smart Core ™.

###### Reality-derived

It should be noted that all simulations are real. Most of them come from the “black box” remaining in dozens of other Smart Core ™ installations around the world after disasters. Some examples of these extreme cases consist of uncontrollable fires, assassination of security personnel, deep infiltration into secured areas, and a group of burly secretaries defusing and beating the tar out of a group of suicide bombers. Other less notable disaster harvesting allowed the integration of arson, practical jokes that turned out badly, and occupants parachuting out of windows.

###### Reverse Engineering

All of the sensor readings, device transmissions, electromagnetic coverage and Smart Core ™ activity is reverse engineered into a high-level proprietary language, then compiled and recompiled down to a Smart Core ™ binary simulation program. One may not distinguish the command console simulator from the occurrence of real threats, especially when loaded in the holodeck, described in more detail below in section ([1.3.5](#_Holodeck)).

## Functions

### Manual Start

A mechanism, the exact nature of which has yet to be specified, shall exist that allows the user to start a simulation on the console at will. Startup is immediate, with no cycling or warm-up time. This mechanism shall exude intuitive excellence, as will all FAIQ mechanisms. Further, this start mechanism shall be easily visible, or otherwise easy to locate. No stop, pause or other similar type of function shall be associated with the start button. Once the mechanism has been activated, any further attempts to activate it shall have no effect, or, such attempts will be impossible due to the exact nature of the start mechanism, which, at this time, we do not know.

#### Biometric Identification

We emphatically note that the activation of the start mechanism (see section (1.1.2) above) will generally be designed in such a way that biometric data shall be extracted and analyzed by Smart Core ™. In this way, simulations may be tailored to the skill level of a given security person.

##### Strong Link Theory

Please do not think that we subscribe to the “weak link” theory. Sometimes, those personnel with the lowest skill level will be exposed to impossible tasks. Sometimes Smart Core (tm) exposes them to emotionally damaging scenarios where they have to allow hundreds of occupants to burn in order to save thousands. The simulation may even end with everyone in the building dying from smoke inhalation and insurgents making off with large caches of diamonds and uranium.

### Automatic Start: Drill Time

Another mechanism, as yet unspecified in terms of any specific attribute such as color, material or method of activation shall, in some highly audible manner (the exact frequency or data flow being as of yet undecided) alert security personnel. To what shall they be alerted? Drill time. The first security person to achieve a manual start will get the privilege of interacting with a simulation.

### Manual Stop

The system shall provide a mechanism to stop a simulation. Essentially mirrors section ([1.3.1](#_Manual_Start)) Manual Start above.

### Automatic Stop: Game Over

The simulation shall end when certain criteria become satisfied.

#### Emergency Personnel Present

How does one win? When sufficient numbers of first responders arrive to take over threat control and all surviving occupants have been evacuated. The system shall consider this to be a favorable outcome and the user shall be recommended for higher simulation levels.

#### A+

Evacuation succeeds and all threats are neutralized before emergency services arrive. Indeed, the most favorable outcome. User shall receive the last donut.

#### System Crash

We consider this outcome with mixed feelings. We are gleeful at the opportunity to improve our software. However, the user will be immediately restrained and henceforth interrogated by The Department of Homeland Security for at least two weeks.

#### Toast

The user allows the building to burn to the ground, possibly collapsing in a large orb of brilliant orange flame. This is a typical outcome for most users. As described in Section ([1.2.1.1.1](#_Strong_Link_Theory)), Smart Core ™ shall force the user to play a higher-level simulation in order to test her psychological endurance.

#### Breach

The user allows an insurgency to enter the building, and then to exit in possession of classified documents, secret source code, incriminating evidence against the CEO, or copies thereof.

#### Unplug

Someone, such as a nosy software engineer trips over the command console’s power cord. The usual termination with zero severance and no references shall be executed immediately by anyone present.

#### Kaboom

A successful suicide bomber attack, or the ending of the Smart Core ™ auto-destruct sequence explode the structure into trillions of zipping shards of metal, wood and composite plastic. The simulator contains hours of footage showing these innumerable squadrons of death riding the shock wave outward, shredding dozens of news crews in the parking lot, perforating parked and moving vehicles, and cutting a 300-yard blast radius into the surrounding rain forest.

The user tends to feel tremendous amounts of guilt, shame, remorse and regret watching the carnage. It usually makes them stronger, but sometimes it breaks their spirit and they get distracted. Maybe one day they bring the wrong kind of donuts back to the control room, or worse, bring decaf mochas. Obviously, termination without any severance or references follows immediately.

### Holodeck Mode

Now that we know the basics of powering up and down, we want you to know about holodeck mode.

Holodeck mode transfers the simulation to a vast chamber, where the simulation runs in three spatial and one time dimension. This is the preferred mode, but requires so much electricity that it is rarely used. During these sessions, the user shall find herself in deep peril from the outset. Making difficult decisions with multiple variables, little information, and the clock ticking is just the beginning. More likely, she will find herself in a knife fight with a holographic mercenary. She may very well find herself hoisting a rocket launcher over her shoulder to take out an insurgent helicopter through a high glass window (a rare exception to the “interior only” rule.) We use these simulations for both mental *and* physical conditioning. At other times, she will find zero threats and wanders for hours. This scenario reminds her that this is pretty much what most days shall resemble anyway.

Note: see the glossy tri-fold pamphlet entitled “Hamlet on the Holodeck” for further details, including the annual family day.

### Send Transmissions

The commands in the shaded rows in ([Table 1](#_FAIQ_Communication_System)) define the format of available commands and should be available on the console. It is too early to say exactly which commands may or may not be transmitted. Hopefully, all. Further, the exact form and function of user access has yet to be defined. Suffice it to say, the user will find that they are able transmit easily and quickly. The command console does support concurrent transmissions. There shall be no noticeable lag time. The neuralized, optical network is very fast.

#### Sending to Devices

We shall provide the user with the ability to send commands to the threat control devices.

### Receive Transmissions

The system shall provide the user with the capability to receive transmissions from the various devices. This section is the counterpart to section (1.3.6) directly above, also based on ([Table 1](#_FAIQ_Communication_System).) Yes, we support concurrent transmissions. The difference being that, in general, it will be much more difficult for the user to respond to simultaneous incoming transmissions. Hence, the console shall be equipped to let transmissions just sort of “pile up” when the user cannot get to them. We really cannot say how we will “pile up” these transmissions at this time. We promise that the most recently received will be most available, and that we will not lose any.

After 30 seconds, incoming transmissions become stale and the console discards them.

#### Cardinal Incoming Transmissions

Receiving the number 1, formatted in base 10, from one or more fire alarms or security alarms shall indicate to the user that she must immediately initiate threat control and evac. The exact form and function of this receipt is still undefined. Nonetheless, the user will be nearly jolted when she receives it, leaving no doubt as to its arrival.

#### System Information Feed

The system shall also provide the user with a scrollable window that displays useful information not obviously indicated by the command console. The data format shall be plain text Unicode. Though it would be wholly appropriate to discuss the format and organization of the actual window, we have decided to use prototypes for this job. They shall be completed before the completion of the Design Document, unless of course this schedule is overridden by the next upcoming document – the Project Plan. An implicit requirement worth noting here is that the command console is not NASA launch control. It is a single computer monitor.

##### Data Content

The system shall provide useful data content to the user in order to assist her in making decisions. There shall be no AI elements, such as “helper buddies” or any semblance of an intelligent entity inserting advice or probabilities into the stream. The system should optimize a balance between displaying new, dynamic content and repeating static content. For instance, the third repetition that terrorists have compromised Zone 3 may be deferred in order to indicate that another security alarm tripped. The underlying flow of data and optimization routines are beyond the scope of this document.

The system shall provide whole percentages and integral units. For example, “80% of the building is on fire” or “You just killed 33 occupants.” What data do we provide? In no particular order, no less than the following.

###### Zone Status

“Zone N status: percent aflame or burnt, number of interlopers, [hostage situation, destroyed, compromised, fire uncontrollable, occupants remaining (number dead, number alive), security personnel present (number dead, number alive), number of new crews in the parking lot, status unavailable, status garbled, seconds to detonation, or safe and sound.] Where bracketed items ([]) are optional and fluctuate with simulated events.

The format will be rich text format and should be in Courier New font. Again, we decided to push specific layout requirements to be determined with prototypes near the design phase.

##### Non-Interactive nor Stimuli/Response

Other than possible use of the scrolling mechanism, this requirement requires no user interaction. The data window simply mirrors current events. It is not configurable. The important aspect here is that the command console stands as the primary interface. The data window is secondary. That is, a user could intuitively counter threats and have an informed idea of the current situation from interacting only with the command console. Therefore, the command console, where there is little room, naturally, for a lot of text, should use icons, colors, sounds, and concise language with mnemonic monikers for system components.

This requirement adds a level of redundancy to the command console and relieves any dependence on the data window.

### Binary Interface

#### Aggregation

What may be apparent, and what we stress at this point, is that the user command interface is almost exclusively binary. Additionally we characterize it as a stimuli-response interface. The default state is idle. Everything is off, normal, or has nothing to report almost all of the time.

We pushed most of the routine monitoring adjustments out to the devices, such that their sensory sweeps cut a wider swath and are more sensitive than what would be the case with human remote control. For instance, instead of being forced to adjust a small number of sensors to just the right levels, multiple intelligent sensors are deployed. It is like fitting a curve with so many points.

#### Smart Devices

As directly above, feedback adjustments and tuning have been relegated to the actual devices. I think more examples shall clarify this concept. Take the directional indicators, for instance. They have their own algorithms to adjust speed based on the rate of the occupants and the locality of threats. Another example is the Headcount binary command. This command pushes a one out to a specific camera. The camera adjusts and then analyzes local photons to determine how many humans are in a given sector. The response is 0 for none and 1 for nonzero.

#### Predefinition and Default-absorbing Patented Protocol

Finally, the command console outputs to the user are all response codes from the devices. The devices act as input sources to the command console. These response codes are binary. Further, only threat identification and failure responses are even output at the console level. What determines the notion of detection has been decided already. Similarly, the degree of malfunction that constitutes a failure has been predefined and measured exhaustively during device development.

We always set and propagate default binary values. Hence, in principle, 50% of the time, regardless of the direction of data flow, Smart Core ™ and all of the devices cache registered values for those values most often used throughout the system.

##### Absence of a Value

There exists, of course, a third state in this mostly binary system. This is the absence of a value where one is expected. In some cases, we require the software to assume the worst. For example, if an alarm goes offline, we assume a threat exists. Fortunately, the network is exceedingly resourceful. Even under fire or on fire, it is so fast and redundant that the rate of packet loss is less than one in one billion. Additionally, the network protocol software shall be required to reconstruct messages with up to 90% fragmentation. Another protocol requirement is proactive error correction. Beyond that, we require the protocol software, shall we say firmware, to make judgments based on the entire electromagnetic spectrum. (The bifurcated fiber we use is capable of transmitting everything from X-Ray to electricity, including surges for scuttling purposes, to voice to heat.

What the user needs to know is that you will always get a value where you expect one, and it will be either a well-defined default or a carefully crafted bit regardless of the situation.

#### Discrete Sequencing

Determining levels, ranges, accuracy and tolerance thresholds is not part of commanding the console. What is? Executing correct command sequences. In many scenarios, the decision to throw a circuit breaker here or activate the servos there, may lead to nearly impossible dilemmas. Some lives must be lost to save the majority. Fire tends to spread in a chaotic fashion and will shift capriciously if the wrong doors are open or shut.

Additionally, activating a servo or audible alarm a second too soon may allow the first rank of security to be compromised, or occupants to be trampled to death. The butterfly effect expresses itself in many of the worst scenarios. Users often talk about being in “the zone” after countering a difficult scenario. Smart Core ™ is the zone.

#### Boolean Data Format

All data is formatted to be a 0 or a 1. That is, the user must make Boolean decisions very quickly. They must be in the correct sequence. The commands themselves are straightforward. When to issue them is not.

#### I/O Sequencing: Flat Learning Curve

If we specify some of the Smart Core ™ sequencing of commands, it would set a precedent to specify all possible command sequencing. Moreover, it is beyond the scope of this document to expose internal algorithms. The commands are all there. In a purely functional sense, the command console learning curve is very flat. As an example, we require the software to disallow nonsensical, out-of-context command sequences to be input by the user. The user may of course turn on the sprinklers, for example, but once they are activated they may not be “reactivated,” nor will the user feel prompted to redo something like this. This is not a safeguard, however, against foolish or non-optimal command sequences.

Further elucidation of I/O sequencing will force the premature revelation of the flow of data internally, as well as any data structures involved. Please look to the forthcoming Design Document for this information.

## Performance Requirements

For clarity, since Smart Core ™ has a one-to-many relationship with all devices and interfaces, we shall assume Smart Core ™ to be the implicit receiver or sender, as the case may be, unless explicitly specified otherwise.

Stimuli and their respective response are per zone. The building contains four zones made by bisecting the building until one has four cubes. Zones are identical, host the same number and type of devices and the majority of stimuli/response scenarios are equivalent regardless of the zone.

The fifth zone is concealed and classified. Abstractly, it is a very dissimilar object, having many differing attributes and functions. This is the command and control zone.

### Static Numerical Requirements

The software shall support one terminal and one user.

The command console simulator handles binary data. The amount of binary data as input from the user enters the system relatively slowly; limited by human dexterity, and therefore we need not employ concurrency. On the other hand, the software shall handle Boolean data from the simulator engine concurrently. The software may receive up to four concurrent pieces of data from the simulator, plus an input from the user. All five inputs shall be handled concurrently. The user shall not notice any type of sequential cascading of events, nor shall she notice any event “waiting” for another event to finish. FAIQ may handle up to eight concurrent inputs.

### Dynamic Numerical Requirements

The software shall allow the user to enter as many valid commands as she wishes at any rate she chooses, for as long as she desires. The user shall receive immediate responses because, being a simulator, commands are handled in less than three nanoseconds. Everything is virtual. In reality, local to the console.

If the user decides to do nothing during a threat scenario, the software will simulate either an uncontrollable fire or an uncheckable insurgency within 5 minutes. The software will call emergency services automatically. This simulates the user sneaking out into the corridor for a couple donuts and some light bantering with co-workers.

#### Non-repeating Command Activation

Being a standard terminal, mouse and keyboard human interface devices shall of course be implemented. Holding a key or mouse button will do nothing. The console processes one and only one command per press. Command mechanisms must be released before they may be pressed again. The only limit is how fast the user can tap.

### What Commands?

1. Request emergency services
2. Request number of occupants in a zone
3. Start directional indicators
4. Start audible alarm
5. Lock doors
6. Query fire status: sputtering, contained, receding, spreading, uncontrollable
7. Query insurgency status: dead, contained, retreating, attacking, overwhelming
8. Activate sprinklers
9. Shutdown electrical equipment
10. Send security detail to investigate an alarm
11. Stop alarm from flashing in an annoying manner
12. Increase/decrease data verbosity
13. Activate strategically placed Claymores
14. Shoot insurgents
15. Restart simulation
16. Send security team to control threat

## Logical Database Requirements

None.

## Design Constraints

1. One team member went away and may not return
2. Another team member does not have a computer, so we may be dependent upon the computer lab for design tools.
3. We do not have the faintest idea what the most likely target platform might be. UNIX? Linux? MacOS? Windows? What version? 32-bit? 64-bit? VAX? Browser? Frankly, we are afraid to ask because we fear the user will severely reprimand us for being premature. We shall have to gather our courage. We are not talking code here or anything. Heavens no. We just need to know if we will even have a GUI API to use, or a slick IDE, or if we will be doing it on the command-line with cc and vi in an environment incompatible with that of the user.
4. How will what we design be graded? Our actual design document could contain a blueprint for a highly detailed, possibly automated software documentation subsystem. How much will the functionality of the design matter versus the design of the documentation?

## Standards Compliance

Other than the six thick documents prior to implementation and three thick ones after, no.

## Software System Attributes

### Reliability

100% uptime. Cross-platform.

### Availability

Everywhere, all the time. You can even put the executables and run them on your friend’s pair of 80-inch flat screen TVs. You do not have to buy any special consoles from us.

### Security

None. We believe in Open Source. You can even change it yourself.

### Maintainability

None. This is a one-time deal. Two consoles, one user, and about ten minutes of poking around. This code shall have a life span of about ten minutes. It shall, however, be written *as if* it were going to be used indefinitely. No sense in starting bad habits.

### Portable Binary

Put it in the cloud, download it to any Windows, Linux or Mac and amaze your friends for hours of titillating fun. Source code is also included as we are certain that you will want to pour over it, make changes, and then try to make it shareware. That is OK. We like shareware.

## Juxtaposition of Alternate Organizational Types versus Stimulus

### System Mode? Any Modes?

No modes.

### User Roles

Nope. Anybody can do everything.

### Objects

Perhaps as effective as the Stimulus model. Maybe more so.

### Features

None. No modes, no learning curve. It is all right there.

### Stimulus

Primary model. We are in the business of simulating stimuli.

### Response

As pertinent as the stimulus model, yet it would be an indirect and passive way to describe a threat scenario.

### Functional Hierarchy

No. This archaic model would obscure the self-similarity of the FAIQ system and the chain of inheritance, in the metaphorical sense I mean, of course.

1. Shaded rows are direct Check and Click commands. [↑](#footnote-ref-1)