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No. 1: What were the results of survey conducted by CHAOS in 1995. (10)

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survey conducted by the Standish Group (1995) called CHAOS drew attention to what many called the software crisis when it reported that only 16 percent of the application development projects were successful in terms of being completed on time and within budget. Moreover, about 31 percent of the projects were canceled before completion, while 53 percent were completed but over budget, over schedule, and not meeting original specifications. The average cost overrun for a medium-size company surveyed was about 182 percent of the original estimate, while the average schedule overrun was about 202 percent. the results of the survey suggest that a medium-size project estimated to cost about \$1 million and take a year to develop actually cost about \$1.8 million, took just over two years to complete, and only included about 65 percent of the envisioned features and functions.

Q No. 2: What is trilogy and what terms and conditions were defined in that? (15)

After years of developing information systems without an overarching organizational view, the FBI found itself with an “improvised” IT infrastructure with more than 50 independent application systems written in different programming languages and running on disparate platforms. In September 2000, Congress approved \$379.8 million for a three year project that was called the FBI Information Technology Upgrade project under the direction of FBI Director Louis Freeh.

However, the FBI Information Technology Upgrade project was eventually divided into three parts and renamed Trilogy. The Trilogy project centered on upgrading the agency’s 56 field offices and 22,000 agents and support staff with new desktops and servers, Web-enabling a number of the most important investigative database systems, and, most importantly, a Virtual Case File (VCF) system that would automate the antiquated paper-based Automated Case Support (ACS) system .

The VCF was envisioned to help FBI agents efficiently share data about cases in progress, especially terrorist investigations. The system would also enable agents anywhere in the United State quickly to search various documents and allow them to connect possible leads from different sources. In addition, the VCF would include a case management system, an evidence management system, and a records management system. The intention was to eliminate the need for FBI employees to scan hard-copy documents into computer files. A custom-developed system was needed since no existing commercial

software packages were available that meet the agency's needs when the project began in 2001. In the spring of 2001, development of the VCF software was contracted to Science Applications International Corp. (SAIC) in San Diego, California and was to be completed by late 2003 .

In September 2001, one week before the 9/11 terrorist attacks, Robert Mueller replaced Louis Freeh as the director of the FBI. The terrorist attacks laid bare the inadequacies of the FBI's information systems . The FBI concluded that it was losing intelligence as fast as it could gather it .

Q No. 3: In case study, Matthew Patton was one of the few persons who identified issues in this project. What were his findings? (10)

Patton soon realized that SAIC was not interested in his opinions and was told "not to rock the boat" when he began expressing his concerns regarding potential security and design issues. As he stated, "They were trying to design the system layout and then the whole application logic before they had actually even figured out what they wanted the system to do" (Goldstein, 2005). For example, Patton argued that the 800-plus pages of requirements were too bloated and complicated.

In addition, Patton complained that SAIC made no attempts to control costs with the 200 programmers who were on staff to "make work" when only a couple of dozen would have been sufficient. Patton pointed out, "The company's attitude was that it's other people's money, so they'll burn it every which way they want to" (Eggen & Witte, 2006).

Patton also claimed that SAIC attempted to write much of the VCF code when an off-the-shelf product like Novell's GroupWise email system was already being used by the FBI and would have been more appropriate to use than coding a new email application from scratch. Patton was told to "calm down and be a team player (Goldstein, 2005). Out of frustration, Patton posted a message to InfoSec News that mentioned he was working on the Trilogy case management system and that no one was taking security issues seriously. In his posting, he asked for help getting in touch with someone at the FBI who would care and demand accountability from its contractors. He ended with the question: "Shouldn't someone care?"

Sherry Higgins saw the message and reported Patton to the FBI's security division; Higgins called Patton a disgruntled employee who posted inaccurate and sensitive information (Goldstein, 2005). Patton's

security clearance was revoked. Unable to continue working on the project, he ended up leaving his programming job three months after posting his concerns.

Q No. 4: Why trilogy failed and what were the reasons of its failing? (15)

Some FBI agents refer to the Trilogy project as “Tragedy,” because it shared characteristics of many failed projects: the best intentions, catastrophic communication, and staggering waste

To better understand this failure, the US National Academy of Science provided an in-depth study that outlines the reasons for the failure of the Trilogy program and the VCF system (Alfonsi, 2005). The study is called “A Review of the FBI’s Trilogy Information Technology Modernization Program,” by McGroddy and Lin (2004), and four significant areas were identified: enterprise architecture, system design, program and contract management, and human resources.

1. According to McGroddy and Lin (2004), the FBI failed “as a matter of its highest priority” in crafting an enterprise architecture to define a strategic view of its goals, mission and needs that could be linked through information technology to its operations and processes. As a result, the FBI could not determine how such investments could be tied to its operational objectives. Moreover, the committee concluded that “the FBI’s efforts and results in the area of enterprise architecture are late and limited, and fall far short of what is required.”
2. The second area of concern reported by McGroddy and Lin (2004) centers on System Design, or, more specifically, the FBI’s plan for a “flash cutover” from the old ACS to the new VCF. Their opinion was that a limited initial rollout would provide an early warning for potential problems. Moreover, the committee expressed its concern that the rapid development approach and compressed project schedule presumes success at every stage and did not give adequate consideration to testing. This would in effect implement a prototype throughout the bureau where users would most likely be the testers after implementation.
3. Thirdly, the committee expressed serious concerns regarding the approaches and processes used to develop its IT infrastructure and applications. A major weakness included the lack of “user vetted prototypes in its applications development processes.” Even the most experienced IT professionals cannot anticipate all of the functional requirements and specifications, so internal and contracted developers should make use of extensive prototyping and usability testing with real users. The notion is that iterative development with ample user feedback and involvement increases the likelihood of delivering a system that meets their needs.

4. Lastly, McGroddy and Lin (2004) identified human resources and external constraints as the fourth area of concern. They point out that the FBI does not have an adequate human resource and skill base needed to deal with the FBI's modernization project. For example, they point out that the FBI had an extreme shortage of experienced project managers, contract managers, and senior IT managers with good communication skills.

Furthermore, the FBI operates under a number of external constraints that inhibit its flexibility. For example, congressional approval is needed to take any actions or make any changes that exceeded \$500,000. The committee pointed out that such constraints are inconsistent with the expectation that the FBI could move quickly to redesign itself and deal effectively with new challenges