Historical Work Record
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2002-2003 LLNL

Hiring and Responsibility
<u>4 February 2002</u> I was hired as a software engineer with a title of Computer Scientist to develop algorithms used in the Integrated Computer Control System ICCS. This is the software control system which controls the experimental setup, alignment, shot and diagnostic data reduction for each Shot experiment in the NIF. A NIF Shot is the experimental test sequence which fires 192 lasers into the Target Chamber striking the Deuterium target. Within two weeks of being hired I was introduced to my assignments; I was to develop and write two software modules where the final product was software code written in the ADA computer language. My contributed code was compiled along with a greater portion of computer control code called the Framework completing the computer control system for the NIF.

Task #1, Start-up thread from TAXON List
<u>12 February 2002</u> Task #1: Write a piece of software (component to a start-up thread) that initiates hardware components in the NIF during the start-up phase of the ICCS control system. I was given two of these threads to write but soon discovered there were a total of 40 similar start-up threads that were implemented identically. Each of the start-up threads were assigned to a responsible engineer.

<u>19 March 2002</u>   I completed the first compilation and execution of the task assigned to me, a total of four weeks had passed since the task was assigned. In the weeks following I re-wrote this single start-up thread *fourteen times* due to engineering changes ordered by the Technical Lead and the Lead Engineer. I looked for a better way to complete this task. Rather than write the thread by hand again, I chose to write a program generator which took the input file (a list of hardware in a spreadsheet called a TAXON List) as input data, and generated the source code in ADA for the thread. I distributed this code generator (via email) as a tool that each responsible engineer could use to generate his thread instead of coding it in a much slower fashion by hand.

<u>25 June 2002</u>   In a meeting with my Technical Lead I am told the tool is a waste of my time, that I do not follow the "Livermore Culture". Following that meeting I immediately approached two veteran PhDs from the Lab (J. Woodruff who retired in 2002 and Steven Lewis newly hired from BNL) in the offices next to mine to explain what I had done and to see if he had any objection to my approach. They offered no objection. In fact Steven admitted to building tools for process automations while at Berkley National Labs.

<u>12 July 2002</u>   In a meeting with the Lead Engineer I am told the development of this tool is an ineffective use of my time, despite having hand-written the same thread fourteen times. Presumably following Livermore Culture each responsible engineer should also re-write their forty remaining start-up threads by hand also (40 x 14 = 560 re-writes), that would be an effective use of Laboratory time!

The Start of Harassment

19 April 2002 After distributing this tool and inserting the completed code into the ICCS Framework, I considered the task complete and job finished. In a brief meeting with my Technical Lead Engineer he gestured the tool was a "thumbs up" idea.

24 July 2002   The final 2.9.1 revision of the start-up threads are delivered to the software Framework.

23 January 2003 Six months following delivery of the completed code, my Supervisor confronted me and demanded to know why I had not submitted code from Task #1 for compilation in the ICCS control system. My Supervisor then confronted me about taking this approach and insisted that I should instead hand-edit the code like everybody else does presently, and that my automation tool was inappropriate for the NIF engineering task! I was further told that I do not work within the culture of LLNL. I explained my code was submitted months earlier (July) and indeed was executing in the main control loop ever since the submission. He insisted the code had not been submitted. He called a meeting with myself and another Lead Engineer included whereby both told me the code was absent from the main build. I then proved to him and the Lead Engineer that the code executing in the main control loop had my water mark on it - an identifying label on each code segment I produced. My Supervisor left me in a huff with no further comment.

Task #2, Collision Avoidance System

12 July 2002 My second major task was to develop in software, a collision avoidance system to prevent two robot positioners (the TARPOS and TASPOS) from colliding with each other and with other instruments (DIM, SIM) inside a 10m sphere called the NIF Target Chamber. I began the task by performing a historical discovery in the archives for documents that describe what the collision avoidance system was expected to do. I discovered there was merely a high level discussion on the topic in a single document. Missing better information I interviewed several engineers for information about this task.

23 September 2002 During discovery I met Lee Pittenger, a senior engineer who was introduced as the LLNL resident expert on the kinematics of the robot positioners. I read a document he wrote (UCRLAD-1269S5Rev 2 l National Ignition Facility Sub System Design Requirements "Target Positioning Subsystem" SSDR 1.82 L. Pittenger October 26 1996) which was supposed to describe in kinematic geometry how this robot positioned itself in three dimensional space. Despite the spherical target chamber where spherical coordinates would be most appropriate, his derivation worked the entire problem in Cartesian coordinates but *leaving out the third z axis*! Further, the derivation he wrote had no diagrams showing what coordinate system his derivation was based. I met with Lee Pittenger to discuss his derivation, and for an hour he spoke about his derivation without ever drawing a single diagram of what he intended to prove. I asked him for a diagram of the coordinate system his formulas referred to, again he refused to draw one. I dismissed his work entirely and began my own derivation.

9 December 2002 Following this discovery I prepared (wrote) my own specification

documents and called a design review for all development engineers and managers to attend. In anticipation of the review I prepared hand-outs, prepared the conference area in building 491, broadcast email to the attendees, and scheduled the design review meeting. At the appointed hour, *NOBODY* showed up to attend the meeting. I distributed my specification document via email to the engineers in my group asking for comments. No comments were returned.

9 January 2003   I developed the entire kinematic problem in three dimensional space, and checked the formulations in a spreadsheet. The computations agreed very well with the same computations done in a CAD package (Pro-Engineer) of the TARPOS/TASPOS developed by the CAD designer Imants Reinbach, so I considered the whole development a careful success so far. The reason this approach was important was the formulations I developed could be cast in ADA code and used as part of the control system. The robots would not need a third party system like MathWorks to control the positioners from outside the control system.

5 February 2003   I presented this work to two levels of management and they seemed to grasp the concept, but were unfamiliar with the mathematics and methodology. I expected some probing and challenging questions from the attendees about this approach, they offered none. I experienced this response before, management would challenge the implementation I used (how to complete a task, tools to use, procedure to take) to complete a task but could not challenge the methodology and the result (precision, repeatability, accuracy, performance). I draw this conclusion, because there were no specifications written to define engineering requirements, there were also no criteria to define success or failure for the completed task. A design review presented in this climate will get little constructive feedback.

Task #3 Camera Internal Video System (CIVS)
10 September 2002 Operators of the NIF have no way to visually see inside the target chamber during an experiment. A camera video system (CIVS) was conceived for that purpose which also supports the collision avoidance task. I explained to my Supervisor the investigation of CIVS was necessary to support Task #2. I asked for a new charge number to support the video effort, despite the change in tasks, I was instructed to charge to the same software account as Task#2.

4 December 2002 More harassment; my Supervisor asks me who gave authorization to begin work on the CIVS video system. I volunteered I said, since it was an integral part of Collision Avoidance, Task #2. At some point an optical survey must be made to calibrate the target positioners inside the Target Chamber, the video system was conceived as a means to view the Target Chamber interior and assist with the survey. Supervisor then said to back-charge the CIVS account for time charged to software development account in order to reflect the time actually worked on CIVS.

Task #4 Bottom Loader Canister Control System
25 September 2002 My Lead Engineer requested I explore a re-write of the software which controls the Line Replaceable Unit LRU in building 432. I interviewed a

responsible engineer there named Ray Abounader about the control software for these devices. Ray admitted there were no requirement specifications for the development nor were there any design documents. The only documentation to read was the code itself, hastily written in the 'C' language. I recognized immediately there would be little I could contribute to this development without specifications. Like most software subsystems I encountered thus far, this one was also rudderless and without a heading or requirement to meet. Shortly after I began this task, the Lead Engineer removed me from the task with little explanation.

Missing Documentation on ICCS
21 February 2002 I attended the weekly Beam Control meeting hosted by my Supervisor where he told the group the funding for NIF was expected through 2005 but could likely end next year 2003. If funding was in jeopardy he said, work tasks would be cut out of the development program namely 1) Documentation 2) Regression Testing 3) Exception Handling. This was my first clue to the program being in trouble with the admission of management that the resources to produce documentation would be compromised.

After my second month on the job I noticed the suspicious lack of documentation for the ICCS. There were few documents on anybody's desk and the on-campus on-line documents appeared to be very general in nature, not of the type and scope required of a sophisticated control system for NIF. I probed the on-line documentation to try and find documents which specify the requirements for the software I was tasked to produce, and any refined documents that would be necessary to define the lower level details. There were none.

Readers can do a similar search yourself from outside the Laboratory. I dare anybody to find a Software Requirements Specification for the ICCS at "Information Bridge", the site prepared by the DOE at http://www.osti.gov/bridge/basicsearch.jsp . This is hugely significant because the SRS is the contractual agreement between the Client (DOE) and the Customer (LLNL) on what will be provided by the completed ICCS.

I visited the documentation control expert on the program to understand what the specific nature of the document tree was, and how it was organized. With her assistance I found the trunk of the document tree, but virtually every branch was merely a facade with no specific details underlying the document branch.

Every modern software development task of any significant magnitude demands at least four or five documents to specify how the software will be written and how it will perform. These documents are a SRS (Software Requirements Specification), a SDD (Software Design Document), a SQA (Software Quality Assurance), and more documents for verification, validation and software test, interfaces and the database. I found only a high level requirements specification for the control system which lacked any sufficient detail to design the system we were expected to produce.

Illusions of Excellence in Software Engineering Process
In the marketing campaign to promote the technical prowess of this project, NIF

managers publish technical papers for technical community to savor. Notice the papers always feature the same authors (Dr. E. Moses is missing from this one).

> "SOFTWARE ENGINEERING PROCESSES USED TO DEVELOP THE NIF INTEGRATED COMPUTER CONTROL SYSTEM" A. P. Ludwigsen, R. W. Carey, R. D. Demaret, L. J. Lagin, U. P. Reddi, P. J. Van Arsdall LLNL, Livermore, CA 94551-0808, U.S.A.

Read the Summary section of this paper, the link is provided here http://accelconf.web.cern.ch/accelconf/ica07/PAPERS/ROAB01.PDF. The summary states

> "Rigorous application of software engineering practices can deliver reliable large-scale control systems for complex physics machines."

It is evident the NIF management team and the engineers actually believe they execute a true software process and lead the software development community by this example. Yet to develop the ICCS control system software, there is little documented evidence to demonstrate this software process.

19 April 2002   A note from my engineering notebook reads: "Nobody uses Rational Rose to store db design." Rational Rose is a software design tool that is used to implement the engineering practice referred to in this Summary. This is a clear contradiction from the published paper, nobody on the NIF ICCS program were using the design tools ascribed by NIF management for implementation of "software engineering practices".

29 October 2002   In a weekly Beam Control meeting hosted by our Technical Lead engineer, the Lead said "our software process is working because the number of Software Change Requests SCR's is increasing". Indeed a graph presented by the head of quality control Uma Reddy showed the number of SCR's were growing exponentially. In software quality circles this indicates a drastic failure of software process engineering. The graph more likely shows that software requirements have not been defined in the beginning of the project which results in growing number of change requests to an immature design. It was abundantly clear to me that in this case the Technical Lead did not understand the concepts in software engineering process.

Appointment with Dr. Edward Teller
December 2002 When I was a youngster I grew-up on the Hertz Ranch in Woodland Hills California. My parents were employees for John and Fanny Hertz and we lived in a guest house adjacent to the Hertz residence. It was there where I met Dr. Edward Teller for the first time. John and Fanny Hertz met with Dr. Teller many times at the Hertz Ranch during the days when Teller was planning the facilities and funding for Lawrence Livermore National Laboratories. I met Dr. Teller again as a college freshman when he advised me on my university studies. In 2003 Dr. Teller was in failing health but managed to commute from his home in Palo Alto to Livermore on Tuesdays and Thursdays.

10 December 2002   I made an appointment to see my old family acquaintance and one Tuesday prepared to visit him. My plans were intercepted by my Supervisor who told me I could not see Dr. Teller without an escort, and I needed a specific special clearance to enter the area where his office was located. My Supervisor insisted that he would provide escort. Obviously my supervision would compromise the issues I wished to discuss with Dr. Teller, so the trip was postponed pending the issue of clearance and a re-schedule. About a week later I called Dr. Teller's office to re-schedule in January but was told he was no longer available for a visit with me.

Unescorted Foreign National
On this particular day I was returning from another building and I entered my building (491) from the west side. Once inside the building I encountered and Asian about 5'11" tall who asked me for directions. I noticed immediately he was a foreigner from his thick Chinese accent, then I noticed he was not wearing a security badge and dosimeter. He produced a visitor badge but had no required escort with him. I took him to the librarian's desk who telephoned the office of his assigned host. When the escort arrived from inside building 491, I released the "visitor" to this escort. I don't know how the visitor gained access to building 491, this building has an airlock security door that requires a security chip badge for secured entry. This foreign national certainly gained access to building 491 with help from someone inside.

Meeting with Management Shunned
13 November 2002   I had the derivation of the robot kinematics in a spreadsheet and it agreed with a CAD model. I reached a point where I needed to know what was required of the robot itself to proceed with a software design. Since nobody attended my design review, I decided to catch my Hiring Manager and ask him how I was supposed to design software when the requirements of the collision avoidance task were not conceived or defined. I stopped this manager in the hallway once and tried to explain my situation. I could not proceed without review from other engineers. He slipped passed me explaining he was in a hurry to another meeting.

December 2002 Sent email to Hiring Manager to get status on software requirements document and software process issues. No response from manager.

February 2003 Repeated email to Hiring Manager, received no response.

22 February 2003 I made an appointment with Hiring Manager through his secretary, and at the appointed time I went proudly to his office prepared to explain our next steps; if no one could inform me how to proceed, I would make more assumptions and proceed alone. I reached his office and walked in. My Hiring Manager was busy reading something on his computer screen, when he saw me he bolted from his chair and brushed past me out his office door. He said he had another "appointment in building 591". I called his secretary and made yet another appointment a few days later. That meeting never occurred since my termination occurred first.

ICCS Software Subsystem Testing
22 January 2003 My colleague Luciana asked for my help running a test on the robotic positioners inside the target chamber. This was a subsystem test where the software was allowed to control movement of the robots inside the chamber without any operator intervention or manual interference. We quickly discovered that the robot was allowed to run past the safety kill switches at each joint extension. The software was intended to shut down the stepper motors when the safety switches were exceeded, but clearly the behavior we saw was an exception to any such requirement. The switches were tripped yet the motors continued to operate driving the robot into a support column that supported the roof over our heads! Unexpectedly as the robot moved, a vacuum chamber nearby became entangled with the arm and was lifted off the floor by the motion of the arm. I wrote up the test report with those discrepancies and we submitted the results for review by the subsystem Deployment Manager. Notably on 12 February 2003 during another experimental test the mechanical engineering department reported that a collision had occurred between the TARPOS and TASPOS inside the Target Chamber.

Here is a sequence of events which occurred during our test.
22 Jan 2003   Messina submits a request to Supervisor and Technical Lead for Les' assistance in TC TASPOS software test since Les is also an expert in mechanics, structures, and materials
28 Jan 2003   Miklosy and Messina point out safety and mechanical/structural issues that could damage TASPOS to responsible engineer. Luciana later explains issues to Hiring Manager in NIF corridor (mentions Les in attendance)
29 Jan 2003   Miklosy and Messina attend meeting led by responsible engineer to discuss issues found previous day. Problems demonstrated to gathering of engineers and technicians gathered in TC next to TASPOS.
14 Feb 2003   Risk analysis meeting (FMEA) by Bob Nyholm (Messina attended but Miklosy was not invited).

Black Friday Termination Day
28 February 2003   I had just finished giving a status report on Task #2 to my Technical Manager and a Lead Engineer in my office. I presented the agreement of CAD results and my computed solution for the robotic positioners. The Lead Engineer walked out with a digital copy of my computation spreadsheet and some documents describing their operation.

Suddenly my Supervisor, my Hiring Manager and the Division Leader storm into my office. The Division Leader announces that my services are no longer needed and he hands me a termination letter. The letter says my reason for termination was "unacceptable performance", and these three managers begin to remove my books from the shelves of my office.

I asked the managers if they could elaborate on the meaning of unacceptable performance since I had also received a commendation letter about my good performance from the

same Hiring Manager. No explanation was offered, instead the Division Leader said if I insisted on causing trouble, he would call security to have me removed. They then announced that the contents of my office will be shipped to my residence and I am to proceed with them immediately.

Within 15 minutes they had packed me into a car minus my professional materials, stripped me of my security badge, drove me outside the main gate of the Livermore fence and left me standing on the sidewalk. While in the car the Division Leader said "Messina is next". I telephoned my carpool (Messina) describing my circumstances, that my badge was confiscated and I could not re-enter the Laboratory.

Confiscation of Professional Materials and Destruction of Record
About two weeks later I received a telephone call from the Division Leader, my personal items, books, notes, references would not be shipped to my house but rather I should pick up my belongings from the Laboratory. I protested my termination again and asked for an explanation, none was given.

After carting home about 10 boxes of books, I unpacked the boxes to find the managers had removed all my notes, derivations, datafiles, a back-up CD containing all my work, and letters. They lifted every scrap of evidence that I had ever worked at Lawrence Livermore National Laboratory, and they were careful to remove the commendation letter from my Hiring Manager that described the good work I was doing for the Lab.

Performance Appraisal and LLNL Employment Record
June 2002 The human resources management plan (LLNL PPPM) requires that employees prepare a Personnel Interim Review (PIM) twice a year. The PIM records the employees goals and objectives while employed at the Laboratory and also contains the performance evaluation recorded by the Supervisor. In June I prepared my first PIM recording my tasks and accomplishments for the semester. I submitted the completed PIM to my Supervisor for his comments and completion. The completed PIM was never returned to me with review comments and signatures.

January 2003   I prepared the second mandatory PIM as required by PPPM in the new format required by all departments. The form was submitted to my Supervisor, but again the completed form was never returned with completed comments.

13 March 2003 In the weeks following my dismissal date (28 February 2003) I telephoned the Personnel Office at Lawrence Livermore National Laboratories and requested a copy of my employment record. Under direction of the UC Personnel Process and Procedures Manual (PPPM) the Laboratory is required to record personnel evaluations in the Employment Record and surrender them to the employee when requested.

The clerk complied with my wishes as though my request was ordinary and her response would be routine. She informed me the record would be mailed to my home address in a few days. A few days passed, the employment record arrived and it was delivered with

the employment office on the return address. I eagerly opened it anticipating a record of reprimand which would support the Lab's accusation that my performance was unacceptable. I also expected to find a record of my performance evaluations made by my Supervisor. Instead the Personnel Evaluation document was **blank**, no entries of any type were included on the record.

FOIA
<u>6 August 2003</u> I attempted to retrieve my letters of commendation from my Supervisor and a copy of my work from my office computer. Despite giving explicit directions to federal investigators to return copies of my project binders, my emails, my correspondence, and my computerized project records, LLNL eventually sent a thirty pound box of chaff. They sent printed pages of the pre-installed bookmarks from the Netscape browser, nothing more was included. LLNL clearly skirted their responsibility under FOIA to comply with the law.

Complaint to DOE
<u>18 March 2003</u> I complained about the shoddy work and complete disregard of engineering process to the on-site Department of Energy representative, Scott Samuelson. The reader should notice I approached DOE *after* I was terminated. I sent him a graph prepared by the NIF ICCS quality control engineer showing the exponential growth of software change orders (SCR's) and records of other events which occurred in the NIF program. Scott's official reply was my multiple complaints were all "unsubstantiated".

Personnel Key
… removed