at the budgeted cost. Full success rarely happens. Some research shows only one in eight IT projects are successful, and 68 percent of IT projects resulted in a waste of resources and damage the standing of IT professionals.[11]

Computer industry professional journals are rife with statistics showing a poor performance by the industry. A large recent study looking at 5,400 IT projects reports that the average cost overrun is 45 percent and major delays are routine.[12] When completed, they generally provide only 56 percent as much utility as promised, and 17 percent of IT projects go so badly that they threaten the very existence of the purchaser.

There is a large body of published materials and training classes pointing out what is necessary to avoid these difficulties. These reports were published starting many years ago. The lack of success of complex software development continues nevertheless. Many of the departments the CGJ's IS Committee interviewed seemed aware of these studies and emphasized the same tools recommended by the studies. Some departments, however, did not: One department CIO stated he depended on "great programmers."

5. Measuring success

Given the industrywide difficulties, have county software development programs been successful?

How does one measure a successful application or project? The Registrar-Recorder says it uses productivity metrics (how much work could a given employee complete before and after the introduction of the new software). LASD says it uses productivity metrics. DPSS uses a "post mortem" approach. Other departments the committee interviewed said "nobody does that" when asked about post mortems. Certainly increased productivity is a crucial measure. But there must also be some measure of the efficiency of the software development process. The county CIO has no records of either process and thus no measure of whether software development has been successful.

Looking at projected cost and actual finished cost is an overly simplistic way to judge success. The real start of a project may substantially precede the awarding of a contract on that project. Estimating the cost for something new is difficult and can be inaccurate. There seems to be a common practice countywide to include contingency funds that cover unforeseen expenses. Cost figures do not gauge the extent of functionality of the software.

[11] "The Relationship Between Strategic Leadership, Human IT Infrastructure, Project Management, Project Success, and Firm Performance," by Isabel Rivera-Ruiz, in the International Journal of Information, Business and Management (May 2015).
[12] McKinsey and Company and University of Oxford 2012. http://www.mckinsey.com/insights/business_technology/delivering_large-scale_it_projects_on_time_on_budget_and_on_value.

To inquire further, the CGJ IS Committee sought documents from each department it interviewed that showed (1) the expectations at the start of the department's projects and (2) an evaluation of success on completion. These departments provided the committee with system requirement documents. With the exception of the Assessor's half page, however, they provided no documentation that evaluated the efficiency or success of the software development project. See Appendix 1. As the adage goes, "You can't manage what you can't measure."

6. Mitigating the risk of failure

a. System development

To mitigate the risk of failure, most developers use the system development cycle or a variation of it. The system development cycle is usually shown in three to six steps but can be expanded to show substeps.

Below is a typical version of the system development process (as defined by Alan Freedman in the Computer Desktop Encyclopedia) with substeps. The seventh step is production and not part of the development process except as a goal.

1. Systems analysis and design
    - Feasibility study
    - General design
    - Prototyping
    - Detail design
    - Functional specifications
    - Technical specifications
2. User sign-off on specifications
3. Programming
    - Design
    - Coding
    - Testing
4. Implementation
    - System testing
    - Training
    - Conversion
    - Installation
5. User acceptance testing
6. User acceptance and sign-off of new system
7. System is in production

b. Project management

The management of project development is traditionally done by creating a detailed task list. Major tasks are divided into subtasks. Each task has an estimate associated with it, along with an estimated begin date and end date. It is often recommended that each task should take no longer than one week. Each task completion date is known as a "milestone." A person is assigned to do each task. A larger picture of the project is produced and displayed by use of a Gantt chart (bar chart) or a Program Evaluation and Review Technique (PERT) network chart—a pictorial display of the project. These are sometimes combined with the Critical Path Method, which displays the tasks of the project that cannot slip without impacting the end date and those tasks that can slip without impacting the end date.[13]

There are 395 new application projects across more than 30 county departments, as summarized from data provided by the county CIO. The departments with the highest number of applications under development were LASD with 67, DHS with 65, and DPSS with 61.

Four departments are implementing new systems whose combined costs would exceed $1.6 billion. The four departments are the Assessor, Auditor-Controller, DHS, and DPSS. None of these projects used the same method of development or project management.

The County Assessor is developing a new property-assessment system to replace the present antiquated system. The new system will carry the assessment data for land and buildings within Los Angeles County as before but will also include Web access to online copies of building permits, deeds, overhead satellite views of the property, and street-level views of the property. The major problem the Assessor encountered in development of this system is to manage 2.5 million files.

The Assessor is using the Agile approach, which is a variation of the system development cycle. Agile parses the system into small pieces that can be deployed to production in a few weeks, rather than building the entire system at one time and waiting many months or years to implement.

Project management and development cycle almost merge with the adoption of the Agile development approach. Working software is the principal measure of progress. According to the Assessor, DAPTIV Project Portfolio Management software is used to track and inventory modules. An evaluation, planning, and review meeting is held each month. A post-mortem review is done at end of each module.

[13] Managing the System Development Process, by Deloitte Touche.

The Auditor-Controller is building a new Human Resources system to replace its old system. After looking at packages and the four bids resulting from an RFP, the Auditor-Controller decided to cancel the RFP project and build its own system, to be run on ITS Data Center hardware.

The Auditor-Controller uses middle ware[14] to define the processes and generate program code, in place of the traditional system development process.

The Auditor-Controller established a project Advisory Committee consisting of representatives from the CEO, county CIO, Department of Human Resources, and ISD. The vendor lead person and Auditor-Controller lead person co-manage the project. Milestones were established with penalties on the vendor for being late. Only the Advisory Committee can change dates. There will be countywide phased implementation module by module and department by department.

DHS had implemented the same patient-following system at each of its six major hospitals. Because each hospital operated independently of the others, each of their systems was modified and enhanced in different ways, and the six hospital systems did not communicate with one another, so there was not one comprehensive, unified, case-following system. The goal of the current DHS project is to replace the six major individual-hospital case-following systems with one single integrated system, called the Online Real-Time Centralized Health Information Database (ORCHID) system.

Instead of modifying one of the existing hospital systems to include everyone's functionality, an RFP was created for a new system with several key requirements, among them that:

1) the vendor must provide a platform (hardware) to run its system;
2) Los Angeles County be able to use the vendor's computer platform to do its hospital production; and
3) the vendor's hospital system must have been in production on that computer platform for at least one full year.

This RFP excluded upgrading the existing systems and integrating them into one system. It also excluded purchasing the Cerner[15] system and running it on Los Angeles County computer hardware, although the DHS representative said the contract provided an option to do so. According to DHS, it did not exercise this option because ITS uptime availability was not sufficient to run a hospital system.

[14] Middle ware is an infrastructure that facilitates creation of business applications and provides core services.
[15] The winning proposal for the ORCHID system was presented by Cerner. The Cerner production system and computer hardware are located in Kansas City, Missouri.

A milestone methodology was used to track the steps in this project. The implementation was organized to convert each of the six major hospitals and their associated clinics, one at a time, according a fixed schedule. Harbor-UCLA was the first of the Los Angeles County hospitals to go onto this new system, in November 2014, and the other hospitals will be phased into production through February 2016.

The major mission-critical system for **DPSS** is the LEADER system. It is more than 21 years old, is written in COBOL, and runs on a privately owned UNISYS mainframe in Minnesota.

The existing LEADER and several smaller systems, 10 applications in all, are being replaced with one single integrated system, called the LEADER Replacement System (LRS). The LRS project will integrate:

- CalWORKs (California Work Opportunities and Responsibility to Kids) (includes GAIN and Cal-Learn)
- Food Stamp (Supplemental Nutrition Assistance Program, now called SNAP)
- General Relief (for those not qualified for State or Federal aid) (includes General Relief Opportunity for Work, GROW)
- CAPI (Cash Assistance Program for Immigrants)
- Medi-Cal
- IHSS (In-Home Supportive Services)
- Foster Care Programs
- Kin-GAP (Kinship Guardianship Assistance Payment Program)
- Adoption Assistance Program (AAP)

DPSS's development project uses the Service-Oriented Architecture (SOA) variation of a standard development cycle. SOA is a design, development, and implementation pattern based on distinct pieces of software, each providing a unique functionality and brought together to form an integrated system via common communication.

DPSS's standard project management methodology is being provided by the Microsoft Project package. Weekly status meetings are held to review the progress and status of each project component.

Four departments—**Fire, LASD, Registrar-Recorder, and Public Defender**—also have systems under development but not on the scale or at the cost of those above.

The **Fire Department** occupies 240 buildings and must track and maintain firefighting equipment. The mission-critical system for the Fire Department is the Computer Aided

Dispatch System (CAD). The CAD system runs at Northrop Grumman on Hewlett Packard hardware using a UNIX operating system. It is programmed in COBOL. The system is very reliable but antiquated. It is the only one of the department's systems with a backup site.

The department stated it was preparing an RFP for a replacement system. But subsequent to this interview, the Board of Supervisors approved a five-year contract to continue running the CAD system at Northrop Grumman.

Other systems important to the Fire Department are:

- Automated Employee Staffing system. This is an ad-hoc system put together by a former Fire Department firefighter and is used at fire stations for staffing assignments. It is no longer supported, and there are software variations among the fire stations. The Fire Department tried, unsuccessfully, to replace it with a COTS system.
- Badge Tracking Application
- Maximo Inventory System

The department wants to incorporate GIS into the new systems.

Development characteristics:

The Fire Department has neither a standard written development methodology nor a project management methodology. It prefers buying to building applications.

Mission-critical systems for the **Public Defender** are:

- Case Management System (Defense Management System, special issues, witnesses, performance metrics, case load, investigations)
- Electronic Filing System
- Public Defender Archive System
- Public Defender Statistical System
- Attorney Human Resource (attorney history and assignment preferences, case load)
- Other People's Data collection system

Development characteristics:

The Public Defender intends to use Framework methodology for future development.[16] It has no project management methodology. COTS packages the department looked at were not adequate for the department's volume of data and number of users. It hired a consulting firm to help prepare an RFP for new system replacement.

Mission-critical systems for the **Registrar-Recorder** are:

- Voter-management system (currently Data Information Management System, transitioning to Election Systems and Services)
- Property documents recording system (developed in-house)
- Birth, death, and marriage records
- Fictitious Business Name recording system

Development characteristics:

The department has a development manual as a guide. The department has no standard project development method. The department's development projects cost less than $2 million. It uses .NET development environment, specifically C# programming language.

LASD has 200 remote locations and stations; 22,000 users; 3,500 mobile digital computers in cars; and 1,000 mobile devices. LASD has 370 IT personnel to support this deployment.

Mission-critical systems for LASD are:

- Regional Radio Network (computer-aided dispatch)
- Deputy Performance System (under revision or enhancement)
- Missing Property (COTS)
- Non-Workable Crimes (COTS)
- Automated Jail Information System (AJIS proprietary software, runs at ISD/ITS)
- Countywide Warrant System CWS (proprietary software, runs at ISD/ITS)
- Deploying a new evidence management system

[16] Framework is a set of principles, models, disciplines, concepts, and guidelines for delivering information systems.

Development characteristics:

Systems are coordinated with ISAB. The department's biggest development problem is scope creep. Development training of key staff is by a vendor. Project-management training is provided by county CIO staff. Primarily, the department uses Microsoft ASP.NET development suite.

FINDINGS

1. Production systems are fragmented over 64 Los Angeles County data centers plus three private out-of-state data centers.

2. Development and hosting are going out of Los Angeles County hands. This means jobs and county funds are moving out of the county.

3. Software development industrywide has such a high failure rate that extra oversight is warranted.

4. Los Angeles County has no method to determine to what degree completed software development programs have been a success, and there is no permanent record of lessons learned from the experience of developing new systems.

5. There appears to be no standard system development methodology for Los Angeles County.

6. There appears to be no standard project management methodology for Los Angeles County.

7. Data security is constantly being challenged, so the Los Angeles County chief information officer has been working to upgrade and standardize security.

8. Data are not standardized within Los Angeles County chief information officer–defined clusters of departments, except within the justice (ISAB) group.

9. Some departments worry about Information Technology Services (ITS) responsiveness and ITS's ability provide a high level of service.

10. Some Los Angeles County data centers inadequately conduct backup. The most-comprehensive backup operation appears to be that of the ITS Data Center at Downey.

11. Many Los Angeles County departments worry about the disaster survivability of the ITS Data Center and the Orange County backup site. Three departments worry so much that they run their mission critical systems on private data centers outside of the county, in fact, even outside of California.

12. The Los Angeles County Board of Supervisors is moving toward consolidating most of Los Angeles County data centers into one disaster-resistant facility.

13. Los Angeles County information systems use many different programming languages. The county has no standard or guideline on how to select a programming language for use on its development projects.

14. There are no enterprise-wide programming standards for the languages that are used. There is no central guide to good programming practices.

15. In Los Angeles County, there is a countywide tendency to replace existing systems rather than modernize them, in part because COBOL is unjustifiably considered obsolete, and lack of expertise in COBOL contributes to this tendency.

RECOMMENDATIONS

4.1. Los Angeles County's chief information officer should require, upon the completion of a software development project above the Los Angeles County Board of Supervisors' cost threshold, a measurement of the efficiency of the development project, and the chief information officer should keep this measurement as a permanent record.

4.2. The Los Angeles County chief information officer should require, upon the completion of software development projects above Los Angeles County Board of Supervisors' cost threshold, a measure of the success of the system (productivity metric), and the chief information officer should keep this measurement as a permanent record.

4.3. The Los Angeles County chief information officer should establish a centralized quality control group to monitor the progress and problems of system development projects.

4.4. The Los Angeles County chief information officer should provide a system development guideline. While not meant to constrain the development approach, the guideline should standardize the steps and deliverables at the end of each step of the system development process.

4.5. The Los Angeles County chief information officer should provide a project management guideline or standard so that anyone can look at the project plan and see whether the project is on schedule or behind schedule.

4.6. The Los Angeles County chief information officer should provide training in its guidelines and standards.

4.7. The Los Angeles County chief information officer should continue to promulgate security standards.

4.8. The Los Angeles County Board of Supervisors should provide ITS and the other county data centers with secure facilities.

4.9. The Los Angeles County Board of Supervisors should promote production hosting by Information Technology Service.

4.10. The chief data officer of the Los Angeles County chief information officer should continue to standardize county data.

4.11. Information Technology Service should establish a council to set priorities for requests for service by Information Technology Service and discuss customer problems.

4.12. Information Technology Service should institute written service-level agreements between clients and Information Technology Service.

4.13. The Los Angeles County chief information officer should provide programming standards for each programming language used within Los Angeles County.

4.14. The Los Angeles County chief information officer should provide a guideline on the selection of a programming language for the development of new systems.

4.15. The Los Angeles County chief information officer should recommend that departments with COBOL-based systems but insufficient numbers of COBOL programmers should consider using Information Technology Service support.

4.16. The Los Angeles County chief information officer should provide in-house training and formal classes as needed.

4.17. Where feasible, and when the proposed centralized data facility is operational, the Los Angeles County Board of Supervisors should require the transfer of outsourced production systems to that facility.

4.18. The Los Angeles County chief information officer should require a cost-benefit analysis to be provided by the department to the Los Angeles County chief information officer to assess whether it is better to upgrade the existing system or acquire a new system.

REQUEST FOR RESPONSE

Recommendation Number	Responding Agency
4.1–4.7, 4.10, 4.13–4.16, 4.18	Los Angeles County Chief Information Officer
4.8, 4.9, 4.17	Los Angeles County Board of Supervisors
4.11, 4.12	Los Angeles County Internal Services Department
4.11, 4.12	Information Technology Services

ACRONYMS

AJIS—Automated Jail Information System
CAD—Computer Aided Dispatch System
CDO—chief data officer
CEO—chief executive officer
CGJ—Los Angeles County 2014–2015 Civil Grand Jury
CIO—chief information officer
CISO—chief information security officer
CJIS—Criminal Justice Information Services
COTS—commercial off-the-shelf
CPM—Critical Path Method
DHR—Department of Human Relations
DHS—Department of Health Services
DPSS—Department of Public Social Services

DPW—Department of Public Works
GIS—Geographic Information System
HIPAA—Health Insurance Portability and Accountability Act
HRS—Human Resources System
IS—Information Systems
ISAB—Information Systems Advisory Board
ISD—Internal Services Department
IT—information technology
ITS—Information Technology Services
LASD—Los Angeles County Sheriff's Department
LRS—LEADER Replacement System
ORCHID—Online Real-Time Centralized Health Information Database
PERT—Program Evaluation and Review Technique
RFP—Request for Proposal
SOA—Service-Oriented Architecture
UPS—Uninterrupted Power Supply

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Jim Contreras
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This report is dedicated to the memory of "Amazing" Grace Hopper.

APPENDIX 1

After conducting interviews, the CGJ's IT Committee wrote to the departments and asked them several follow-up questions. Question 3 was designed to find out whether each department had evaluated the software development process at the conclusions of its projects. This question was also designed to limit the responders' choice of projects so they would not be cherry-picking.

QUESTION 3 reads as follows:

> In addition to the information requested above, the IS Committee would like summaries, or cost/benefit analyses, or scope definitions, or portions of larger documents that will provide the following information for the first three software development projects completed in 2013 (or if fewer than three were completed in 2013, the last three completed anytime before 2014):
>
> a. A document created at the outset of the project defining the project describing the scope [sic]; the amount of time the project is expected to take; the anticipated cost in dollars and employee hours; and, a document reflecting the anticipated cost of the project broken down into hardware and software cost.
>
> b. The evaluation of the project at its completion, including the final cost.
>
> c. The reports measuring the change in the department's business performance attributable to the introduction of the project.
>
> Please call…if clarification of the above-referenced information is needed.

RESPONSES TO QUESTION 3

Assessor

The Assessor provided two documents regarding its Building Plan Acquisition System. One document was a Project Charter describing the project. The Assessor also submitted the Project Final Summary, which summarized the project description and the tools used and included a half-page evaluation of the development process addressing "issues confronted" and "main lessons learned." The document stated the project achieved all of the functionality planned but was 17 months late. Cost figures and productivity measures were not included.

The Assessor also provided defining documents for its Enterprise Content Management System and Personal Property Imaging Processing Project but did not include any measure of evaluation of software development nor productivity metrics.

Auditor-Controller

The Auditor-Controller (Auditor) gave us "board letters" for one large project that was expanded over several years. The documents gave a good description of the status at the time the start decision of each segment was being made. The Auditor also gave us a document showing the final cost.

The Auditor said it made monthly evaluations of progress during development (a common modern practice), but the independent evaluation of the completed phases has not been conducted. Its goals for the project were standardization and modernization. The Auditor did not centrally track productivity changes. It did not supply any measure of evaluation of software development nor productivity metrics.

The initial contract for this project was for $17 million in 2004. Amendments during the following years took the cost up to $223 million including a contingency fund of $23,255,801.

DHS

DHS initially responded that it doesn't conduct any in-house software development. The committee informed DHS that the committee thought the question was valid even as to outsourced developments. DHS then provided blank sample forms it uses to initiate projects. DHS also cited two software development programs it had completed and said documents that capture the data requested in questions 3a and 3b were not in place for those projects but are now in place for future projects. As to question 3c, the department is not currently collecting data.

DPSS

DPSS provided a modification request specification for three separate changes to existing software. The documents did not provide costs or hours estimates, but DPSS provided that separately, as well as actual hours and costs data. The department did not supply any measure of evaluation of software development nor productivity metrics.

Fire

With the committee's agreement, the Fire Department reported on only one software project. The department provided a proposal from the beginning of that project, including a description and proposed cost. The document dated near the conclusion of the project shows payments about four times the proposed cost. That included an entry of $60,000 for "out-of-pocket" costs. The department did not supply any measure of evaluation of software development nor productivity metrics.

The Fire Department said it does not conduct formal post-evaluation reports. Success factors are identified at the beginning of a project and if met, the project is called successful.

LASD

LASD provided an approximately 400-page Request for Proposal, dated July 2013, for a biometric identification system. This development project is presumably in progress. The department did not supply any measure of evaluation of software development nor productivity metrics.

LASD also provided more than 500 pages of its Business Automation Plan for 2014–2015. This consisted of hundreds of two-page reports identifying the projects and summarizing the funding status and the value/risk assessment. The department did not supply any measure of evaluation of software development nor productivity metrics.

Public Defender

The Public Defender gave us no data about development.

Registrar-Recorder/County Clerk

The Registrar-Recorder responded about three projects with undated reports that were clearly done after completion. The department did not provide program expected or final costs nor any measure of program development success.

The first program is a pilot program. The department claims savings in mailing and printing costs, but the document does not include the cost of the program. The savings and participant numbers are much larger in the first year than in the subsequent years. The department expects to vastly increase this program.

The Registrar-Recorder says the second project didn't cost anything; it was fully reimbursed for staffing, hardware, and software costs by a four-county consortium. This project was transferred from a vendor to DHS for completion. Although joining with other counties to solve a common problem was a good idea, the statement that the project didn't cost anything seems to be a reflection of budget complexities. The consortium had to get funded.

The Registrar-Recorder says the program has provided "great operational efficiencies" and is under review by "Lean Six Sigma" to determine cost savings.

The third program replaces a mainframe legacy program. The department sees that as a cost-saving measure. The department plans to redo its other software to get it off the mainframe and avoid mainframe hosting costs and to eliminate vendor costs.

The department did not supply any measure of evaluation of software development nor productivity metrics.

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DEPARTMENT OF HEALTH SERVICES WRITE-OFF FOLLOW-UP

Virgil L. Greer Jr., chair
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DEPARTMENT OF HEALTH SERVICES WRITE-OFF FOLLOW-UP

TOPIC

The Los Angeles County 2013–2014 Civil Grand Jury (the prior jury) investigated write-offs by the Los Angeles County Department of Health Services (DHS), totaling $285 million over five years.[1] In its Final Report, the prior jury made recommendations to DHS on how to reduce the amounts of future write-offs.

The Los Angeles County 2014–2015 Civil Grand Jury (CGJ) decided to follow up on those recommendations, checking DHS's progress on implementing those recommendations. The CGJ created the DHS Write-Off Follow-Up Committee (committee).

BACKGROUND

The prior jury formed an investigative committee to initiate an audit investigating and analyzing DHS annual write-offs. Those write-offs totaled $285 million over the five fiscal years (FY) from FY 2008–2009 through FY 2012–2013, for an average of $57 million per year. The prior jury submitted recommendations to DHS to initiate corrective actions. By law, DHS was obligated to respond to those recommendations, in writing, to this year's jury. Based on these responses, the committee generated a list of follow-up questions to send to DHS, inquiring about the status of the recommended actions.

The committee reviewed the new responses, which covered FY 2008 through FY 2013. The committee created a Response Table to show the status of these recommendations and the initiated corrective action, to date.

Attachment A comprises the following:
(1) the recommendations submitted in the prior jury's Final Report
(2) the responses by DHS to the prior jury's recommendations
(3) the follow-up questions this year's jury submitted to DHS
(4) DHS's responses to the CGJ's questions

[1] Those write-offs had been authorized by Los Angeles County Board of Supervisors.