Facility Condition Assessment Practices

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ABSTRACT

Facility Condition Assessment (FCA) is emerging as a powerful executive tool for both strategic capital planning and tactical project prioritization. Until recently, FCA systems primarily were static tools for collecting deficiency information to help manage deferred maintenance backlogs. Little thought was given to the provision of life cycle data and to the integration of FCA information with other FM technology systems – particularly CMMS and project management software. With the current functionality of many FCA vendors, the usefulness of these systems extends well beyond the simple collection of static data.

This article looks at current FCA capabilities and how to effectively use and maintain FCA data as a major component of strategic FM planning.

INTRODUCTION AND NEED

Most organizations have significant backlogs of facility renewal and replacement needs. To get an understanding of the extent of the deferred maintenance backlog, organizations will often hire a consultant to assess the condition of the facility, or portfolio of facilities, and generate a report of deficiencies and corrections. If the building portfolio is large or disbursed, the organization will often engage multiple consultants to perform the inspection audit. The result is usually a report of findings consisting of deficiencies and correction data to aid the client in prioritizing problems and helping determine deferred maintenance budgets.

The limitations of such an approach include:

- The data is obsolete as soon as it is collected;
- Life cycle information is not collected;

- Quality control for large portfolios is a problem since data collection is often inconsistent between consultants;
- The FCA data is not integrated with other enterprise financial and FM systems;
- No benchmark information was derived from the data collection.

With the increasing awareness that physical infrastructure greatly effects worker performance and productivity, the need to better financially manage this infrastructure, and increased regulatory reporting requirements, organizations are increasingly turning to sophisticated technology to help manage facilities portfolios.

One of the more powerful incentives for using computer based tools for portfolio management is the result of a recent Government Accounting Standards Board (GASB) statement (particularly statement 35) requiring detailed information about the condition and stewardship of government buildings starting in June 2002. Information associated with existing conditions of buildings maintained along with costs associated with maintaining the infrastructure at an established level over time will be required in a pre-established format. The advantages for the client (in this case any local government with total annual revenues of over $100 million) are significant and it will be only a matter of time before other organizations (both public and private) require such information.

When such FCA data is available on a regular and on-going basis, it is possible to use this information in a strategic manner to help determine alternative funding strategies for short and long range FM needs.

Figure 1 below, from the National Association of College and University Business Officers (NACUBO) 1991 report "Managing The Facilities Portfolio: A Practical Approach to Institutional Facility Renewal and Deferred Maintenance (Applied Management Engineering, Virginia Beach, VA), illustrates an overview of such a facilities portfolio management model.

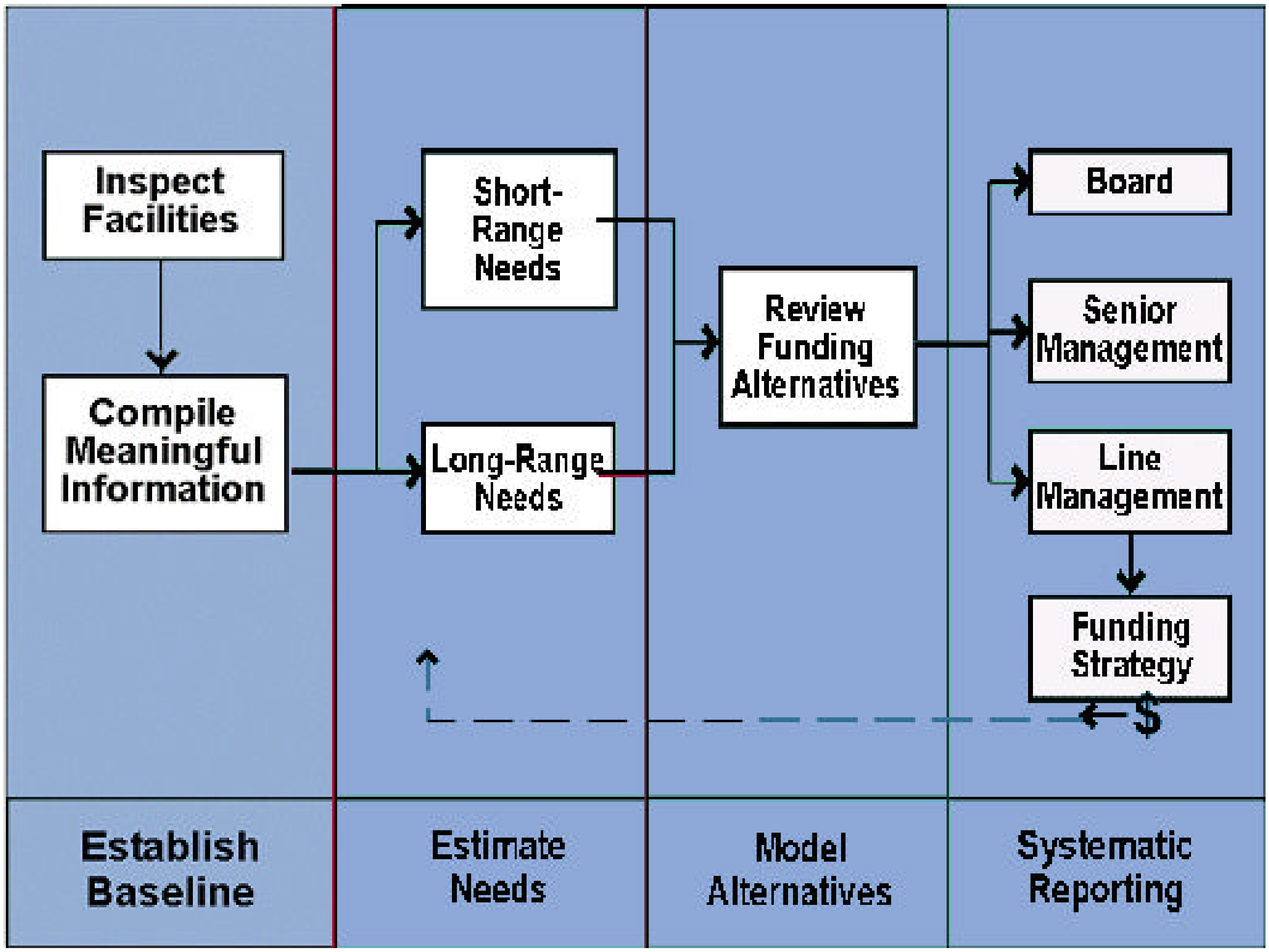


Figure 1: An Overview of the Facilities Portfolio Management Model
(from NACUBO's *Managing the Facilities Portfolio*)

THE FCA PROCESS

1. *Baseline Data*: The planning process begins with a building inspection that includes the determination of what data needs to be collected (see figure 1 above). FCA data can be quite flexible in its determination and include not only physical systems (architectural, civil/mechanical, electrical, other engineering systems, underground facilities, physical infrastructure, etc.) but include other parameters associated with space utilization, air quality, code compliance issues and even the consideration of esthetic parameters.

   Preparing for the inspection involves, for example, the determination of what systems need to be inspected, what priorities are to be assigned for maintenance and renewal deficiencies, what data associated with preventive maintenance needs to be collected for equipment, whether life/safety information is to be collected, types of standards and coding schemas that are to be applied, how cost correction data bases for deficiencies are to be used, whether space utilization data is to be collected, and so forth.

At a minimum, NACUBO recommends that the following data be collected:

- Building number / name;
- Gross square footage;
- Date of construction;
- Type of construction;
- Functional use;
- Number of floors;
- Current replacement value.

2. *Inspection Team and Inspection*: The inspection team must obviously reflect the skill sets of the baseline data requirements being collected. For large projects, or for geographically disbursed buildings, multiple teams might be deployed. The teams can be in-house or outsourced – there are advantages and disadvantages to both. If outsourced, care must be taken to insure data consistency – particularly if multiple teams are deployed, even from the same outsourcing group. Teams must work with the client to review procedures, priorities, standards and other data. Correction information must be determined. Judgments regarding whether entire systems or components of systems need to be determined. Source data (e.g., floor plans, craft codes, local labor rates, contact information, safety precautions – if required, historical data) must be gathered and calendar schedules for inspections determined. Deficiency information must be described during the inspection along with locational information, priority, type, corrective information (including craft required to perform the corrective action, quantity and timing data) and other details that will enable cost estimates (including labor and material information) to be generated for budgeting purposes.

3. *Analysis and Reporting*: Once FCA data has been collected and analyzed, the types of analysis that can be performed, is considerable. Figure 2 below depicts deficiencies summarized by category and correction costs (in this case using R.S. Means data for labor and material cost calculations):

Building Integrity	$2,139,937
Code Compliance	$964,428
Energy	$381,777
Functionality	$1,875,061
Hazardous Materials	$2,104,497
Total:	**$8,036,128**

crosstab of deficiencies by category and priority

Category **Priority »**	1	2	3	4	5	Total
ADA/Accessibility					41,741	**41,741**
Aesthetics				528,687		**528,687**
Building Integrity	10,000	1,912,251	10,455	207,231		**2,139,937**
Code Compliance	813,210				151,218	**964,428**
Energy		3,028		231,499	147,250	**381,777**
Functionality	22,987	279,720	503,368	1,003,348	65,638	**1,875,061**
Hazardous Materials					2,104,497	**2,104,497**
Total	**846,197**	**2,194,999**	**513,823**	**1,970,765**	**2,510,344**	**8,036,128**

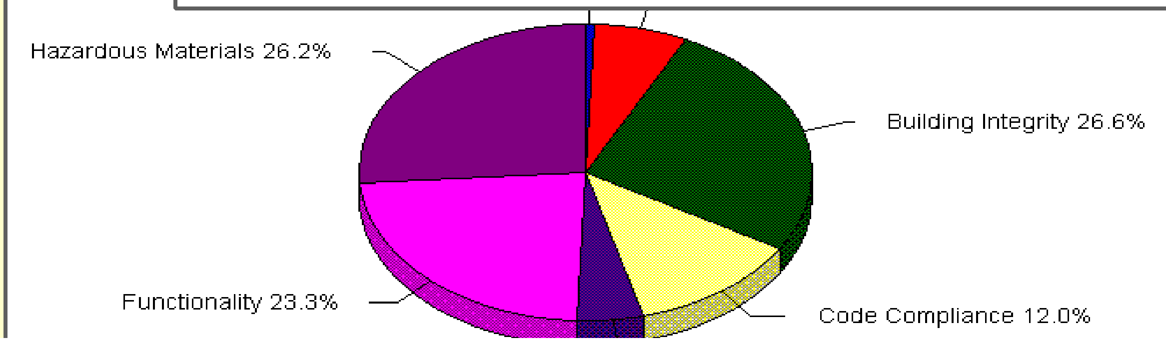


Figure 2: Deficiency Analysis (illustration courtesy of VFA, Inc.)

Another FCA analysis that is possible relates to life cycle information. For each of the building systems inspected, it is possible to estimate the current position of that system within its life cycle as well as the replacement value of that system at the end of the life cycle. Figure 3 below illustrates output from a sample life cycle data analysis.

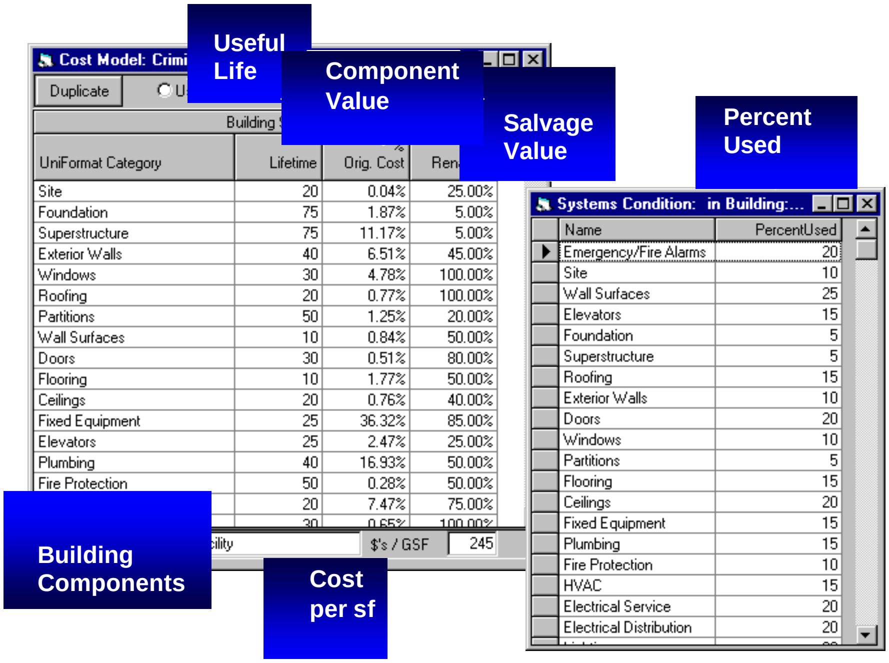


Figure 3: Life Cycle Data Analysis (courtesy of VFA, Inc.)

One of the most powerful types of benchmark data that can be derived from such information is called the Facility Condition Index. The FCI is a ratio and is used to measure the relative condition of a single building or portfolio of buildings taking into account either a specific priority or system or all systems. It is calculated by dividing the Current Replacement Value (cost of replacing an asset) of the system(s) in question by the existing Cost of Deficiencies for those same system(s).

$$\text{Facility Condition Index} = \frac{\text{Cost of Deficiencies}}{\text{Current Replacement Value}}$$

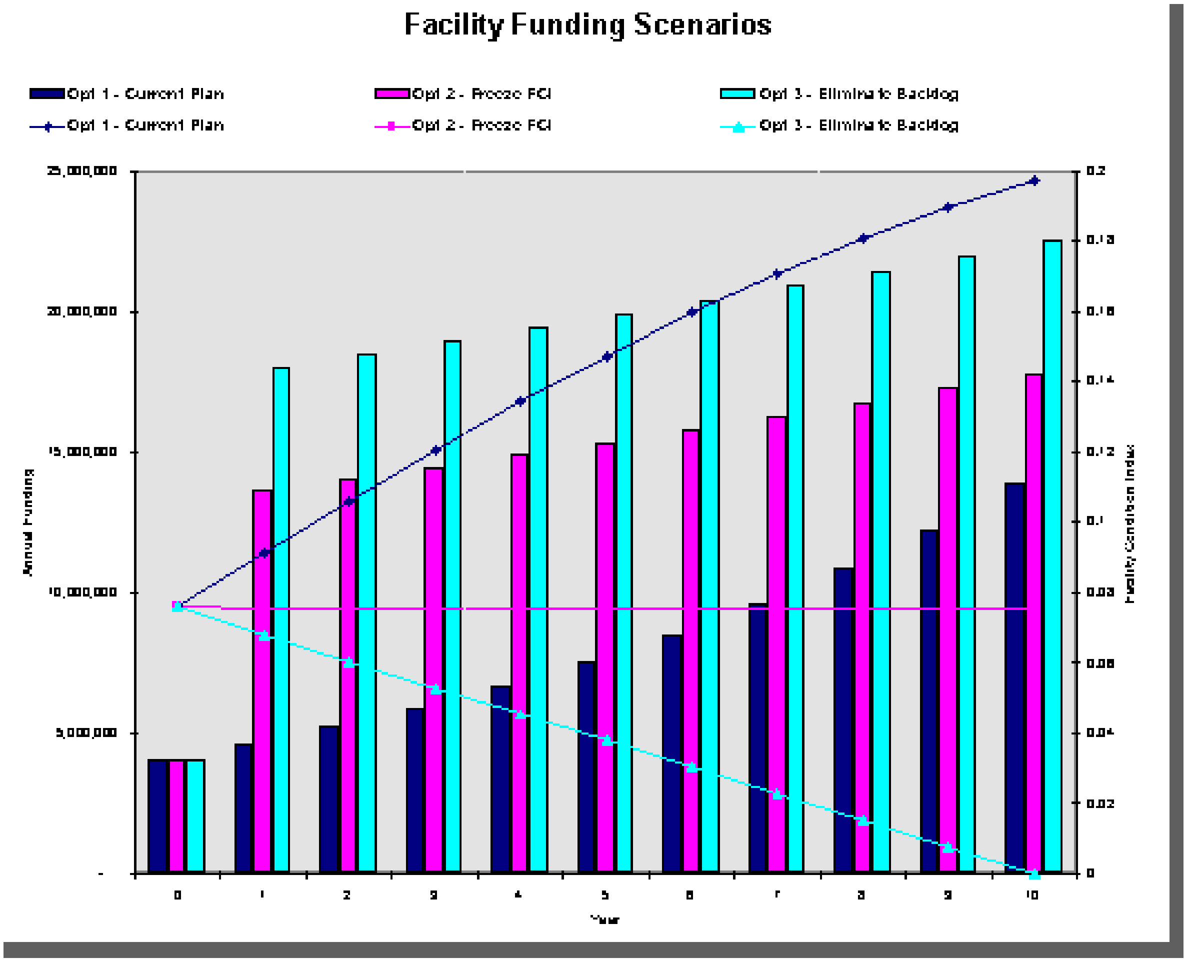
From the formula above, one can see that the higher the FCI, the worse the building system(s) condition. A new building with no deficiencies and a 100% replacement value would have an FCI of 0.

Suggested condition rations from NACUBO are:

FCI Range	Condition Rating
Under .05	Good
.05-.10	Fair
Over .10	Poor

Thus the object of the portfolio manager is to minimize the FCI – or at least to understand the FCI implications of a specific investment policy.

Using such data, it is possible to perform financial analyses over time – taking inflation into account. For example, an FCI can be calculated taking assumed annual funding levels projected over a certain time span. Similarly, it is possible to hold FCI steady and calculate the investment rate required to maintain a specific FCI. Finally, one can look at the effect on funding to achieve a desired FCI. Figure 4 below illustrates such an analysis. The curves and associated bars (representing the three funding scenarios) illustrate the degradation of the FCI at a fixed funding level; the center line fixes the FCI at the desired rate and calculates the funding required to keep the FCI constant; and the third (decreasing) curve shows the improvement in the building FCI by increasing the funding rate.



FCI

Figure 4: FCI and Corresponding Funding Requirements (courtesy of VFA)

CMMS INTEGRATION

The next issue that needs to be addressed relates to integrating the FCA database with a CAFM system. The interface should be bi-directional in that information (e.g., CAD and other database updates) needs to flow from CAFM to FCA and inspection data needs to flow from FCA to, for example, CMMS work order and, to a lesser extent, preventive maintenance modules. Additionally, as demand work orders are executed, the FCA database must be updated.

At the present time, most traditional CAFM vendors do not have sophisticated FCA modules and, conversely, FCA vendors do not have general-purpose CAFM systems.

A document needs to be generated between the client and the group performing the inspection audit to insure that the data is collected in a manner consistent with the CAFM/CMMS systems in place. At a minimum, the document should contain the following information:

- Information requirements to enable comparison between the CAFM database and the mapping of the data to be collected.
- The FCA software requirements should support, at least:
  a. CAFM Database Column Name;
  b. CAFM Description;
  c. CAFM Database field format (text, numeric, date etc.);
  d. CAFM field Length – (number of characters).
- Asset definition to feed CAFM/CMMS systems including:
  e. Frequency of the PM;
  f. Procedures Associated with the PM;
  g. Time associated with each procedure;
  h. Materials associates with each PM;
  i. Hazardous Materials associated with each PM;
  j. Setup time;
  k. Wrench Time;
  l. Clean up time.
- Provision of FCA database schema.
- Submission of sample data set for assets to test FCA/CAFM interface.
- Provision of support for CAFM layering standards for CAD.
- Provision to insure that FCA follow all building, floor and room numbering formats as well as other data standards.
- Data requirements if bar-coding is used for tagging and collecting asset information.
- Definition of Class and Class Type categories to support CAFM standards.
- Definition of deliverables from inspection.
- Definition of media format for deliverables.

Figure 4 below depicts the potential dataflow between the FCA and CAFM/CMMS system:

demand WOs
- PM WOs
- Asset inventory
- Space utilization
- CAD
- FCI
- Financial Investment Scenarios

FCA

Assessment
- Deficiences
- Materials
- Labor
- Costs
- Spatial data
- PM data
- Life Cycle data

1. Planning

- Baseline data
- Financial Planning

2. CMMS Components

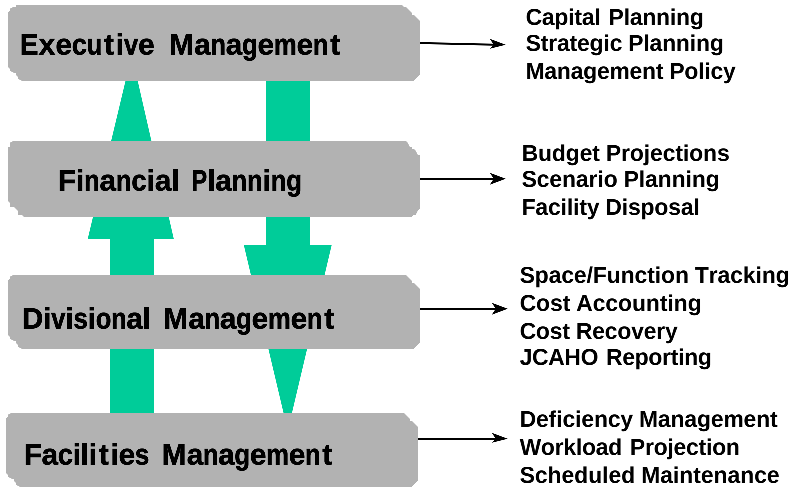
Work Order Processing
- Accounting / CPMS links
- Central Help Desk
- Purchasing links
- Scheduling and PM Links
- Preventative Maintenance Systems
- Equipment / Inventory Data Management (intelligent bar coding)
- Maintenance Procedures (SOPS) / Standards / KPIs

Updated databases

PUTTING IT ALL TOGETHR

If properly planned and executed, FCA data, used in conjunction with CAFM/CMMS, can be a powerful planning tool at a number of levels. The application of the reports generated from such data go well beyond the FM department and effect the highest management levels. Since the data analysis that can be performed, using such tools as FCI, generates data that is used for capital and strategic planning, FCA becomes a significant marketing tool for helping to sell technology within an organization.

It is only a matter of time before mainstream CAFM and enterprise vendors start to incorporate the functionality found in the more sophisticated FCA systems that exist today.



FACILITIES CONDITION ASSESSMENT VENDORS AND FCA WHITE PAPERS

Company	Product	**Headquarters**	**Website**
3DI	COMET, IMPACT and COSMOS	Houston, TX	http://www.3di.com/
Advanced Technologies Group (ATG)	CCMPlus	Oak Brook, IL	http://www.ccmplus.com
Applied Management Engineering	Facility Condition Information Systems (FCIS)	Virginia Beach, VA	http://www.ame.net
CAFM, Inc.	CAFM 2000	WinterPark, FL	http://www.cafm.com
EMG	Consulting	Baltimore, MD	http://www.emgbalt.com
Facility Engineering Associates	IFMIS- Integrated Facility Management Information System	Fairfax, VA	http://www.feapc.com
HCI Systems	IPlan; Building Blocks	Kennebunk, ME	http://www.hcisystems.com/

ISES Corporation	FCAWin32 Software System	Stone Mountain GA	http://www.isescorp.com
MGT of America	Consulting, BASYS (Building Assessment Systems)	Tallahassee, Florida	http://www.mgtamer.com
Pacific Partners Consulting Group	Consulting	Stanford, CA	http://www.ppcg.com
Parsons Brinkerhoff	Condition Assessment Survey (CAS)	New York, NY	http://www.pbworld.com/
Prism Computer Corp.	FAMIS	Irvine, CA	http://www.prismcc.com
Physical Planning Technologies Inc. (PPTI)	RECAPP	Ontario, Canada	http://www.recapp.com/
Sverdrup/DoD	Consulting; Life Cycle Cost Models	worldwide	http://www.sverdrup.com/svt/
Vanderweil Facility Advisors (VFA)	vfa.facility	Boston, MA	http://www.vfa.com/
WASA -Wank Adams Slavin Associates	BCAT (Building Condition Assessment Tool); VFMS (Visual Facilities management System)	New York, NY	http://www.go2wasa.com

White Papers:

A Systems Approach to Facility Management	http://www.cafm.com/WhitePapers.htm
Research & Reports prepared by MGT of America	http://www.mgtamer.com/core.cfm?type=6
Publications from Pacific Partners Consulting	http://www.ppcg.com/Pages/publications.html
APPA Case Study: University of Massachusetts and University of North Carolina	http://www.appa.org/resources/Facilities_Manager/000504/crosson.html
Accurate Facilities Assessments Lead to Sound Capital Improvement Plans	http://www.hcisystems.com/docs/news/Article.asp?ID=3

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