Resources, Organizational Change and Data Systems: Issues and Problems in the Implementation of Outcomes Assessment

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Abstract
As academic units face the challenge of outcomes assessment (OA), the focus has been on the development and clear articulation of program and course outcomes, development of measures, and 'closing the loop' with result analysis and curricular modifications. However, the 'elephant on the table' that no one wants to talk about is the decisions and systems change that must accompany implementation, and the deep cultural change that must occur in the organization to sustain outcomes assessment. This paper will take a case study approach to discuss systems and business model changes necessary for outcomes assessment implementation. Using real examples the authors will examine the parallel business decisions that must occur during the academic analysis process, discuss implementation problems, and offer action-based approaches to resource, data, and organizational change issues

Introduction

A man was held in a high-security prison and closely watched. His wife sent him a letter in which she asked, 'Should I plant the potatoes in the garden now?' He replied, 'Do not plant anything in the garden. That is where I hide the guns." A little while later, he received another letter from his wife saying 'Many policemen came to our house. They dug up the whole garden, but they did not find anything.' He wrote back, 'Now it is time to plant the potatoes.'

(Sloane, MacHale, & Dispezio, 2002)
The Ultimate Lateral and Critical thinking Puzzle Book

One thing is certain, just like the man in the story, outcomes assessment (OA) requires creative approaches and lateral thinking to get the job done. The 'elephant on the table' that no one wants to talk about is the decisions and systems change that must accompany implementation, and the deep cultural change that must occur in the organization to sustain outcomes assessment. OA leads to change throughout the organization as it sets standards and overtly states academic expectations. Implementation cuts through all levels and across functions of the institution and its impact is felt across multiple dimensions: infrastructure, legacy systems, standard operating processes, and people. What at first is a highly focused academic analysis and continuous improvement effort becomes a driver of deep systemic change that requires functional support, incremental increases and/or the re-allocation of resources, and buy-in across the university from operational as well as academic divisions.

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The purpose of this paper is to share some targeted examples of systems change, some expected obstacles, some unexpected challenges, and finally some suggestions to ease the process that we discovered as we implement outcomes assessment in the engineering technology programs at Rochester Institute of Technology, College of Applied Science and Technology.

Much has been written about the instructional development and design process, but this discussion will focus on different questions:

- What are the operational requirements needed to make outcomes assessment work?
- What are the hidden and explicit costs of outcome assessment?
- How do you embed outcomes assessment into the culture?

Implementation: Challenges and Systems Issues

Organizational complexity complicates outcomes assessment. Rochester Institute of Technology is a privately endowed, coeducational university that includes eight colleges and a student body of approximately 11,000 full-time and 1,900 part-time undergraduate students and 2,300 graduate students. There are approximately 1,100 deaf and hard-of-hearing students enrolled. Cooperative Education provides career-related work experience in many degree programs.

This material in this paper is based on the experiences of the College of Applied Science and Technology (CAST). The college includes civil engineering technology; electrical, computer and telecommunications engineering technology; manufacturing, electrical/mechanical, and mechanical engineering technology; food, hotel, travel and nutrition management; packaging science; environmental management and technology; safety technology; health systems administration; and applied arts and science. The college has degree programs at the associate, baccalaureate and master's degree levels, as well as a wide array of diplomas and certificates. Our programs include technical and non-technical content areas and fulltime, part-time, traditional and non-traditional students, and and deliver courses traditionally, online and at international sites.

The college must address outcomes assessment based on requirements from ABET and also from the Middle States Accrediting Association. In addition, we must integrate everything that is done into the larger institute systems, and collaborate with service and functional units that needed to balance our needs against the needs of RIT's other academic units.

Once the actual concept of outcomes assessment took root in CAST and the university, some of the issues that quickly emerged were:

- developing efficient, easily maintained metrics and measures
- sorting data 'whims' from data 'needs'
- meeting the data reporting needs, legacy systems, data maintenance, data storage
- university wide collaboration to achieve efficiencies of scale without compromising individual outcome assessment needs
- upgrading participants to use higher levels of technology
- addressing all these issues within the existing organizational culture and climate
- maintaining the momentum of the outcomes assessment process while trying to operate and meet student needs

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- development time needed by faculty; staff retraining requirements; system development costs

All presented distinct problems, yet at the same time there are many overlapping aspects. The temptation to approach the problem in a linear fashion where course and program outcomes decisions precede data issues and legacy systems, and where existing data drive the process is strong. Yet, this approach sets the stage for disaster. The reality is that the process and all participants must be interactive, dynamic, and flexible. There must be continual re-adjustment and fine-tuning of the systems between faculty assessors and business units as needs evolve; and most important, change needs to go into the heart and soul of some of the legacy systems to sustain TC2K and prevent incremental costs.

The first issue encountered after the initial buy-in stage was a need to define data issues and systems. Frustration was expressed by all participants. Faculty evaluating curriculum and writing outcomes struggled with being able to articulate the types of data needed so early in the process. The technical team continually made the statement 'When you tell me what you need, we will supply it'. Administrators needed to plan the next year's budget requests. All were looking for definitive and concrete answers.

The reality is that the OA development process and the supporting systems development activities are strongly inter-related, re-iterative, and complex. Data needs must be addressed from the first moment you begin to talk about OA. All players need to be prepared for a messy, dynamic, continuous improvement process. As faculty refine their ideas about OA, data needs change, disappear, and are revised. Data system and process decisions must be re-visited regularly to stay in tune with the OA data needs. As Kofoed states: '…for those involved in facilitating organizational change processes, it is perhaps more prudent simply to remember that change process must be viewed as a dynamic process in which learning processes and actions are "predictably unpredictable". (Kofoed, 2002)

This issue was addressed early through structured and regular meetings between the technical experts and the faculty outcomes assessment experts. The exchanges began as soon as faculty began putting learning outcomes on paper and *before* they began to define data needs. As important as responsiveness to change is, it is critical that there is a structure in place where final decisions are made and parameters are established. In our situation, this happened at the department level with department chairs establishing boundaries, and at the college level where the steering committee and associate dean made decisions and sorted through requests. Further, connecting the faculty developing the metrics with the college technical support with regular meetings, allowed ideas to be floated, technical possibilities explored, and realities of cost, availability, institute data supply issues, and technical capability to be addressed.

All this is easier 'said than done.' There is an inherent, traditional culture at work in academia. The 1990's saw many attempts to implement Total Quality Management (TQM) in higher education with many failures. TQM is a philosophical concept focused on customer satisfaction. The use of customer satisfaction to drive improvement of all operations and activities within an organization is its heart and soul. Continuous improvement is the foundation upon which it is built. Continuous improvement could never take root. Traditional academia has many barriers

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to TQM - '… resistance to seeing students as customers; resistance to the technical language of TQM; inability to see relevance of a business approach to faculty and students; and dismissal of TQM as just good management or just another fad. It is noted that early collegiate adopters of TQM appear to be either prominent research universities or community colleges.' (Marchese, 1991) Today, you hear very little talk about TQM in universities and virtually no articles in the literature after 1998. It appears that TQM and continuous improvement in the 1990's were being applied to the business and functional units in isolation from the academic side. TQM never embedded itself or had an impact on academia. It was not until ABET Technology Criteria 2000 (TC2K) and requirements from national accrediting agencies such as Middle States Association drove the concept from the academic side, that change began to happen in academic organizations.

To make this model work and maximize resources, universities need to move away from the classical academic model of add-on with little or no reduction elsewhere. There needs to be a strong relationship between the business and academic components of the university in continuous improvement. Outcomes assessment, which digs deep into the academic learning that takes place and relies on full faculty involvement, drives the process in a manner that did not occur in the early 1990's with TQM. However, to realize true effectiveness and cost reduction across all dimensions the continuing improvement model must be applied throughout the organization. The TC2K development and implementation costs will become direct add-on's to infrastructure costs unless the continuous improvement model is applied to those areas not immediately recognized as part of the outcomes assessment process. The university is being driven by outcomes assessment to look at systems and process change across the institute directly because of TC2K and its cousins the national university accrediting organizations.

The next issue, the need for upgraded systems, expertise, and data that institute legacy systems currently could not supply, also happened early in the process. Further, the need to collaborate beyond the department and college and bring on board university level functional and support departments - who believed that legacy systems were adequate - was apparent. We began to form alliances with other colleges so that the request for change was 'bigger than just from one program'.
The danger here is that it is easy to let legacy systems drive outcome assessment. You must assess what the legacy systems can supply, and honestly answer the question 'is this data that we want or are we settling for what is available?' Rarely do existing systems collect or supply the data needed for outcomes assessment in the right form or with all the relevant pieces. Be assured, you are going to need to tailor, re-design, or eliminate legacy systems and there will be a corresponding effect on functional departments, support staff roles, and skill bases required. Change will require upfront investments in your infrastructure.

For example, the existing institutional student data system is comprehensive however, it cannot supply student level detail about courses and grading in the way faculty have determined they need it for OA analysis. Departments would need to manually collect, store and maintain the data. This raises many resource issues. What data is needed? Who will collect the data? What system will be established to maintain this collection? Whose budget will pay for the server and database programming? Who will maintain the database? What re-training/upgrading does staff

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need? Is additional facility space needed for the server? Our solution is still evolving but it includes collaboration at the university level to establish a data warehouse that involves three colleges, pulls information from multiple systems, coordinates data needs across engineering technology departments and beyond CAST, and a training plan for staff to do report generation from the data warehouse. Our goal is to minimize the amount that has to be maintained at the department or program level, act as a core development group for the university technical team, provide college and university-wide systems where possible, and eliminate systems and processes no longer viable.

One last area that is critical for those implementing outcomes assessment to consider is the hidden costs associated with implementation. The largest hidden cost relates to the time invested by the participants. It is easy to put a dollar value on a new server (between $5,000 and $10,000) and the cost of a new hire, or a new technical system, but the countless hours spent in meetings and development work is less easy to quantify. The following example provides a brief glimpse into the hidden costs.

Example: the ABET Steering Committee met once a week for three academic quarters or approximately 30 weeks for two hours each week. The committee included 3-fulltime faculty and one faculty/administrator. Although each makes a different salary, assuming that an average salary using the chart below (Langham, 1994) might be between $50,000 and $75,000 shows how quickly hidden costs add up. At an average salary of $50,000, the cost of a two-hour meeting is $400. When the average salary climbs to $75,000, a two-hour meeting of four people costs $600.00. So, for 30 weeks of 2-hour meetings the hidden cost ranges from $12,000 to $18,000. Add to this the fact that several faculty received release time to take on the project and it was necessary to hire adjunct faculty for courses, and that many more meetings were held by others, it is easy to see how the hidden costs can build.

Average Annual Salary	Hourly ***Cost*** of Meeting					
$75,000	$150	$300	$450	$600	$750	$1,500
$62,500	$125	$250	$375	$500	$625	$1,250
$50,000	$100	$200	$300	$400	$500	$1,000
$37,500	$75	$150	$225	$300	$375	$750
$25,000	$50	$100	$150	$200	$250	$500
$12,500	$25	$50	$75	$100	$125	$250
	2	4	6	8	10	20
	Number of Attendees					

While The Clock Ticks. . .(Langham, 1994)

This example only looks at the college steering committee. Multiply it by the number of interactions described in this paper and you begin to see the magnitude of the hidden costs.

TC2K: Providing for a "New Way of Life"

In order for the implementation of the continuous improvement process as fostered by the TC2K to be a total success, provision must be made for its on-going viability and longevity. Program

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faculty must embrace it completely on an on-going basis and the departments responsible for the accredited programs need to support it - continually and fully. It must be engrained into daily operations of the program and be pervasive throughout the environment. In other words, it needs to be woven into the fabric of program infrastructure and operations. This does not just happen. A conscientious effort is needed to assure viability and longevity.

A byproduct of TC2K is detailed, descriptive documentation of the program, the courses comprising the program, and the integration of the program with the goals and objectives of the department, college, and institute. Making this information visible and placing it on display around the department can serve as a reminder and indicator that the department is continuous improvement and outcomes assessment based. In addition, this documentation can serve as the basis for program marketing information further embedding the spirit of continuous improvement into the environment. What better way to inform potential students, parents, and potential employers what to expect?

The development and implementation of TC2K is achieved by the faculty and staff in place at the time. As time passes, personnel changes will take place. New personnel need to be quickly assimilated into the system of continuous improvement practiced by the program and department. New employee orientation can address this need. Due to the eventual changing of personnel and the re-alignment of roles and responsibilities, tying the execution tasks supporting TC2K to individuals provides a potential vulnerability affecting continuity. A better approach is to associate specific tasks and responsibilities to organizational position and function. This separates individuals from the required tasks. Documented operating procedures and position expectations provide for continuity.

As Juran stated, 'Quality improvement is achieved one project at a time.' Following the implementation of TC2K, the intention is that it serves as the structure and basis for managing quality improvement of the program. There is a distinct advantage to keeping improvement projects and activities linked to the educational objectives and outcomes that they support. This linkage preserves the "big picture", maintains context relative to the projects, and allows for effective project and activity management. Figure 1 represents an RIT model used to facilitate the above.

The model was created as a result of immediately discovering at the onset of TC2K implementation that the text form of the criteria presented numerous bits and pieces that the implementer needed to put together into a closed loop process. Mission, vision, program educational objectives (PEO,s), program outcomes (PO's), learning outcomes (LO's), measures, metrics, assessment, feedback, etc. How does it all go together? Getting a faculty mutual understanding of the answer to this question was no easy task. Once achieved, however, it needed preserved because it would be the basis for managing our programs. Factoring in the improvement project dimension following assessment evaluation added another key point. Tailored to specific programs and used routinely respective faculty is engaged in a new way of doing business.

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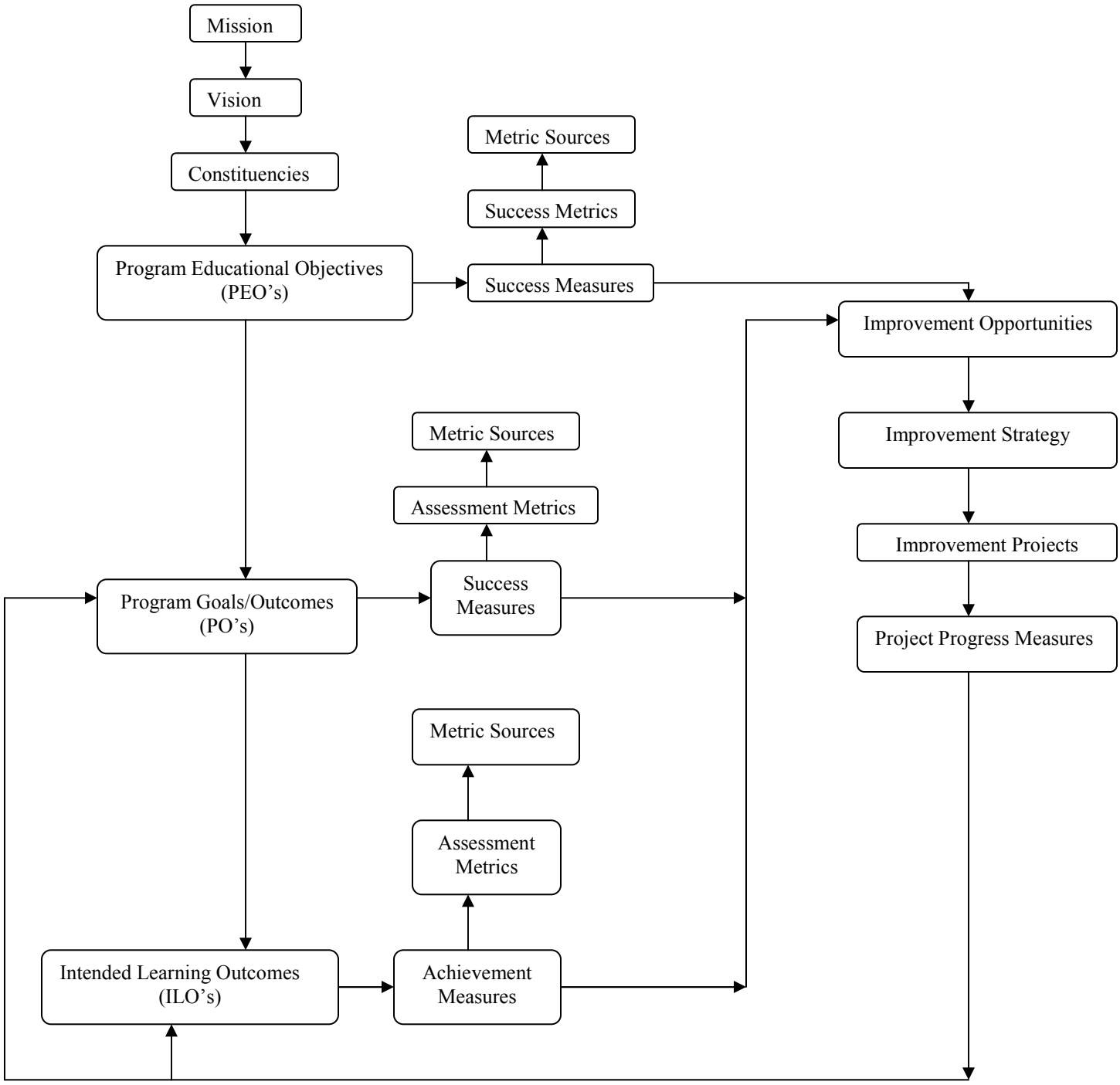
Figure 1 College of Applied Science and Technology
Continuous Improvement Framework



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Conclusion

To make TC2K and outcomes assessment work there are operational, people, system, resource and hidden cost, and culture changing issues that must be addressed that must be addressed early in the process.

Some of the issues and actions that need to happen are:

1. Consensus across departments and programs to reduce system redundancy and process duplications. Example: the use of a common, agreed upon format for course evaluation; collaboratively developed and structured database reports that can be issued on an agreed upon schedule and that users can sort as needed for their individual purposes; Common measures where possible that are different only by necessity such as student success measures, co-op report, formats and forms, formatted reports, process and policy. Development of college web-based database of course outlines with intended learning outcomes and a common college course outline form that meets both ABET and Middle States requirements.
2. Approaching each challenge in a non-linear way
3. Helping participants understand the difference between 'whims and needs' as they make data requests
4. Approaching institute units such as Cooperative Education and Placement and working with them to develop systems that will meet cross college needs for OA. Making other units of the organization partners in the re-design of processes is critical.
5. Building collaborative partnerships with other academic units and then approaching functional support areas
6. Constant and open communication with specific deadlines and accountability clearly articulated.
7. Sharing of best practices and bringing together the 'frontline' developers of the assessment plans to present their ideas and support each other's efforts.
8. Re-assignment and re-prioritizing of work across job positions. For example, faculty assignments shifted, college technical project list re-ordered, staff training to upgrade skills
9. Recognizing and addressing the issues of culture and climate within your own organization to facilitate buy-in and cooperation

By its very nature, this list will always be incomplete and dynamic. It will always reflect the immediate issues that need to be addressed. Constant open communication, involvement of all players in decision-making and organizational commitment to eliminating system redundancies and inadequacies will expose that 'elephant on the table' and lead to the deep cultural change that must occur in the organization to sustain outcomes assessment and TC2K.

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