

# Boom Or Bust—How To Structure Technology Transfer For Success

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## Abstract

The nation's investment in innovation and knowledge transfer has long been a critical factor in maintaining the nation's global economic competitiveness. The knowledge gained through university and government research has helped develop industries and companies that are world leaders in nearly every area and is a primary contributor to the U.S. innovative capacity and economic competitiveness. More and more, both our federal and state governments are relying on our top-tier research universities to impact our economy and develop the next generation of inventors and entrepreneurs who create groundbreaking inventions, high growth start-ups, thousands of new jobs, and, ultimately, new revenue streams and wealth.

The White House, Office of Science and Technology Policy, and the Department of Commerce<sup>1</sup> have spent substantial resources to try to transform university commercialization. These efforts have resulted in lengthy reports with limited concrete action and mercurial results at best. In addition, the recommendations outlined in these reports are delivered without a clear understanding of the impact and outcomes, nor a clear plan of action.

The Obama administration has also recently delivered a Technology Transfer Memorandum<sup>2</sup> to encourage the federal government to improve technology transfer commercialization performance. Coupled with this came a letter from Mary Sue Coleman at the National Advisory Council on Innovation and Entrepreneurship which recommended additional actions needed from universities.<sup>3</sup> While these two

actions are a step in the right direction to improve technology transfer, what we need is a road map that drives sustainable, successful outcomes and maximizes commercialization results. Based on recent analyses, the opportunity at stake to the U.S. is \$2.3 trillion in Gross Domestic Product and more than 150,000 jobs;<sup>4</sup> this is a call to action that more needs to be done to reinvent technology transfer to be better than ever.

Like many universities, Ohio State was dissatisfied with the results of its commercialization activities and realized that dramatic change was needed to create a robust model that not only enhances the universities mission in education, but drives positive outcomes from its research. The Ohio State University consistently ranks in the top 20 universities in the country in terms of total research and development expenditures, but consistently falls in the bottom tier of universities in the commercialization of its research. This paper examines the creation of an innovative commercialization model based on new, broad and comprehensive, performance management framework.

## The New Framework

Performance management in technology transfer has been elusive for many organizations. Multiple performance management models have been created to benchmark technology transfer organizations over the years, and, while many have merit, none of them provide a *comprehensive*, balanced framework. Current frameworks measure important *individual* elements; however, an overall model that measures effectiveness (“what is done”), efficiency (“how it is done”) and overall Return on Investment (ROI), as well as the speed of enhancing these levers, innovation, is needed.

Why is a new performance framework required? The proverbial saying “you get what you measure” occurs when unbalanced or incorrect metrics are put in place. For example, if you were to measure your organization just on Full Time Equivalent (FTE) efficiency, which is a popular measure in many technology transfer offices, you'll have very strong numbers

1. The Competitiveness and Innovative Capacity of the U.S. Department of Commerce. January, 2012. [http://www.commerce.gov/sites/default/files/documents/2012/january/competes\\_010511\\_0.pdf](http://www.commerce.gov/sites/default/files/documents/2012/january/competes_010511_0.pdf).

2. Presidential Memorandum—Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Businesses. Barack Obama. October, 2011. <http://www.whitehouse.gov/the-press-office/2011/10/28/presidential-memorandum-accelerating-technology-transfer-and-commerciali>.

3. University Presidents, AAU, APLU and AASCU Pledge Expanded Efforts to Foster Economic Growth. April, 2011. Mary Sue Coleman, Michael Crow, Bud Peterson, Holden Thorp. <http://www.scribd.com/I-Open/d/53643557-University-Presidents-AAU-APLU-And-AASCU-Pledge-Expanded-Efforts-to-Foster-Economic-Growth>.

4. RHT Consulting analysis, “The Global Technology Transfer Opportunity at Stake,” April 13, 2012.

in the volume of processed licenses and/or patents, but are they the right ones? If you only measure how many big product hits you get, you'll have significant scrutiny around which technologies to patent, which licenses to secure and you may have lots of hits; however, at what cost? And if money is the prime metric that drives decision-making, you may drive licensing income, but you stand to lose the impact that result from the possibilities of truly transformative technology commercialization.

To address the need for a balanced, holistic performance management framework, a new technology transfer and commercialization performance framework was developed. This article provides an overview of the new technology transfer performance management framework as well as a practical case study of how performance management can drive real results.

### Performance Management Complexities

Performance management is actually a complex art and science, and there are a few critical layers to get it right. Industry benchmarking is the first step to understanding relative performance (see Figure A). This helps to establish a baseline. It is critical in this step to select the right peers and harmonize data to get an “apples-to-apples” comparison. While getting an apples-to-apples comparison can be difficult, one can use leading practices to get as close as possible. In technology transfer, it's imperative to select peers based on relative size of the research expenditure, technology portfolio mix similarities, age, and the

number of “hits.” For example, one of the benchmarking metrics that is important under the FTE efficiency umbrella is licenses/FTE; however, if you are benchmarking the National Institutes of Health, it would be inappropriate to perform a comparison to California Institute of Technology given the significant differences in the portfolio. Other information, such as public/private status and region, can further illuminate understanding the benchmark results.

The outcome of this step is simply an understanding of how one performs relative to peers and what metrics can be improved. With this information, organizations can derive their target license volume, product commercialization rate, licensing income, etc.

Once one understands the potential improvement opportunity, it's important to identify the key initiatives required to drive enhanced performance. Therefore, the second step in performance improvement is creating a prioritized roadmap/plan with an associated benefits model. So, for example, if one of the initiatives in

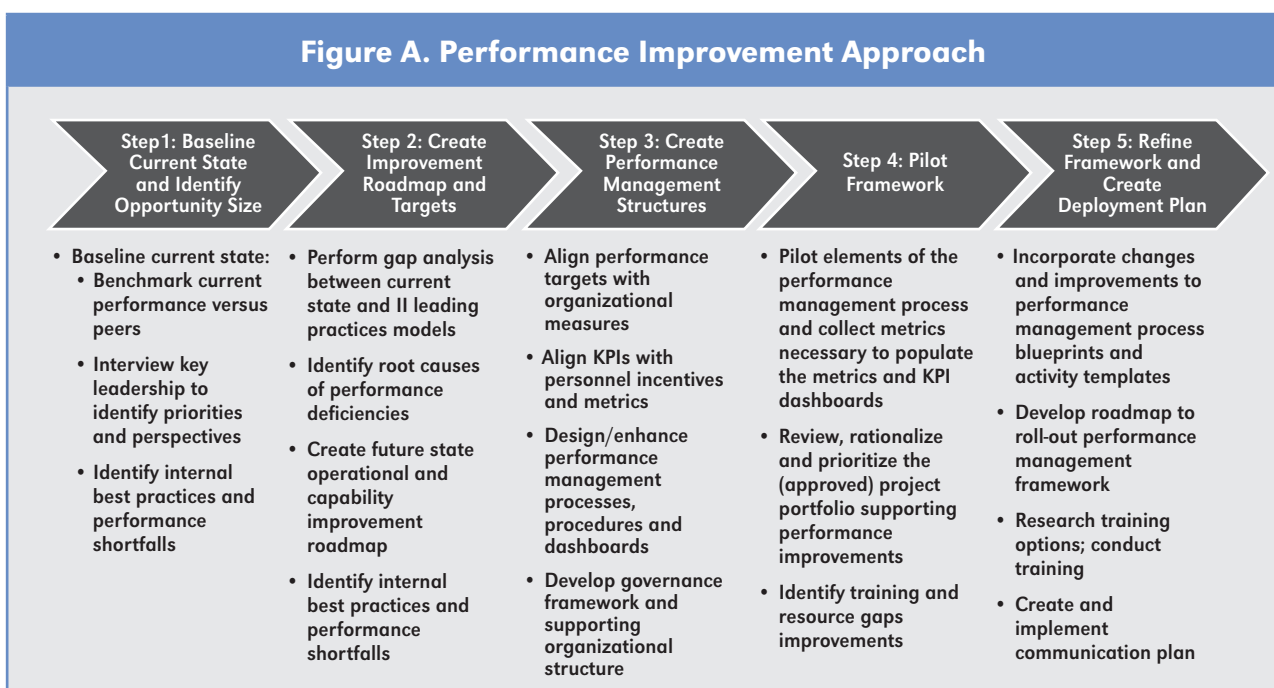
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**Figure A. Performance Improvement Approach**



the roadmap is focused on relationship management, the benefits model will likely reflect improvement in license volume and associated royalty income as a result of an increased number of strategic alliances and/or the enhancements in how alliances are managed.

It should be noted that improvements in licensing income and volume take time, so, it's important to put in place measures that create transparency in improvements of daily and weekly performance activities. Key Performance Indicators (KPIs) are a great tool that allows one to understand improvements at the activity level. For example, to measure progress in relationship management on a tactical daily/weekly basis, one should measure "close rate," which is one of the basic relationship management measures. Close rate is a KPI that measures the percentage of time that a prospect engages with a solution provider and consummates a deal. So in technology transfer, this could be a measure of the number of times a prospective licensee engages with the organization to consummate a licensing deal and does not terminate or withdraw from the contract before the deal is executed and the upfront payment is made.

The third step in performance improvement is setting up an overall performance management "system." The system should include defined targets, structured processes to measure progress and a governance model that outlines the frequency of measuring as well as the decision making processes surrounding performance management. In this step, organizational targets are set. In addition, the technology transfer personnel need to have their individual performance targets and incentives aligned with both the overall performance management organizational technology transfer targets and the KPIs. As an example, and to continue with the theme of relationship management, if the overall technology transfer organization targets for license volume increases by 10 percent, given the relationship management recommendation, this could be based on an assumption that the *successful* close rate increases from 50 percent to 60 percent. New individual targets for close rate should now be established for individuals. In addition, data that tracks the reasons licenses are withdrawn and/or terminated should be collected. On a regular basis, the licensing team should come together and discuss their close rates (amongst other metrics) and share best practices around how they were able to improve these close rates (examples include, but are not limited to: increased follow-ups, new contracts with a bonanza clause, master research agreements, team licensing, etc.). It's important to capture the leading practices that help improve KPIs and institutionalize these into

processes. This is sometimes a herculean change management task, but one well worth tackling.

One can see, just based on these three steps, that developing an over-arching performance management system can be complex, but it is a necessary challenge that a leadership team needs to address.

## Flawed Performance Management Frameworks

Every organization should establish performance management frameworks that align with their strategy, and for technology transfer these should include:

- 1) Increasing innovation by improving the number of inventors disclosing high quality inventions that become licensed products;
- 2) Increasing the conversion of: disclosures to patents, patents to licenses/startups and licenses/startups to commercialized products and revenue; and
- 3) Self-funding research by increasing license income vs. research expense (ROI)

Without effective metrics that gauge the quantitative results of technology transfer offices, as well as the contributing qualitative factors, there is a loss in effective and efficient resource management as well as potential funding, which leads to a vicious cycle of underperformance. The root cause of inferior performance is often attributed to the lack of a good performance management system.

There have been many technology transfer frameworks formulated to measure technology transfer output, but most of these lack a holistic view of performance that can lead an organization to change and measure performance where it is needed. These existing frameworks measure productivity in terms of license income, patent volume, disclosure volume, etc. Some more comprehensive models rely on a "minimize input," "maximize output" measurement system, representing a faulty strategy for the aforementioned reasons. So, the challenge is finding a *singular model* that not only drives the right behavior, but also enhances the performance and culture of a tech transfer office.

## A New Performance Management Framework for Success

As a result of the need for a more holistic performance management framework, we<sup>5</sup> developed a new model based on a first principles approach to performance management—measuring effectiveness

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5. RHT Consulting analysis, "Technology Transfer Performance Management—A New Paradigm," January, 2012.

(“what is done”), efficiency (“how well it’s done”), the “output” as well as the speed of improvement of these metrics. We also assessed the successes and failures of technology transfer offices, as well as opportunities to improve them. We selected 43 peer organizations and analyzed a three-year view of research expenditure, license income, and licenses exceeding \$1MM in revenue. The metrics were based on three years of cumulative AUTM data from 2007-2009 as well as analysis of effectiveness, innovation, financial efficiency, FTE productivity, and overall performance. To gain a comprehensive view of performance, the new framework included metrics in the following categories:

- **Effectiveness—The “What”:** Focusing on the right things.
  - Do disclosures become patents?
  - Do patents become licenses/startups/options?
  - Do licenses, startups and options become commercialized?
- **Innovation—“Net Newness”:** How much of what’s being done is new?
  - Are patents issued based on new patent applications?
  - How many new patent applications are processed per FTE?
  - How many new patent applications are supported per \$1MM in research expenditure?
- **People Efficiency—The “How”:** How much does each FTE support/produce?
  - How many disclosures, licenses, options and startups are processed per FTE?
  - How much in licensing income and research expenditure do FTEs support?
- **Financial Efficiency—The “How”:** How much does the technology transfer organization get out of each research dollar—both research expenditure from government sources and research expenditure from industrial sources as well as total research expenditure?
  - How many disclosures are produced per dollar of research expenditure?
  - How many patents are issued per dollar of research expenditure?
  - How many licenses, options and/or startups are consummated per dollar of research expenditure?
- **Performance:**
  - How much licensing income is produced as a percentage of research expenditure?

- How many licenses, options and startups are created as a percentage of research expenditure?

Again, it is important to note that these questions can be altered or expanded based on your office’s mission, but for this project we adhered to our first principles approach. In addition, measures such as: patents issued as a percentage of disclosures, may require further explanation, given that patents issued may come from disclosures submitted years before. It is imperative to include these types of metrics as they are indicative of long-term technology portfolio quality. On this note, it’s also prudent to measure all metrics across several years so that one year doesn’t skew the data set. More leading practices around benchmarking can be found at: <http://www.innovationamerica.us/index.php/innovation-daily/19036-beyond-see-no-evil-performance-measures>.

The data was then normalized on a 1-10 scale to make each metric comparable to one another. Based on these metrics, we were able to develop a list of some of the top performing universities; which are outlined in Table 1.

## Implementing a Performance-Based Structure—The Ohio State Case

Ohio State University, like many universities and institutes, is assessing its ability to effectively take their breakthrough discoveries to market and play a major role in regional economic recovery. More so, they firmly believe that great economies are built around great universities and they have an obligation to impact education, entrepreneurial training, industry creation, product development and long-term industry partnerships. As mentioned in the introduction, never before has the nation looked to its research universities to step up as a major driver in innovation and economic development and as a force to maintain the country’s long-standing leadership in this capacity. The extent of these changes require a university to understand the long-term resources that are required for success, the ability to create alignment with key stakeholders, the need to drastically modify one’s culture and the requirement for an internal and stated commitment from senior leadership. And, as big changes require big risks and a new way of thinking, Ohio State set upon a strategic course to drastically overhaul its commercialization efforts. As with any new journey it helps to know where you are starting from before you can decide on the most effective path for success; and this began with a performance assessment against our peer institutions. Ohio State used the metrics outlined above to

### Table 1. Top Performing Universities And Their Performance Scores

INSTITUTION	Overall Effectiveness	Overall Efficiency	Overall Score
California Institute of Technology	6.84	9.44	8.23
New York University	5.24	5.05	5.14
University of Georgia	4.49	5.42	4.98
Stanford University	4.47	4.97	4.74
Northwestern University	4.31	5.31	4.84
University of Florida	4.02	5.19	4.64
Georgia Institute of Technology	4.11	5.80	5.01
Columbia University	4.63	3.72	4.14
University of Utah	3.44	4.73	4.13
Massachusetts Institute of Technology (MIT)	4.41	3.86	4.12

### Table 2. Ohio State Versus Average Performance Scores

	Metric	Ohio State Univ.	Average (Overall)	% from Average (Overall)
Effectiveness	Patents Issued/ Disclosures	0.128	0.177	39%
	Licenses+Options+ Startups/Patents Issued	1.533	1.897	24%
	Patent Issued/ Patent Application	0.170	0.204	20%
	License Income/ Total Active Licenses	\$31,509	\$728,880	2213%
People Productivity	Disclosures/FTE	36.163	37.289	3%
	Licenses+Options+ Startups/FTE	7.08	10.35	46%
	License Income/FTE	\$388,716	\$8,751,596	2151%
	RE/FTE	\$164,598,395	\$97,287,337	-41%
Financial Efficiency	Licenses & Options+ Startups/\$1M RE	0.04	0.12	168%
	Invention Disclosures/ \$1M RE	0.22	0.397	81%
	Patent Applications/ \$1M RE	0.17	0.36	119%
	Patents Issued/ \$1M RE	0.028	0.069	145%
Innovation Effectiveness	Patents Issued/New Patent Applications	0.311	0.361	16%
	New Patent Apps/FTE	14.850	22.846	54%
	New Patent Apps/ \$1M RE	0.090	0.232	157%
Performance	Royalty Income as a % of Research Budget	0.002	0.102	4227%
	License+Options+ Startups/\$1M RE	0.043	0.115	168%

identify weaknesses and strengths versus the top 43 “best in class institutions.” The average results are outlined in Table 2.

Ohio State used these results to identify where resources were required and where new programs and expertise needed to be added to produce more meaningful results. These new objectives and programs became the foundation for an overall comprehensive strategic plan that balanced new budget allocations with long term targets.

Figure B illustrates the Ohio State positioning versus the top 43 universities as it relates to overall efficiency and effectiveness.

What’s encouraging is that Ohio State has a great starting position for potential as Ohio State is quite productive in the number of disclosures it receives, the number of patents it gets issued, and in the number of total licenses it executes. On the other hand, Ohio State is woefully behind in the value and impact of those licenses. For that to change, an emphasis needed to be placed on higher quality outputs and a complete restart of Ohio State’s triage, assessment and marketing process and its organization structure. In Table 3, we have outlined the issues and subsequent actions planned to cor-

rect or improve the performance shortfalls.

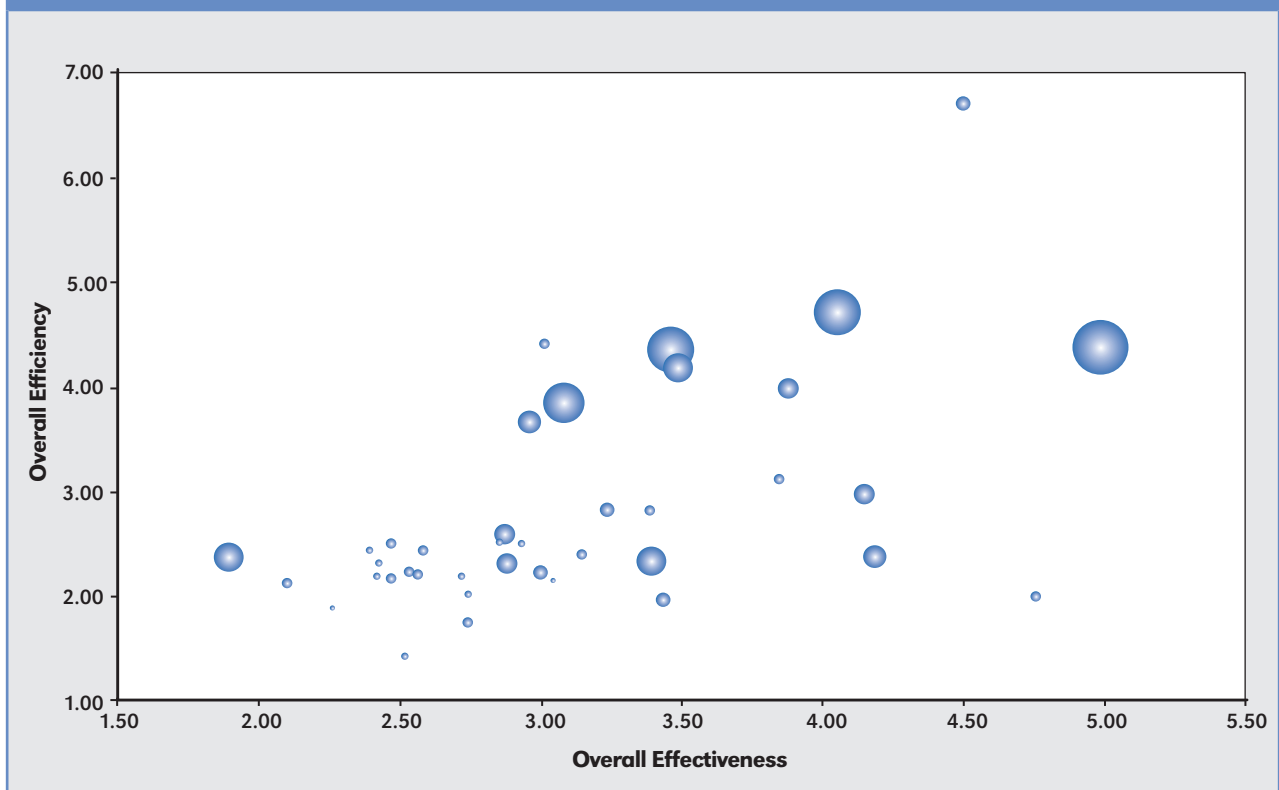
The actions described are focused on a performance based system and should be integrated into a strategic plan that expands upon the major research strengths and assets of the institution or University one is working to improve. An incentive plan for long term goals should also be established to sustain growth, creativity and engagement in success. Each of these actions should then be broken down into a detailed tactical plan. Targeted metrics/KPIs should be designed to accurately measure that the plan is working. Feedback and input should also be gathered from the stakeholders being impacted. Finally, it cannot be overstated that a reliable and comprehensive database is essential for performance planning, reporting and monitoring.

Meaningful change in any organization takes time but it starts with a commitment and a first step. One of those first steps should be a discussion with key stakeholders and senior leadership. Be realistic about the changes you can undertake and the expectations you set. It is critical that these match the resources that are available.

### Conclusion

Given the \$2.3 trillion at stake in technology trans-

**Figure B. University Overall Effectiveness vs. Overall Efficiency**



**Table 3. Ohio State Issues And Actions**

ISSUES	ACTIONS
<b>Effectiveness</b>	
Increase patents issued/app	Restructure legal review. Hire new IP coordinator, measure accountability and conversion per attorney. Create a new triage and more holistic due diligence assessment process to file only on high quality inventions.
Increase revenue per license	Transform marketing process. Hold licensing officers accountable for the par value of a deal and key metrics used to track licenses. Formulate a short term cash-flow strategy with a long term equity strategy. This type of strategy requires carefully formulating a year-to-year plan and financial model that balances income from licenses and high-value equity investments in startups with the budget requirements and research expenditure. Create a five-year forecast based on probability that is monitored monthly.
Increase licenses + start-ups/patent	Create a valuation model that validates IP and the potential business model prior to any company being started or tracked. Hire a new ventures person to implement strategy and funding so only high value long-term growth companies are created.
<b>People Productivity</b>	
Increase licenses + start-ups/FTE	Reorganize the licensing function so it is not cradle-to-grave but a functional organization chart that allows Licensing Officers (LO) to plug into marketing, valuation and start-up functions to increase deal flow and value.
Maintain # disclosures/FTE	Rebuild the triage, vetting and due diligence processes and frameworks to improve the quality of the invention disclosures.
Increase revenue / FTE	Establish clear individual performance goals for all levels of personnel in the office. Restructure overall goals so that they are based on both team and individual success. Structure a team mentoring system that enhances close rate and forecasting for growth.
Decrease time to license	<ul style="list-style-type: none"> <li>• Set a 90-day timeframe to complete all negotiations. Implement an escalation process if timeframes are not met.</li> <li>• Rebuild database function to accurately monitor and track start and completion times for LOs.</li> </ul>
<b>Financial Efficiency</b>	
Increase high value research dollars to increase licenses	<ul style="list-style-type: none"> <li>• Increase research that will create the future licenses—"direct" research.</li> <li>• Hire 4 business development individuals with a goal of \$30 million in high quality research.</li> <li>• Create 2 ideation centers in two key research colleges.</li> </ul>
Increase patents issued/new patent applications	Restructure assessment process with external validation (given this metric is based on the quality of new patent applications, the due diligence reference above will also improve this metric).
<b>Innovation Effectiveness</b>	
Increase new invention disclosures	Review university policies and guidelines for faculty engagement with start-ups and industry. Recommend changes in: royalty distribution, entrepreneurial leave, equity participation, and consulting.
Double the number of licenses generating short term cash flow	Create a focused marketing strategy and plan for those inventions originating from areas such as: technology, arts, engineering and food science—short-term invention areas that will create immediate cash flow. Create software center and hire programmers to code to strategic, short-term business opportunities.
Increase the number of graduate student disclosures and start-ups	<ul style="list-style-type: none"> <li>• Hire a Student Ventures coordinator to triple the number of student inventions and start-ups. Conduct 50 or more education and outreach seminars to achieve this objective.</li> <li>• Establish a student prototyping center.</li> </ul>

fer, we all have an important call to action in driving new levels of performance. A performance based system of planning allows university leadership the flexibility to build programs that achieve the success that is important to them and their organization. The first step is to use a balanced, holistic view of performance using a strong performance framework such as the one outlined above. Once there is alignment on the performance framework, it is critical to assess your baseline metrics versus similar universities and use this information as the foundation for developing new targets and reorganization designs. Once you've analyzed your weaknesses and strengths, a plan can be built that blends the right resources with the right programs to create the desired successes. Culture, environment and personnel incentives should be

analyzed as well, as these have a strong role in the ability to attract and retain the right team of people that will achieve new organizational targets. It is important to assess your new programs and metrics and enhance as needed. However, it is also important to strike a balance between the changes that are made to new programs and metrics and your long term course of action; churn in these areas leads to inconsistency and disappointment. Stay focused on a regular cycle of assessment, reevaluation and adjustment of programs and metrics as standard practice, using a holistic performance management lens. The result: you will have a long-term impact on the performance of your organization and, overall, this will lead to renewed technology transfer success in our industry as a whole. ■