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# Continuous Quality Improvement in Engineering Education: Holistic OBE

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# CQI in Context of Higher Education

*A holistic adoption of OBE can lead to success of more students in achieving their aspirations/potential?*

*Enable success among students of all backgrounds by tackling biases related to regional, gender, religious, and caste differences*

*Solutions to these issues must emerge from within but it may be worthwhile to consider approaches that have been used in other countries that have a similarly diverse population.*

## CQI in Higher Education : What are the Essentials?

- Well articulated set of goals at the institutional, college and program levels that are likely to succeed
  - Should reflect the expectations of all stake holders (students, faculty, employers, parents, promoters)
  - Should be realistic, attainable, and measurable
  - Should be reviewed periodically (every 3-5 years?)
- An action/strategic plan that closely aligns with attainment of the stated goals
- Metrics to measure progress with time
- A culture of empowerment, accountability, and reward system that supports the goals



# More Considerations in Formulating Institutional Goals

- Goals must be unique to the institution that consider factors such as
  - Preparedness level of incoming students and building realistic expectations among them
  - A curriculum that caters to all students that are admitted
    - Consider administering tests to determine student preparedness levels
    - Honors program for highly prepared students
    - Offer opportunities for students not as well prepared to make up identified weaknesses
    - Transferability without excessive loss of credits

# Sample Institutional Goals and Objectives

## A Highly Ranked Institution

- Be among the most highly respected learning institution in the world
- Sustain and enhance excellence in scholarship and research
- Ensure that entrepreneurship and public service are fundamental characteristics of our graduates
- Expand our global footprint
- Relentlessly pursue institutional effectiveness

## A Top 50 Public Institution

- Increase student quality and diversity
- Provide student centered education
- Recruit and retain high quality faculty and staff
- Increase research productivity
- Increase economic development
- Increase alumni and corporate partnerships
- Provide high quality infrastructure

## Initiatives that Were Part of Transformative Strategies at University of Arkansas-College of Engineering

- Benchmarked with programs ranked between 41 and 50 in the US News and World Report rankings (2003) and developed a strategic plan (2004) to achieve those goals
- Started an Honors Program for undergraduate students to enhance undergraduate educational experience for high achieving students (2003)
- Started the Freshman Engineering Program to improve graduation rates (2007);
- Started the Engineering Career Awareness Program (ECAP) (2007) to boost enrollment from the under-represented minority communities.
- Increased graduate student assistantship by 50% (2004) to attract better quality graduate students

# Initiatives that Were Part of Transformative Strategies (Continued)

- Improved the faculty start-up packages to support them in developing their research programs in their early years (2003)
- Started a new Department of Biomedical Engineering (2012) to strengthen research
- Started several interdisciplinary centers in cutting edge research fields such as nanotechnology, wireless communications, power electronics to complement the ones that already existed
- Strengthened alumni relations to raise resources for student scholarships and for faculty endowed chairs; allowed us to recruit better students and faculty
- Strengthened the merit based pay increases to reward high performance among faculty
- Promoting faculty and student accomplishments at national forums to enhance perception about the institution.

## Undergraduate Program Quality Metrics

Metric	Fall 2003	Fall 2018
Undergraduate enrollment	1500	>3,500
Average High School GPA among incoming freshmen	3.65	3.82
Graduation rate among freshmen enrolled	<58%	70%
Number of nationally competitive fellowships awarded to UA engineering graduates	0	7
% Under-represented minorities	<8%	28%
% Women	15%	24%
Number of Honors College Graduates	0	92
US News and World Report Rank	135	98





	Metric	Fall of 2003	Fall of 2018
<b>Graduate Program Quality Metrics</b>	<b>MS Students enrolled</b>	<b>270</b>	<b>800</b>
	PhD Students enrolled	80	280
	PhD degrees awarded annually	8	35
	External Research Expenditures	\$9M	>\$30M
	US News and World Report Rank	142	112
	USN&R Reputation score	2.1	2.7

	Metric	Fall 2003	Fall 2018
<b>Faculty Metrics</b>	<b>Number of Faculty</b>	<b>90</b>	<b>144</b>
	Number of Endowed Faculty Chairs	5	35
	Number of Proposals submitted	80	313
	Average start-up package for new faculty	\$50K/faculty	>\$500K
	Number of Society Fellowships	20	65
	Number of NSF CAREER Awardees	1	7
	Peer reviewed publications	80	>500

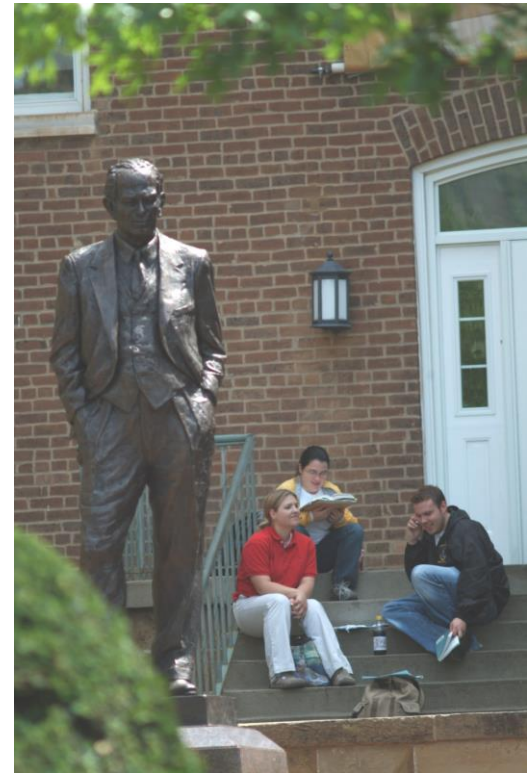
# Summary

- For OBE to be effective, we need to combine it with an institutional continuous quality improvement (CQI) program
- CQI begins with clearly articulated goals that have broad acceptance among stake-holders, are periodically assessed, and have clear metrics to measure progress
- CQI requires a well defined strategic plan to achieve the identified goals with metrics for measuring progress
- A clear sense of priority in implementing the strategies within available resources
- Last but not least, requires patience and a long time (10 years or longer) to see tangible results!



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**THANK YOU!**



**QUESTIONS?**

