Department of Mechanical Engineering
The University of Maryland, Baltimore County
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Baltimore, MD 21250

Web address: http://www.umbc.edu/engineering/me/

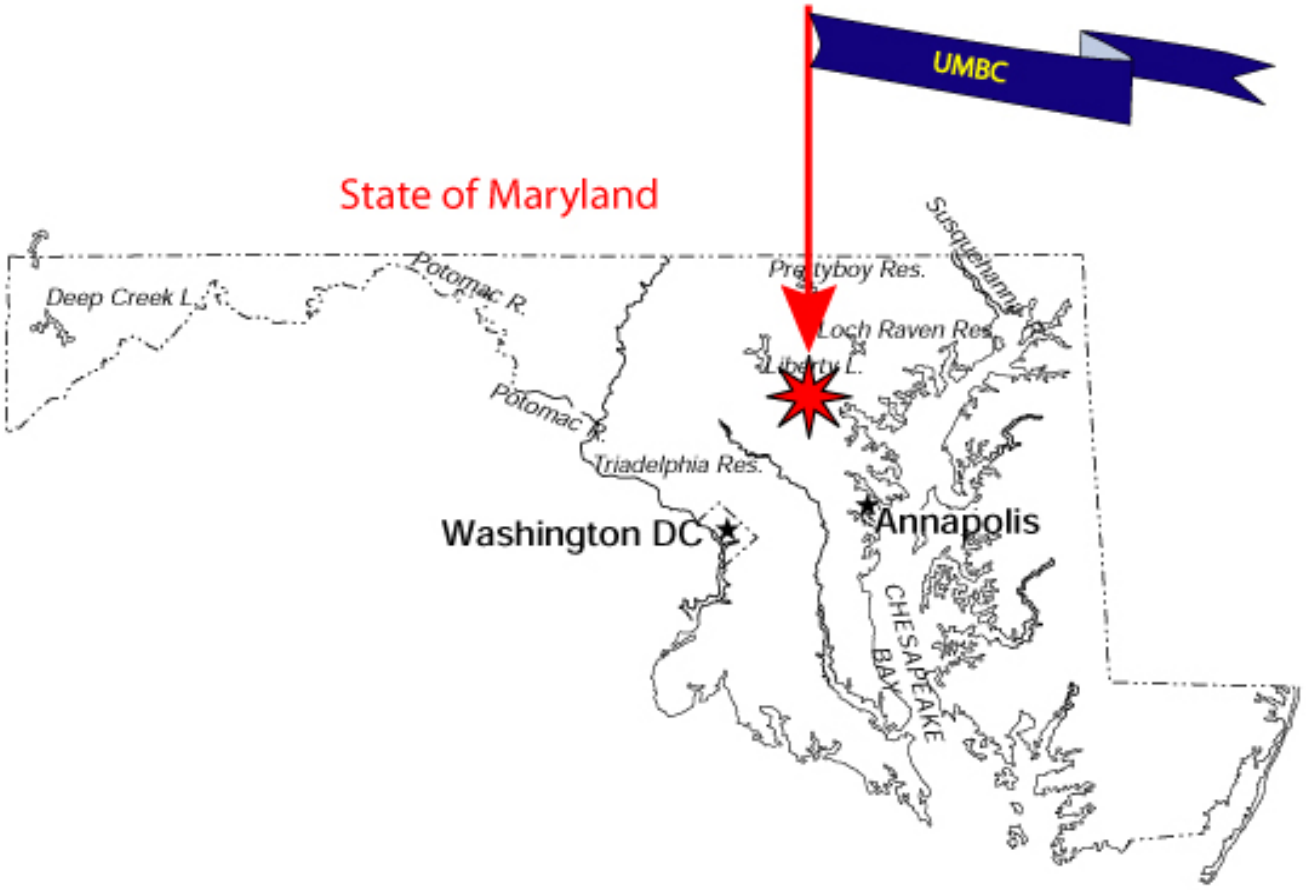
Panos G. Charalambides, Chair

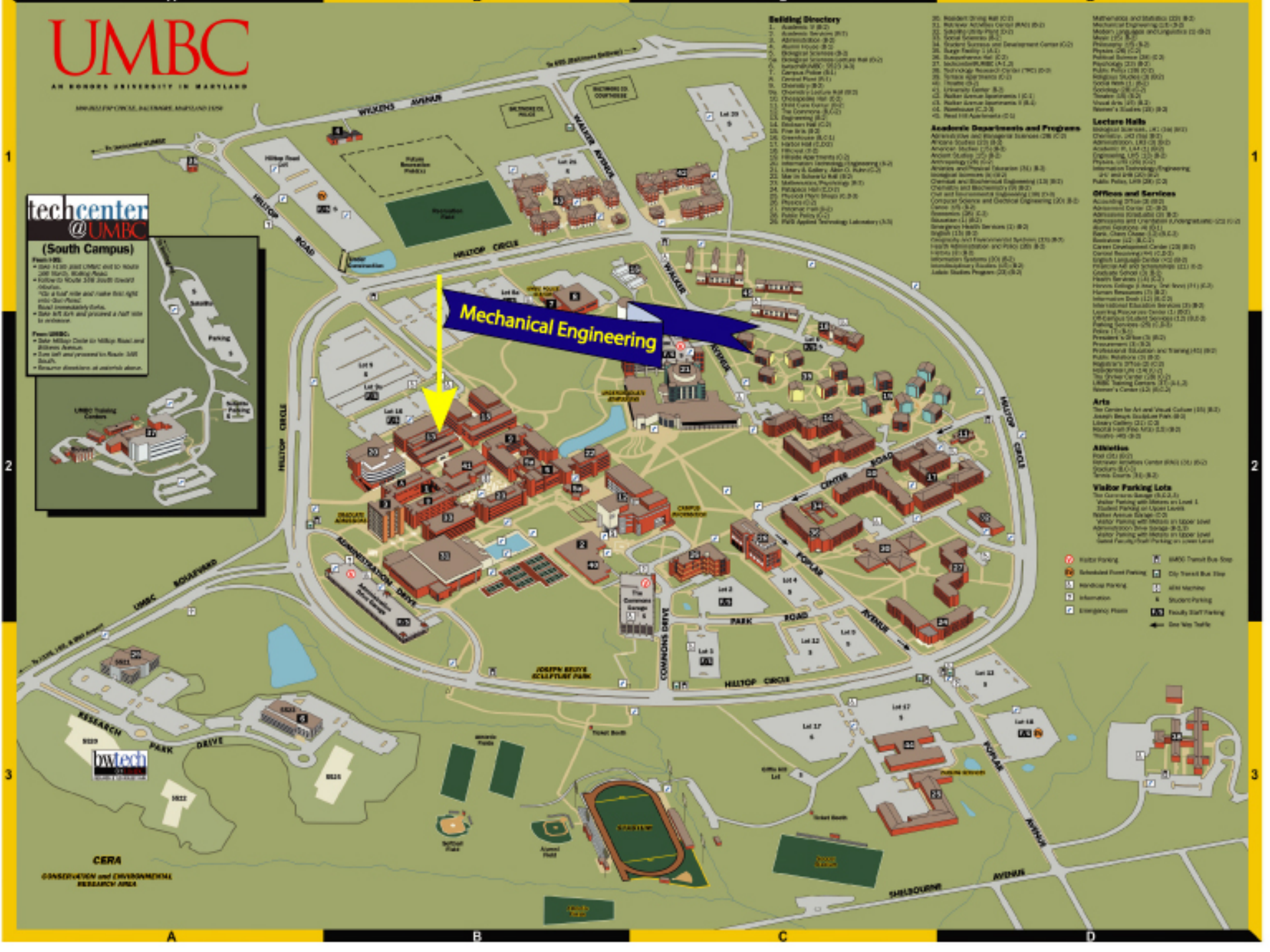
March 23, 2007

"Transforming Mechanical Engineering at UMBC." Invited presentation given at the ASME conference for Mechanical Engineering Department Heads held in San Juan, Puerto Rico, March 2007.

Where are we?


United States
State of Maryland
Puerto Rico


UMBC
State of Maryland
Deep Creek L.
Potomac R.
Potomac R.
Prettyboy Res.
Loch Raven Res.
Liberty L.
Triadelphia Res.
Susquehanna
Washington DC
Annapolis
CHESAPEAKE
BAY


UMBC
AN HONORS UNIVERSITY IN MARYLAND
techcenter @UMBC
(South Campus)
Mechanical Engineering
WILKENS AVENUE
WALKER AVENUE
HILLTOP ROAD
HILLTOP CIRCLE
UMBC BOULEVARD
ADMINISTRATION DRIVE
CENTER ROAD
POPLAR AVENUE
PARK ROAD
COMMONS DRIVE
RESEARCH PARK DRIVE
SHALEBOURNE AVENUE
CERA
CONSERVATION and ENVIRONMENTAL RESEARCH AREA
Building Directory
Academic Departments and Programs
Lecture Halls
Offices and Services
Arts
Athletics
Visitor Parking Lots

Who are we?

Mechanical Engineering Personnel --- January, 11, 2007

State of
The Department of
Mechanical Engineering

Assessing %Effort

	# of Faculty	Courses	SCEQs	Curriculum Innovation	Res. Students	Degrees Conf	J Papers	Non-j. papers	Patents	Conf Abstracts	Book Chapters	Books	Proposals Submitted	Fund Expend	GRA Support	Internal Service	Admin	External Service	Total
AY 98-99	8	41.3	9.1	6.3	24.4	8.1	37.5	6	0.5	9	1.5	0	0	30.6	0	13.5	5.1	6	198.9
AY 99-00	11	45	7.5	1.4	16.5	5.9	26.4	0	1.5	8.1	0	0	12	34.2	8.5	14.5	3.6	7	192.1
AY 00-01	12	48	7.9	0.8	16.7	3.8	30	0	2.2	12.9	2	2.5	12	35	9.3	8.7	2	4.9	198.7
CY01	11	36.7	8.6	3.5	15.3	5	21.6	5.4	2.6	8.4	12	3	15	43.5	12.7	10	1.5	9.9	203.9
CY02	11	45	10.9	5	14.2	4.1	27.3	7.6	2	7.9	2.2	0	12.3	45.5	12.1	12.9	4.6	10	223.5
CY03	11	47.3	9	4	16.4	8.45	13.2	7.4	3.6	5.5	4.4	0	12.3	42.9	10	14.7	3.2	9.3	211.5
CY04	15	39.8	8.7	6	13.8	4	11.2	9.2	3.5	4.2	0	0	13.6	53.9	12.1	10.1	5.3	8.1	219
CY05	15	43.9	9.6	5	18.9	4.7	9.6	9.6	2.7	6.2	1.6	0.8	14	61.9	20.6	16	4	8.3	245.2

TEACHING

RESEARCH

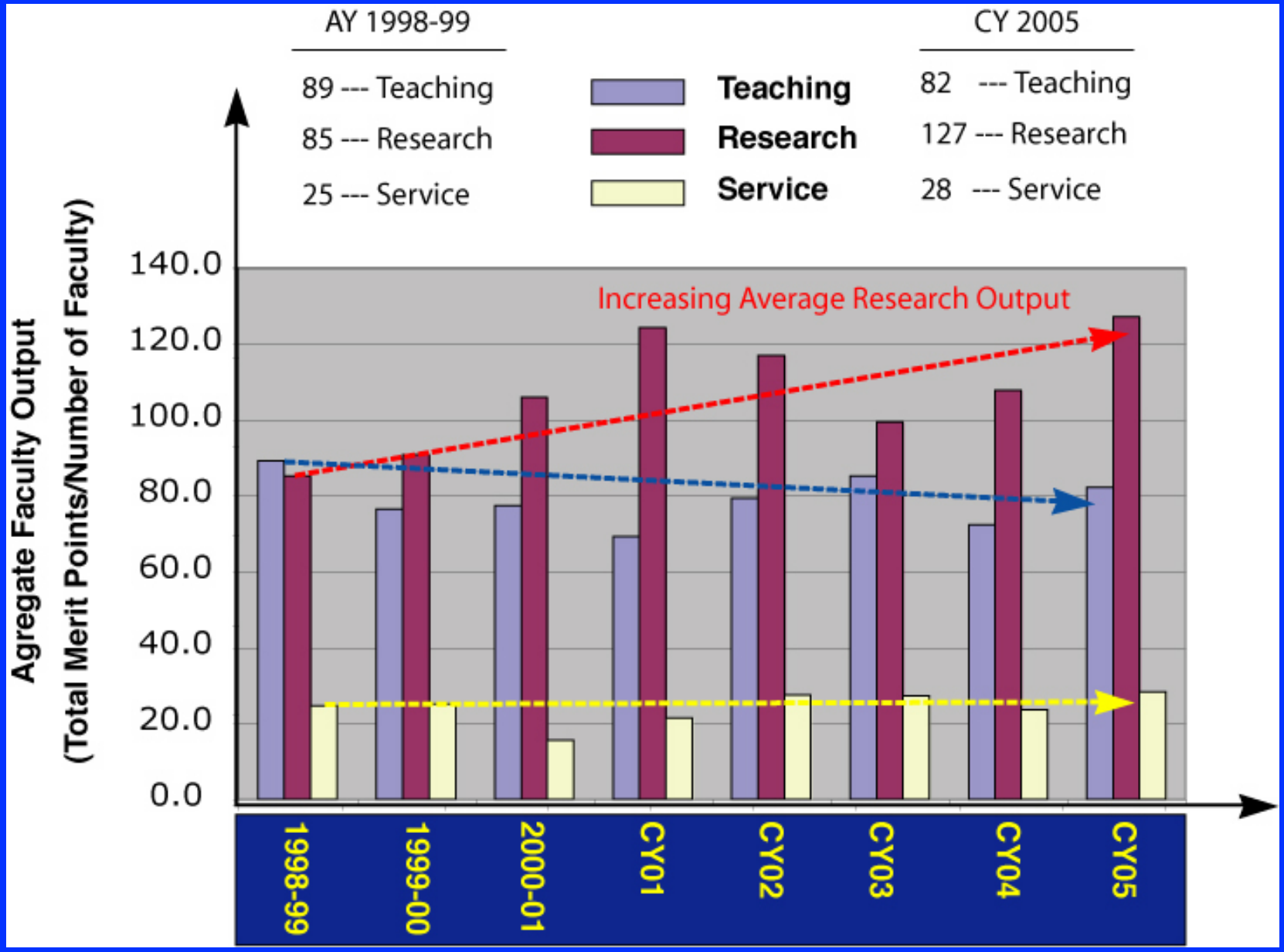
SERVICE

Merit Index Outcomes

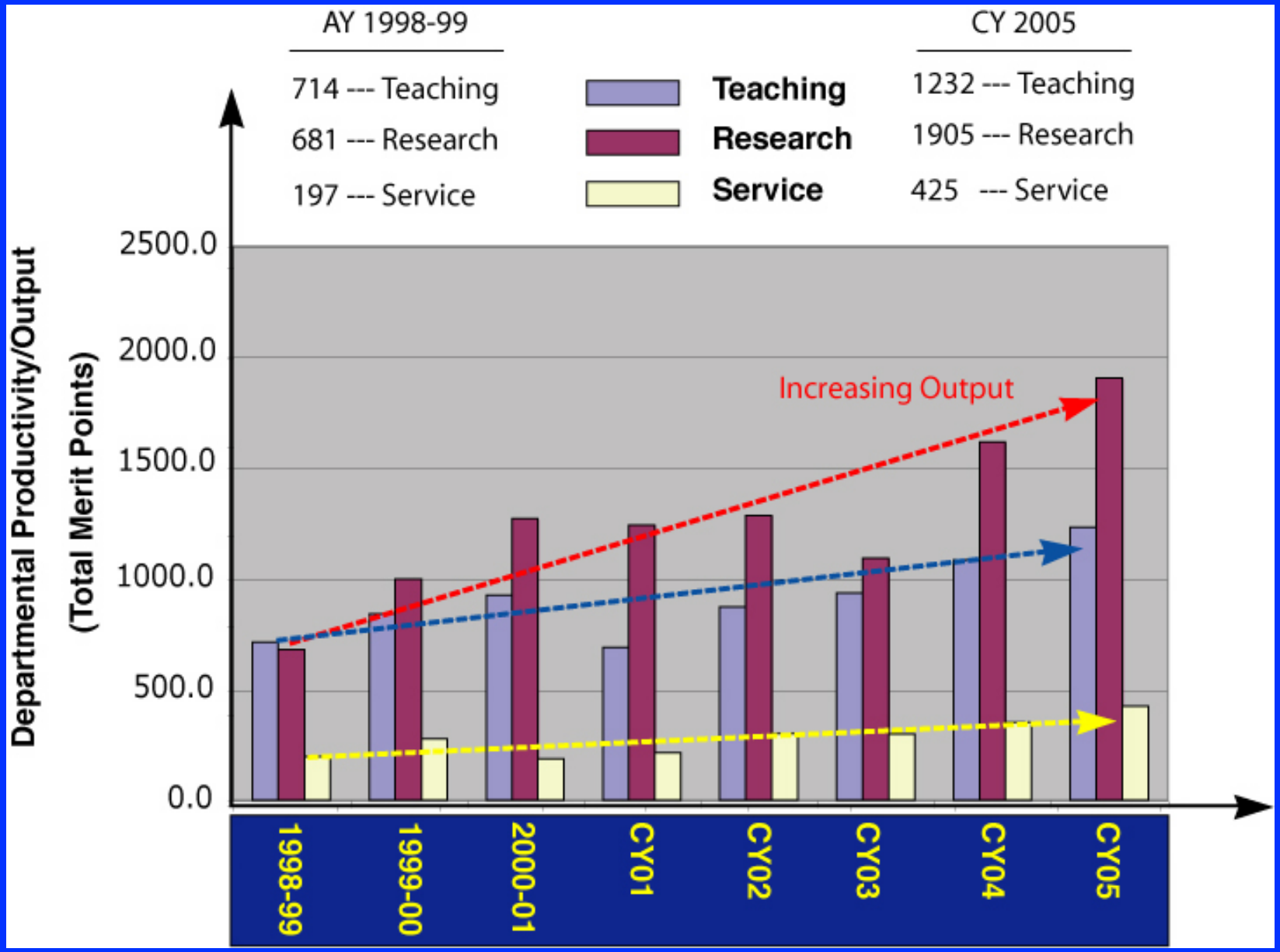
Mechanical Engineering Workload Effort Trends
(Data Compiled by P.G. Charalambides, in preparation for March 14, 2007, Faculty Meeting on Faculty Workload)

Year	Number of Faculty	Merit Points Per Faculty (Average)	Average per Faculty Merit Points			Total Merit Points			% Effort		
			Teaching	Research	Service	Teaching	Research	Service	Teaching	Research	Service
AY98-99	8	199	89	85	25	714	681	197	45	43	12
AY99-00	10	192	76	91	25	839	998	276	40	47	13
AY00-01	12	199	77	106	16	926	1271	187	39	53	8
CY01	11	215	69	124	21	691	1242	214	32	58	10
CY02	11	224	79	117	28	871	1286	303	35	52	12
CY03	11	212	85	99	27	937	1092	299	40	47	13
CY04	15	204	72	108	24	1085	1616	353	36	53	12
CY05	15	237	82	127	28	1232	1905	425	35	53	12

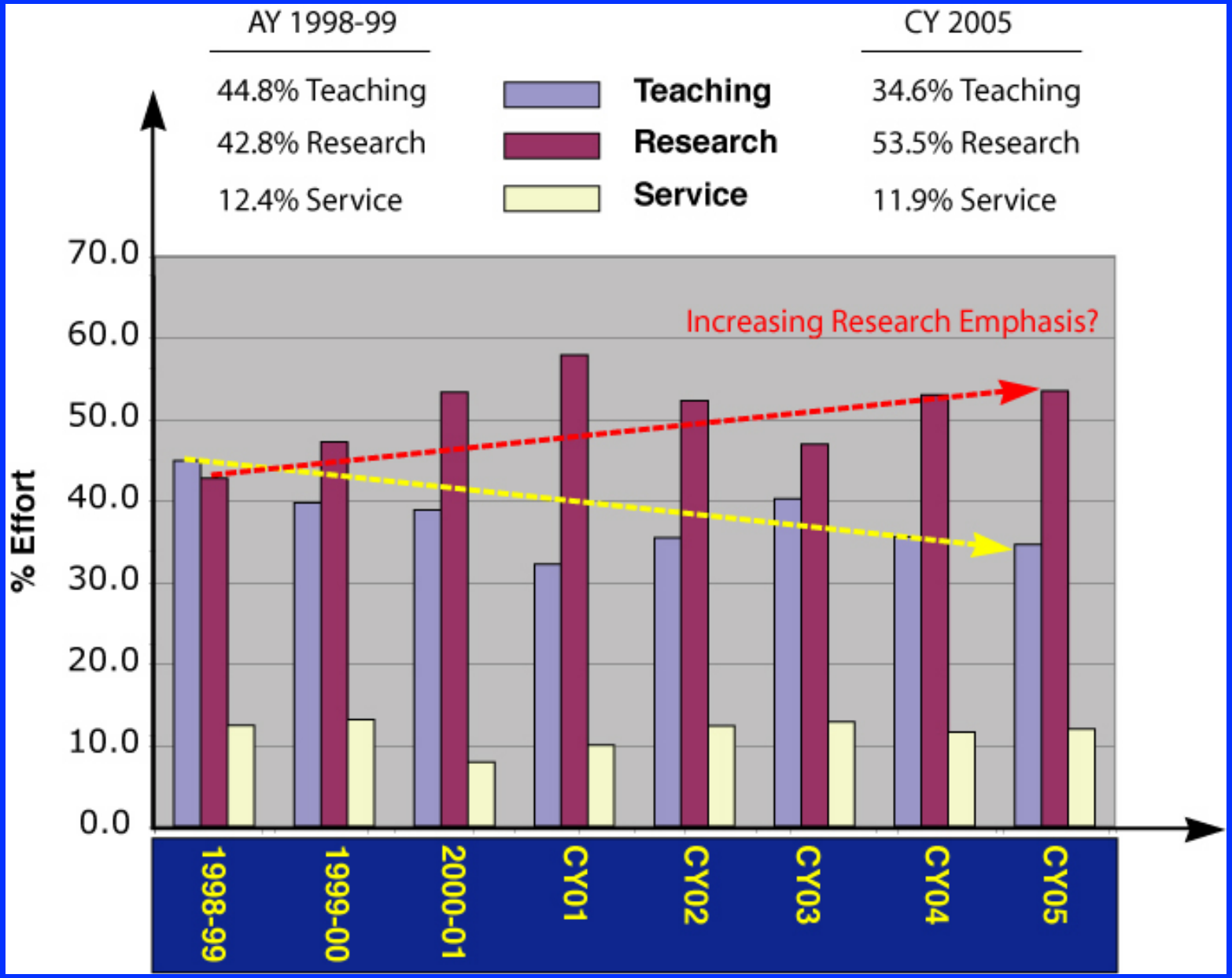
Average Workload Trends



Departmental Output

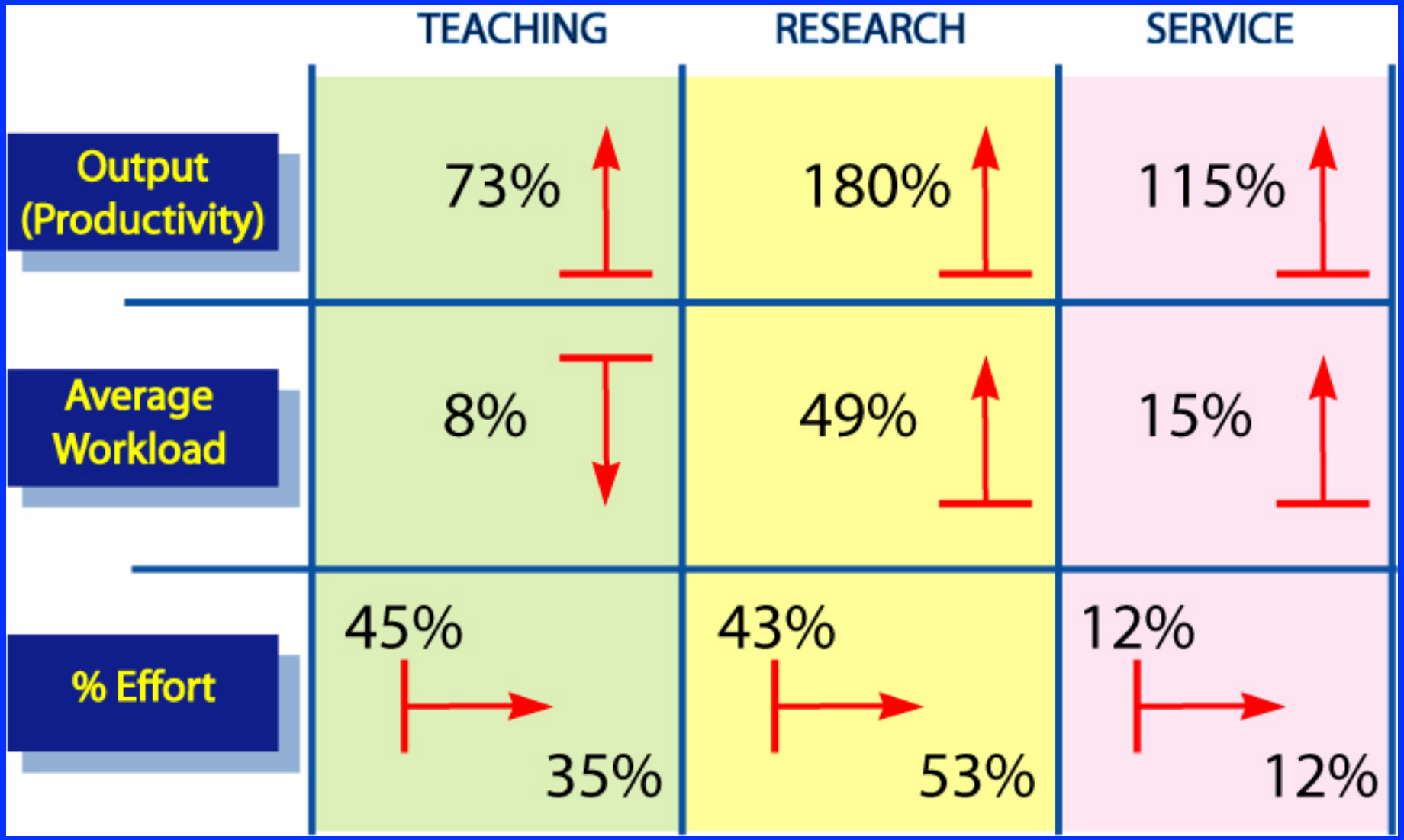


% Effort

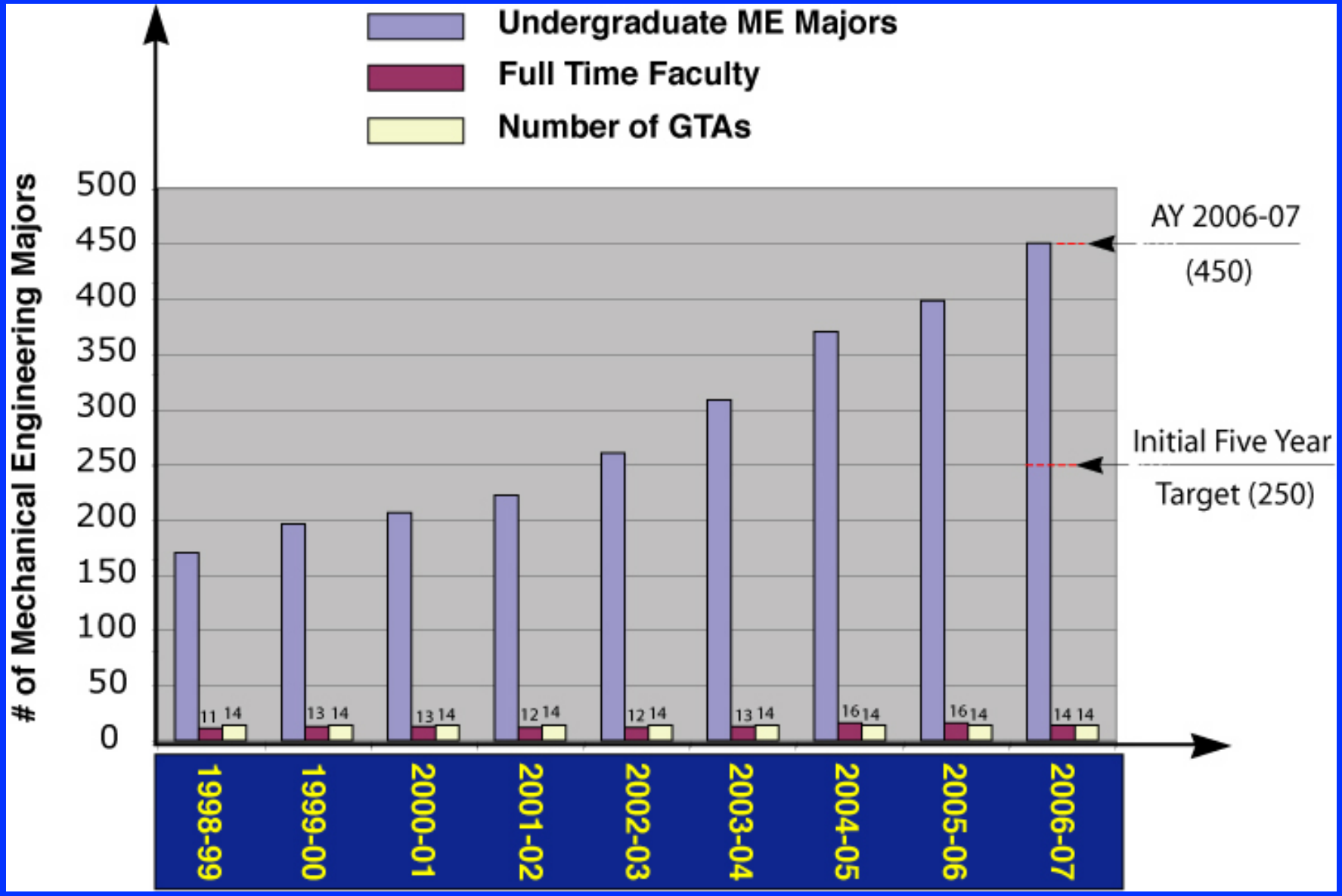

AY 1998-99
44.8% Teaching
42.8% Research
12.4% Service
Teaching
Research
Service
CY 2005
34.6% Teaching
53.5% Research
11.9% Service
% Effort
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Increasing Research Emphasis?
1998-99
1999-00
2000-01
CY01
CY02
CY03
CY04
CY05

Assessing Change

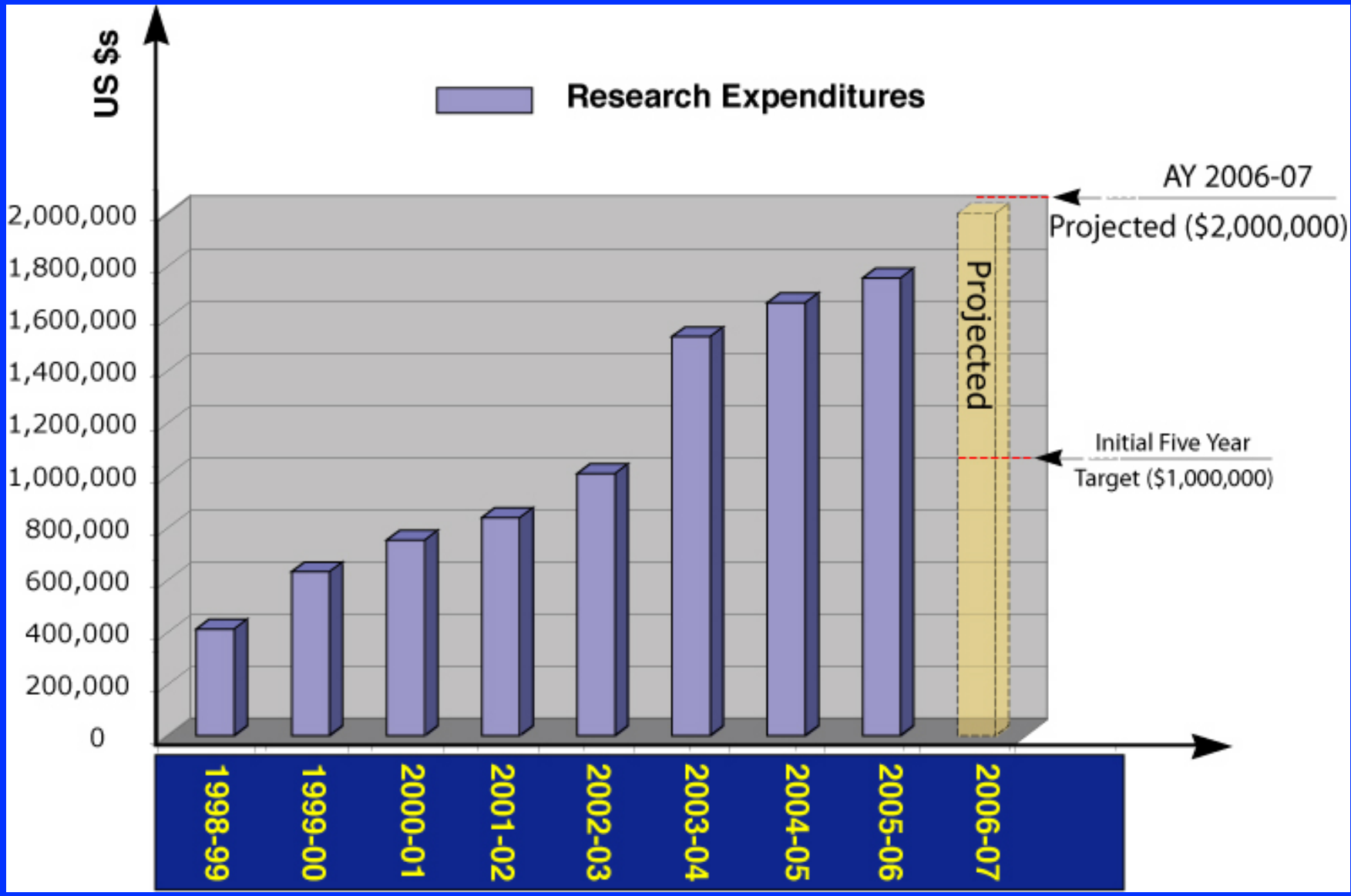
(Faculty Increased from 8 to 15)



Undergraduate Enrollments

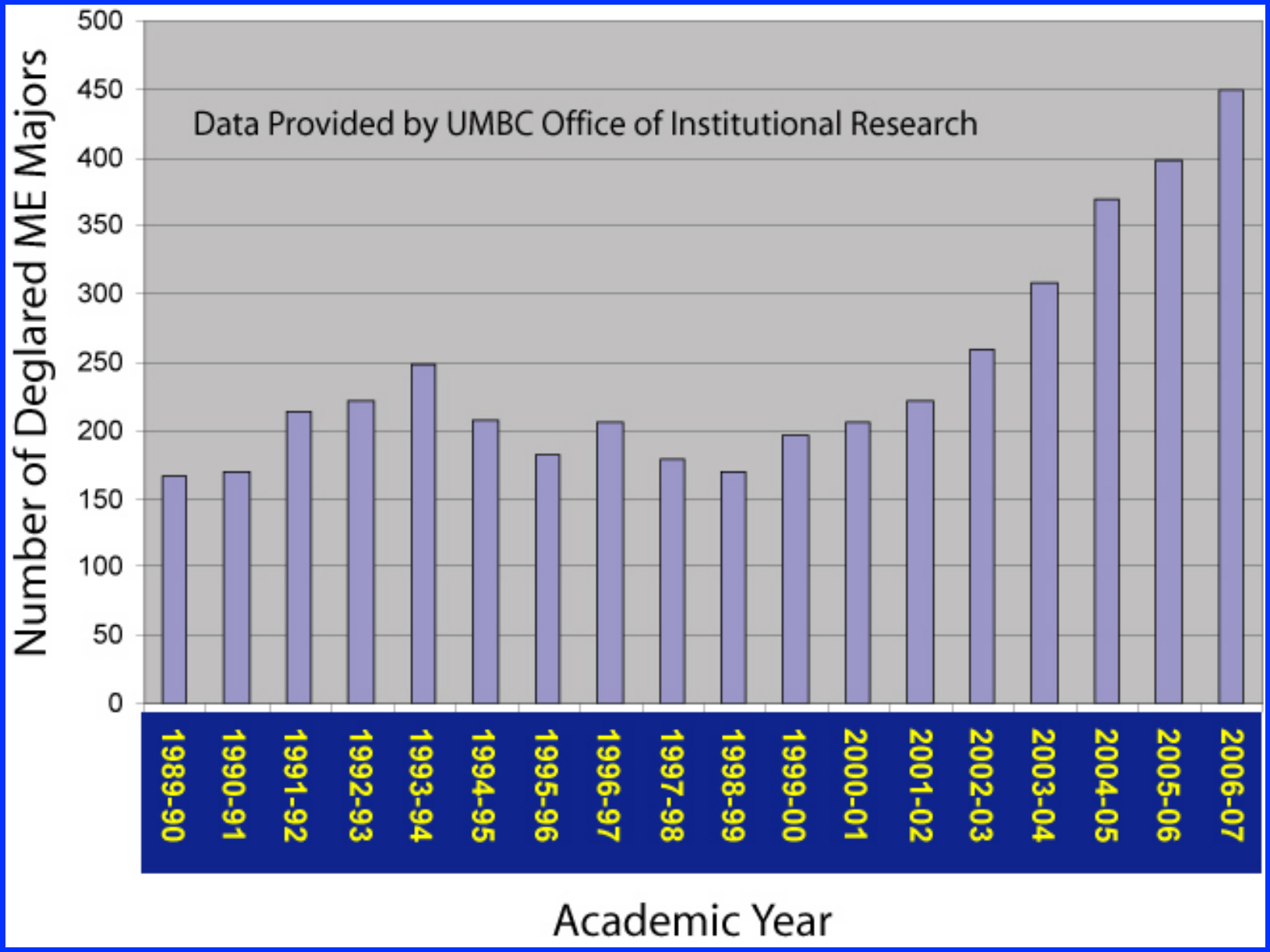


Research Expenditures



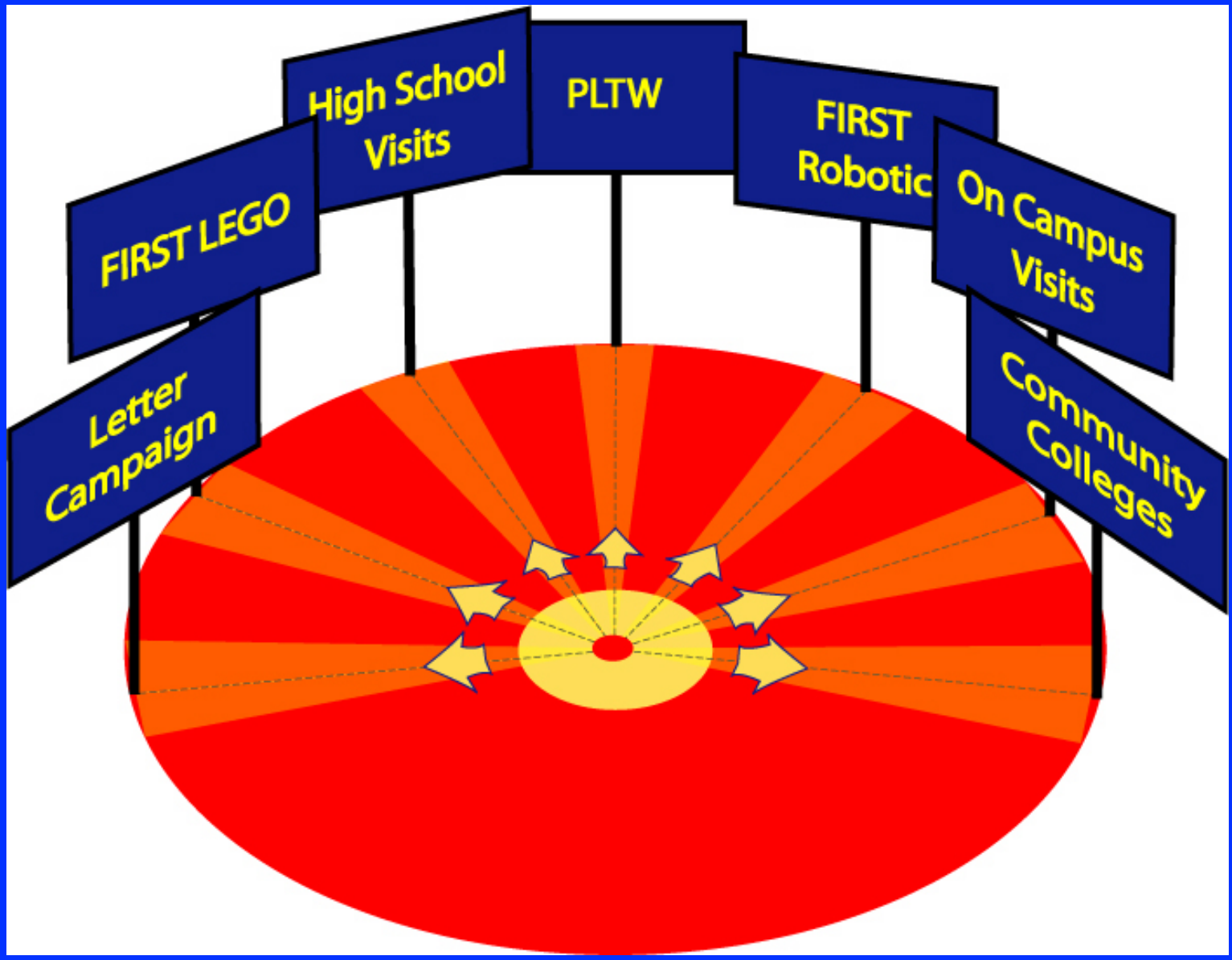
Example of Success

Increasing UG Enrollments by over 110% over 5 years

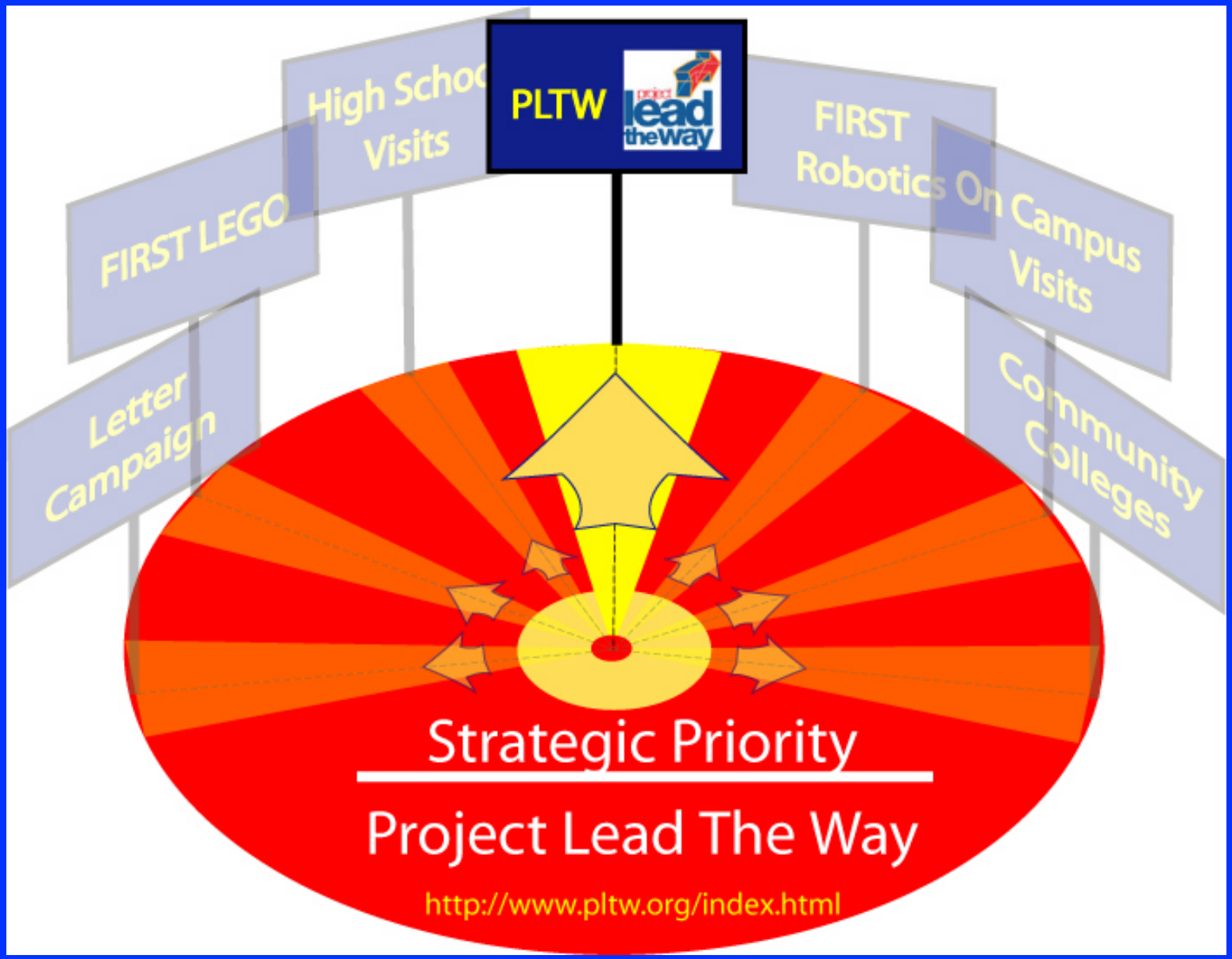

Number of Deglared ME Majors
500
450
400
350
300
250
200
150
100
50
0
Data Provided by UMBC Office of Institutional Research
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
Academic Year

Increasing UG Enrollments
Underpinnings of Success

Facing The Realities



Factor 1: Making Strategic Choices



Factor 2
Embracing Scholarship in Engineering Education

- PT Lecturer 2001-04
- Active in Outreach
- Focused on Engineering Education
- 2004--Tenure Track Appointment
- Director of PLTW
- PI-$10 Million NSF grant on STEM Education

Outcome

Increased UG Enrollment?

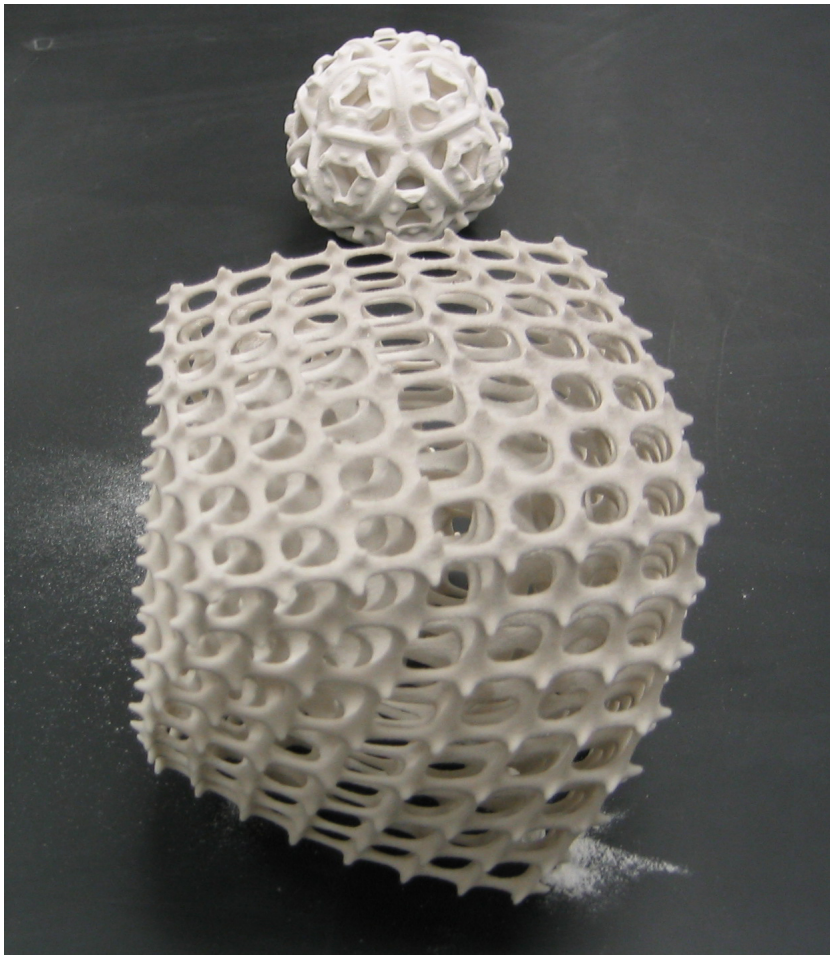
We Believe so!

Too Early to Support Through Data.

Increasing UG Enrollments

Factor 3:
Renovating The Curriculum

Rapid Prototyping



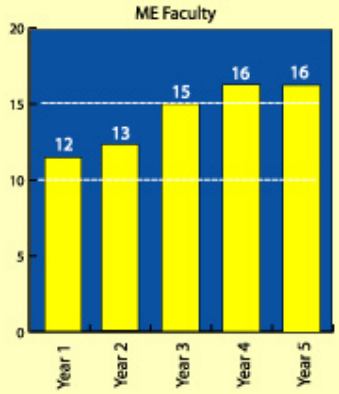

MECHANICAL
ENGINEERING
UMBC

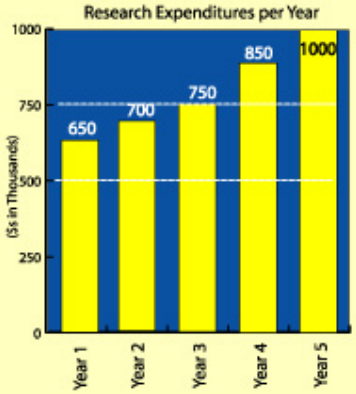
Design Realization in ENME204

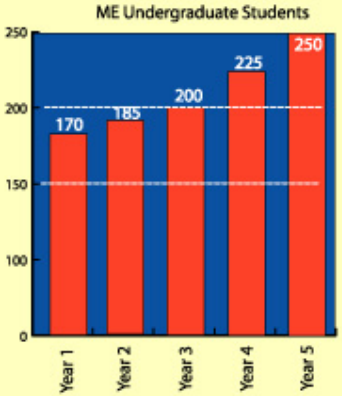
Example of Unrealized Success

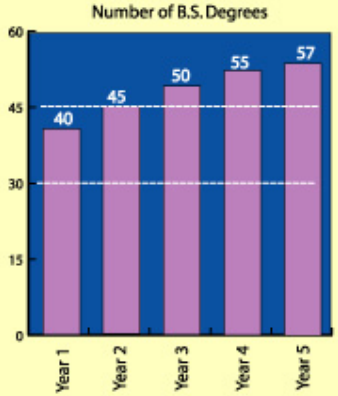
The ME China Initiative

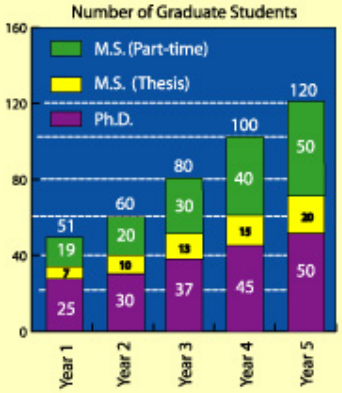
A Five Year Strategic Plan for ME
(Fall, 2001: Year-1 is AY 2002-03)

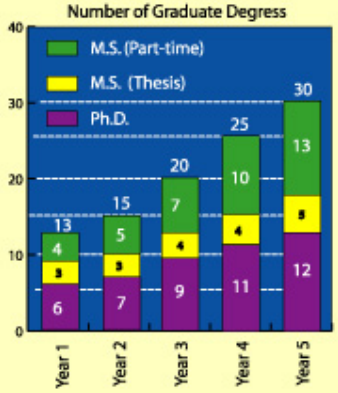












A Draft Proposal on a New UMBC Mechanical Engineering Initiative

OFFERING

A UMBC NON THESIS MS DEGREE IN

MECHANICAL ENGINEERING

AT BEIJING UNIVERSITY OF TECHNOLOGY

Expected Outcomes

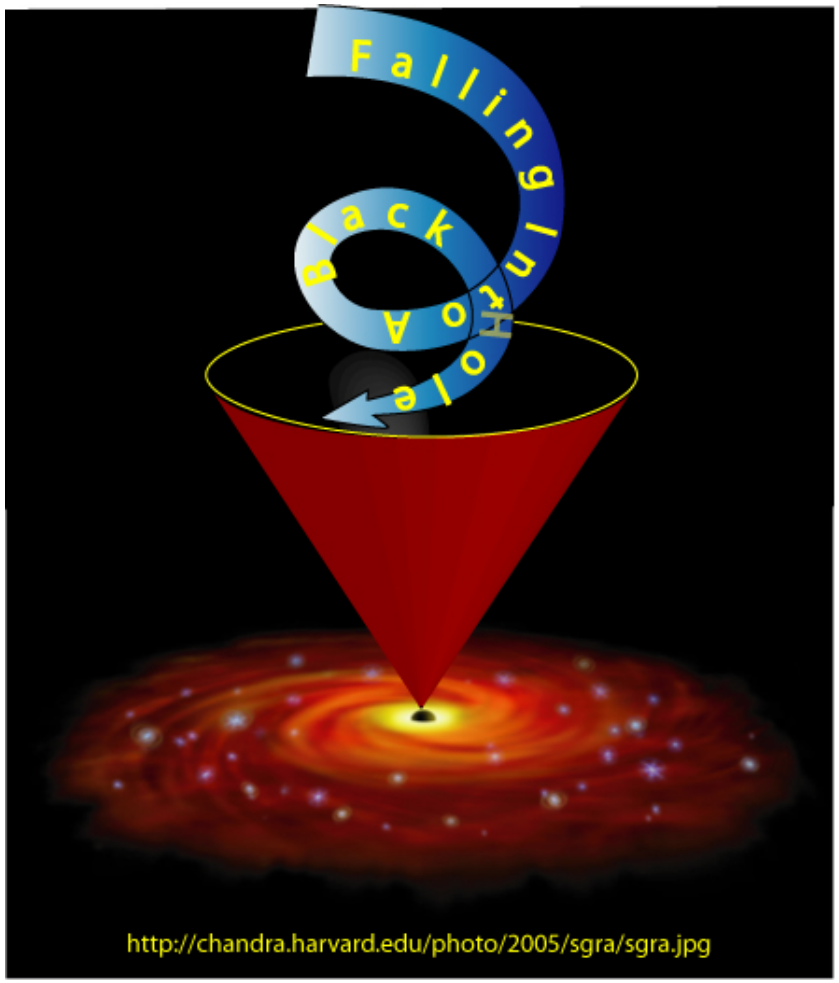
- *Outcome 1:* At steady-state (fourth year after the start of the new initiative) the ME department will be graduating an additional 60 M.S. students per year.
- *Outcome 2:* At steady-state, the ME PhD program at UMBC will recruit at least 5 new highly qualified PhD students per year that have been identified though this new initiative.
- *Outcome 3:* At steady-state, the ME Department will have built on existing collaborations and will have developed strategic partnerships with local offices of Black & Decker and Danaher Corporations
- *Outcome 4:* Chinese graduates employed by the US or other international companies in China. Impact of the UMBC education on the global market.

What Happened?

- "Morphed" into a 1-1-1 hybrid initiative.
- Academics & Program mechanics -worked out.
  - **a) The revised program does not need to be approved by the Ministry of Education in China.**
  - **b) The UMBC faculty do not need to travel to China, and the program does not incur much extra costs;**
  - **c) Could work simultaneously with many universities in China.**
- Requirement for "differential tuition"
- Could start during Fall 2007

  – **Initiative currently in "limbo!"**

Why?



- Lack of an advocate?
- Lack of interest?
- No integral to mission?
- Lack of leadership?
- Lack of vision?
- Lack of resources?
- Lack of commitment?
- Lack of ( )?

Transforming Mechanical Engineering at UMBC

Five Year Vision

- 17 Faculty
- 17 GTAs?
- 250-300 Undergraduate
- 80 Graduate (full time)
- $1.3 M Res Expenditures
- 15-18 ME majors/faculty
- $60-$75K/
- 3 courses/

Drivers of Change

Self awareness Persistance Opportunity
Vision Teamwork Hard work Leadership
Strategic goals Empowerment Perseverance

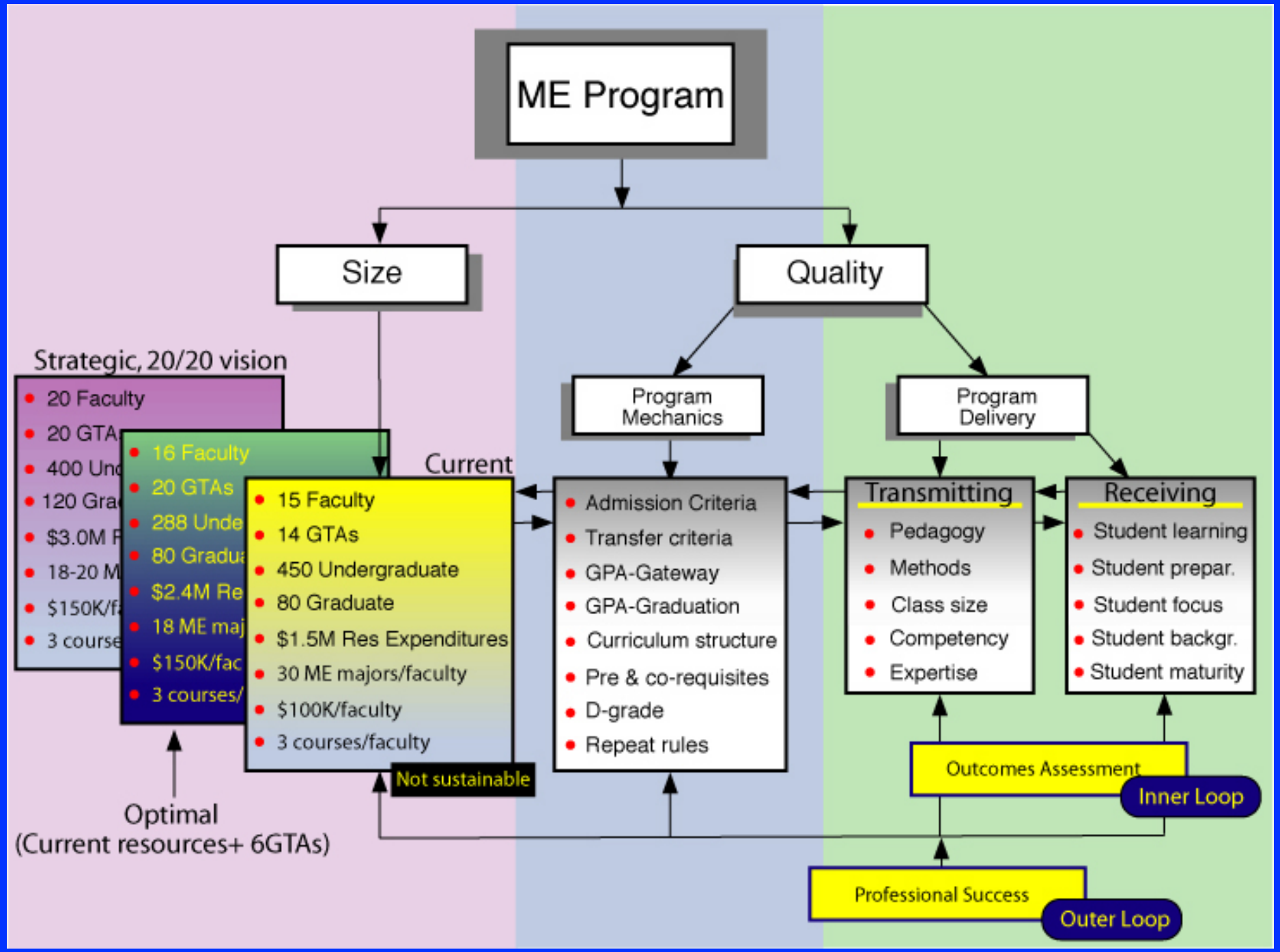
- 13 Faculty & 2 open lines
- 14 GTAs
- 200 Undergraduate
- 50 Graduate
- $ 0.6 M Res Expenditures
- 15 ME majors/faculty
- $ 45-50 K/faculty
- 3 courses/faculty

AY 2001-02

- 15 Faculty & 2 open lines
- 14 GTAs
- 450 Undergraduate
- 80 Graduate
- $1.9 M Res Expenditures
- 30 ME majors/faculty
- $126K/faculty
- 2 to 5 courses/faculty

AY 2006-07

- Size
- Diversity
- Productivity
- Quality
- Morale


ME Program
Size
Quality
Program Mechanics
Program Delivery
Strategic, 20/20 vision
20 Faculty
20 GTA
400 Und
120 Gra
$3.0M R
18-20 M
$150K/fa
3 course
16 Faculty
20 GTAs
288 Unde
80 Gradua
$2.4M Re
18 ME maj
$150K/fac
3 courses/
Optimal
(Current resources+ 6GTAs)
Current
15 Faculty
14 GTAs
450 Undergraduate
80 Graduate
$1.5M Res Expenditures
30 ME majors/faculty
$100K/faculty
3 courses/faculty
Not sustainable
Admission Criteria
Transfer criteria
GPA-Gateway
GPA-Graduation
Curriculum structure
Pre & co-requisites
D-grade
Repeat rules
Transmitting
Pedagogy
Methods
Class size
Competency
Expertise
Receiving
Student learning
Student prepar.
Student focus
Student backgr.
Student maturity
Outcomes Assessment
Inner Loop
Professional Success
Outer Loop