



Incorporating Data Analytics into Enterprise Risk Management

University of Massachusetts

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What we hope you
will learn...

Enterprise Risk Management data is powerful

- Increases transparency
- Helps set strategic priorities
- Creates a risk-informed culture

Agenda

- University of Massachusetts Overview
- Data Generated by
 - ERM Risk Assessment
 - ERM Mitigation Strategy Assessment
- Data Supporting ERM Analyses
 - Facilities and Deferred Maintenance
 - Financial Sustainability
 - Enrollment
- Key Takeaways



University of Massachusetts Overview

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About UMass

University of Massachusetts Amherst

- Land Grant Founded in 1863; Flagship Campus with Broad Research Mission
- Institute for Applied Life Sciences
- State of the art Core Facilities for campus and community users
- Center for Data Science
- UMass Donahue Institute
- Institute for Diversity Sciences
- Energy Transition Institute
- Center for Braiding Indigenous Knowledges and Science
- Elaine Marieb Center for Nursing and Engineering Innovation



UMBA

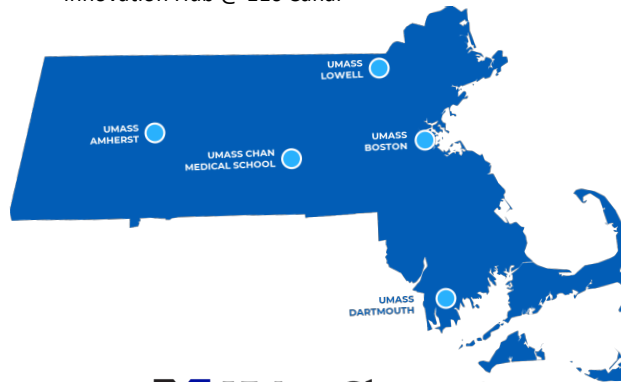
- Established in 1960 to provide dormitories, dining commons, and other buildings for the University
- Acquires, constructs, and demolishes buildings, manages capital projects, and issues bonds on behalf of the University to finance or refinance capital projects

Foundation

- Established in 1950 to foster & promote growth, progress, & general welfare of the University
- Solicits, receives, & administers gifts & donations
- Maintains a portion of the University's investment portfolio, predominantly the endowment



- Wall Street Journal Ranked #1 Public in Massachusetts
- University Closely Engaged With Regional Industries
- Renowned For Technical Emphasis Such as Engineering, Advanced Materials Sciences and Nano-manufacturing
- Mass Medical Device Development Center (M2D2)
- Rist Institute for Sustainability and Energy
- N.E. Robotics Validation & Experimentation (NERVE) Center
- Raytheon-UMass Lowell Research Institute (RURI)
- Center for Population Health
- Innovation Hub @ 110 Canal



- World-class biomedical research program
- Three graduate schools: T.H. Chan School of Medicine, Tan Chingfen Graduate School of Nursing and Morningside Graduate School of Biomedical Sciences
- Graduate Medical Education
- UMass Center for Clinical & Translational Science
- For Health Consulting
- Mass Biologics
- BRIDGE



- Most diverse public university in New England, with over 50% of students first in family to go to college
- Impactful research with strengths in climate equity and costal resilience, health for diverse populations, education, and social justice
- Manning College of Nursing and Health Sciences is leading provider of health care professionals
- College of Management with extensive pathway partnerships
- School for the Environment and Stone Living Lab
- Paul English Applied Artificial Intelligence Institute
- On-campus Venture Development Center incubates technology and life sciences startups



- National Research University With Engineering, Cybersecurity, And Marine Sciences Emphasis (Dartmouth)
- School for Marine Science and Technology (New Bedford)
- Only Performing Art College in the system – College of Visual & Performing Arts
- Plastics Biodegradability Lab (New Bedford)
- UMass Law
- Center for Innovation & Entrepreneurship (Fall River)



- Acquired in September 2021 to expand educational opportunities for adult learners
- 501(c)3 nonprofit based in CA serving adult learners in Massachusetts, across the nation, and across the world

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UMass by the Numbers



\$4.3 billion annual FY25 budget



\$765 million in state appropriation
(not including CB, fringe, ARPA)



Nearly 74,000 students by headcount & **20,000** new graduates annually



\$153 million average monthly payroll



\$409 million in University-generated financial aid



\$86.5 million average monthly spend with over **30,000** vendors



\$826 million in annual research & development



26,000 employees (including students), **3rd largest** employer in Massachusetts

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UMass Financial Accountability Framework

Board Slide

Independent & objective assurance that analyzes data, processes, policies & controls

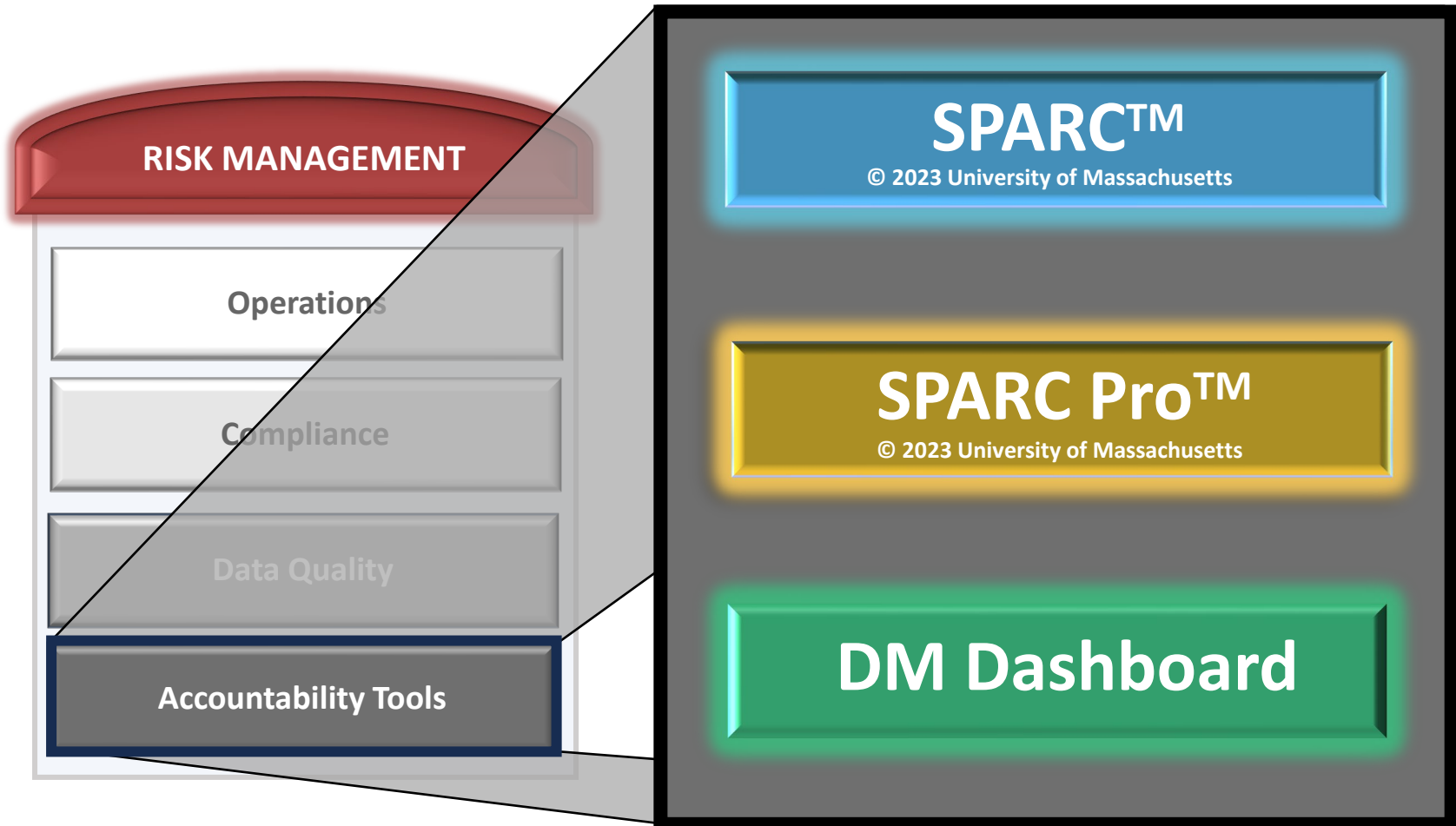
Standard processes to provide reasonable assurance regarding achievement of objectives



Reliable, timely information that is accessible & understandable

Systematic approach to identifying, assessing & managing risks across the organization

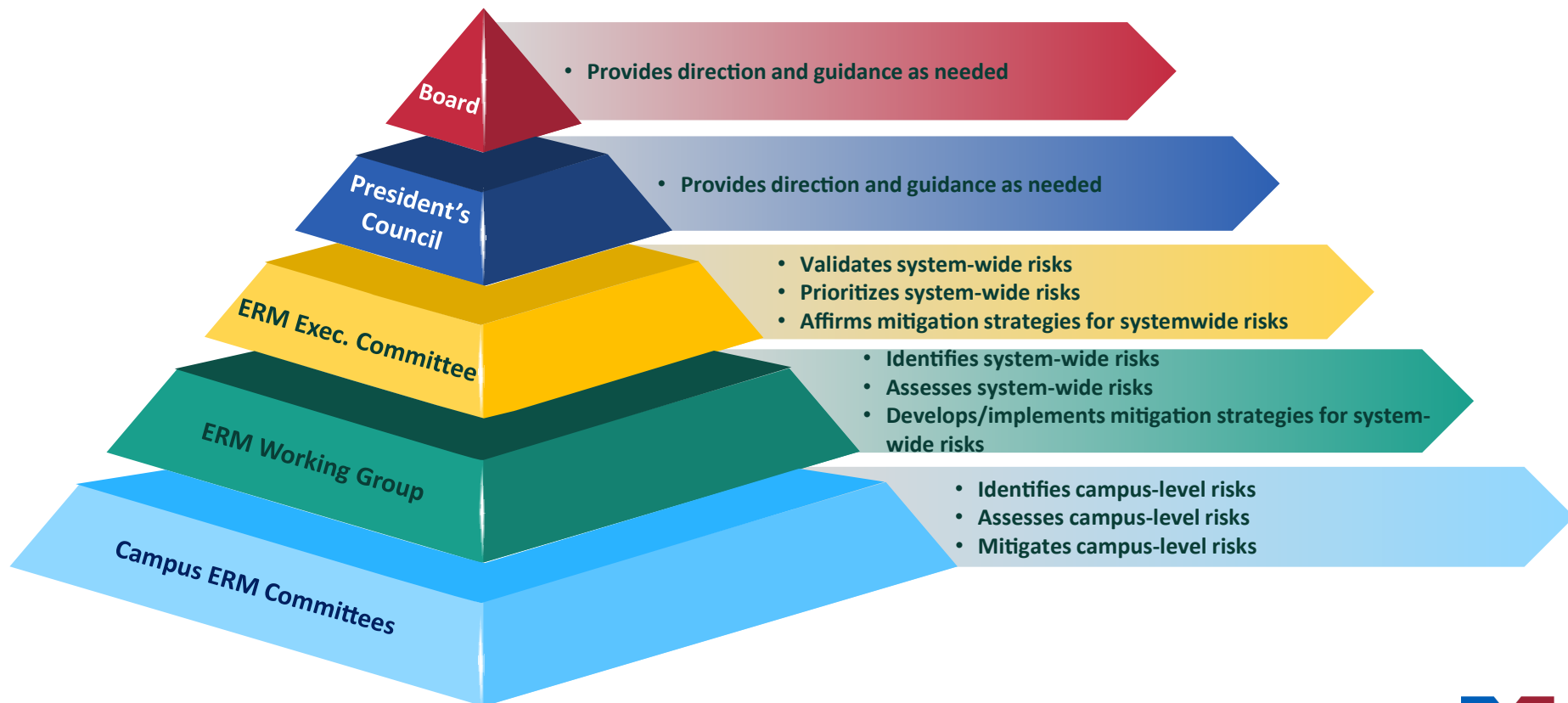
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Data Generated by ERM: Risk Assessment

ERM Governance Structure



Two-Year ERM Program Cycle

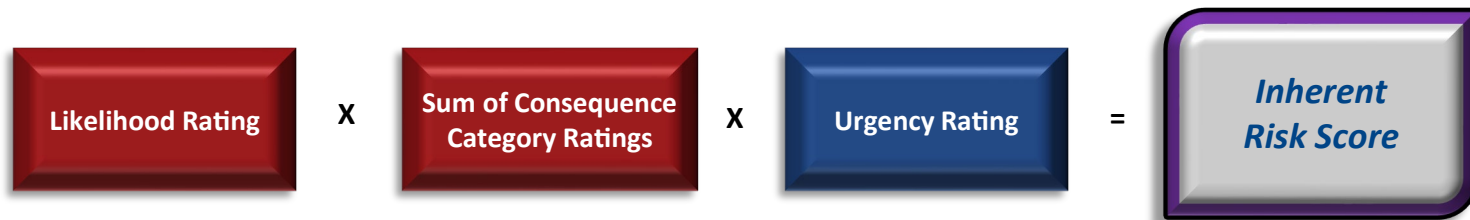


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UMASS Risk Assessment Process

- Focused on systemwide impacts
- Evaluates inherent exposure* of the University to the risk
- Rates risks across three factors
 - Likelihood*: Could the University system experience this risk?
 - Consequence*: How much would the University system be impacted by this risk?
 - *Service/Operations Disruption*
 - *Financial*
 - *Legal/Compliance*
 - *Workforce*
 - *Reputation*
 - *Life Safety*
 - Urgency: How soon does the University system need to prioritize this risk?
- Generates an Inherent Risk Score for each risk



- Assessed by ERM Working Group
- Assessed by ERM Executive Committee

*Risk assessment does not account for mitigation strategies in the evaluation of likelihood and consequence





Using Risk Assessment Data

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FY 2024 UMass Systemwide Risk Registry

■ Priority Risks

Rank	Risk	Rank	Risk	Rank	Risk
1	Enrollment	11	Information Privacy	21	Alcohol and Substance Abuse
2	Information Security	12	All Hazards Planning & Response Capabilities	22	Fraud, Waste, and Abuse
3	Facilities and Deferred Maintenance	13	Labor Relations	23	Crisis Communications
4	Financial Sustainability	14	Data Management	24	Uninsured Loss
5	Student Health & Mental Health Support	15	Vendor Risk Management	25	Multi-State Payroll Tax
6	Artificial Intelligence	16	Sexual Assault Policies & Response Procedures	26	Multi-State Business Tax
7	International Activities	17	NCAA Regulations	27	Employment Laws and Regulations
8	Research	18	IT Disaster Recovery	28	Policies and Procedures Regarding Minors on Campus
9	Diversity, Equity, Inclusion & Accessibility	19	Continuity Planning	29	Academic Quality and Standards
10	Attract, Recruit, Retain Faculty & Staff	20	Environmental Health, Public Health, & Safety Regulations	30	Oversight of Student Organizations

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Leverage ERM Data in Unique Ways

Provided risk assessment information to the Executive Compliance Committee to assist the Committee in identifying top compliance risks for the University

FY24 Risks* Ranked Based on Highest Legal/Compliance Exposure

High

- **Information Security**
- **Research**
- **Diversity, Equity, Inclusion & Accessibility**
- Employment Laws & Regulations
- Academic Quality & Standards

Medium

- **Facilities & Deferred Maintenance**
- **Student Health & Mental Health Support**
- **Artificial Intelligence**
- **International Activities**
- Information Privacy
- All Hazards Plans & Response Cap.
- Vendor Risk Management
- Sexual Assault Policies & Response Procedures
- NCAA Regulations
- Env. Health, Pub. Health, & Safety Regs
- Alcohol and Substance Abuse
- Fraud, Waste, and Abuse
- Multi-State Payroll Tax
- Multi-State Business Tax
- Policies/Procedures Minors on Campus

Low/Negligible

- **Enrollment**
- **Financial Sustainability**
- **Attract, Recruit, Retain Faculty/Staff**
- Labor Relations
- Data Management
- IT Disaster Recovery
- Continuity Planning
- Crisis Communications Coord.
- Uninsured Loss
- Oversight of Student Organizations

**Top 10 FY24 systemwide risks are bolded/italicized*





Data Generated by ERM: Mitigation Assessment

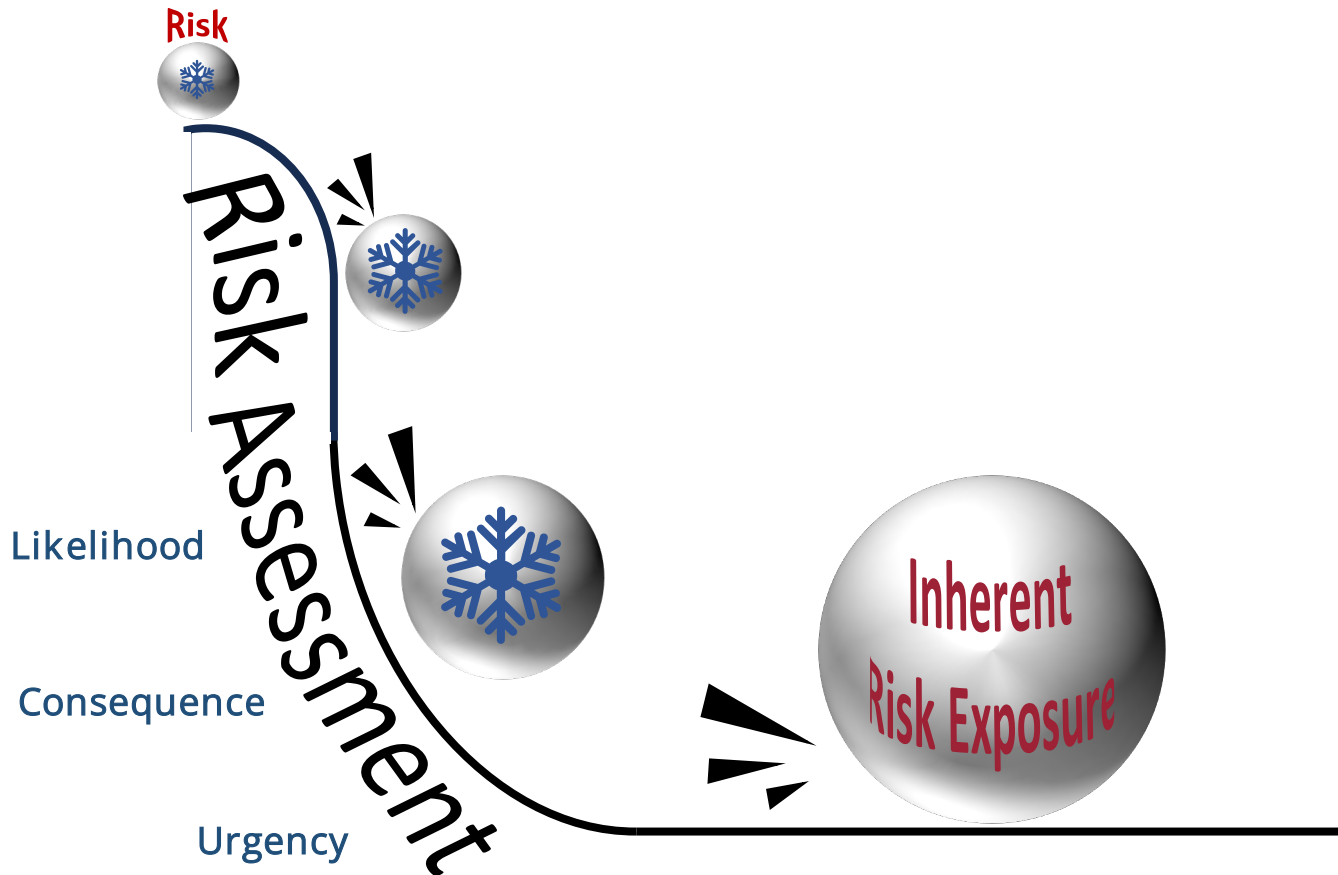
Goals of Mitigation Assessment

- Document risk mitigation strategies for *transparency*
- *Correlate* assessment of risk mitigation strategies to a risk's assessed inherent risk exposure
- Demonstrate *impact* of mitigation strategies on risk exposure

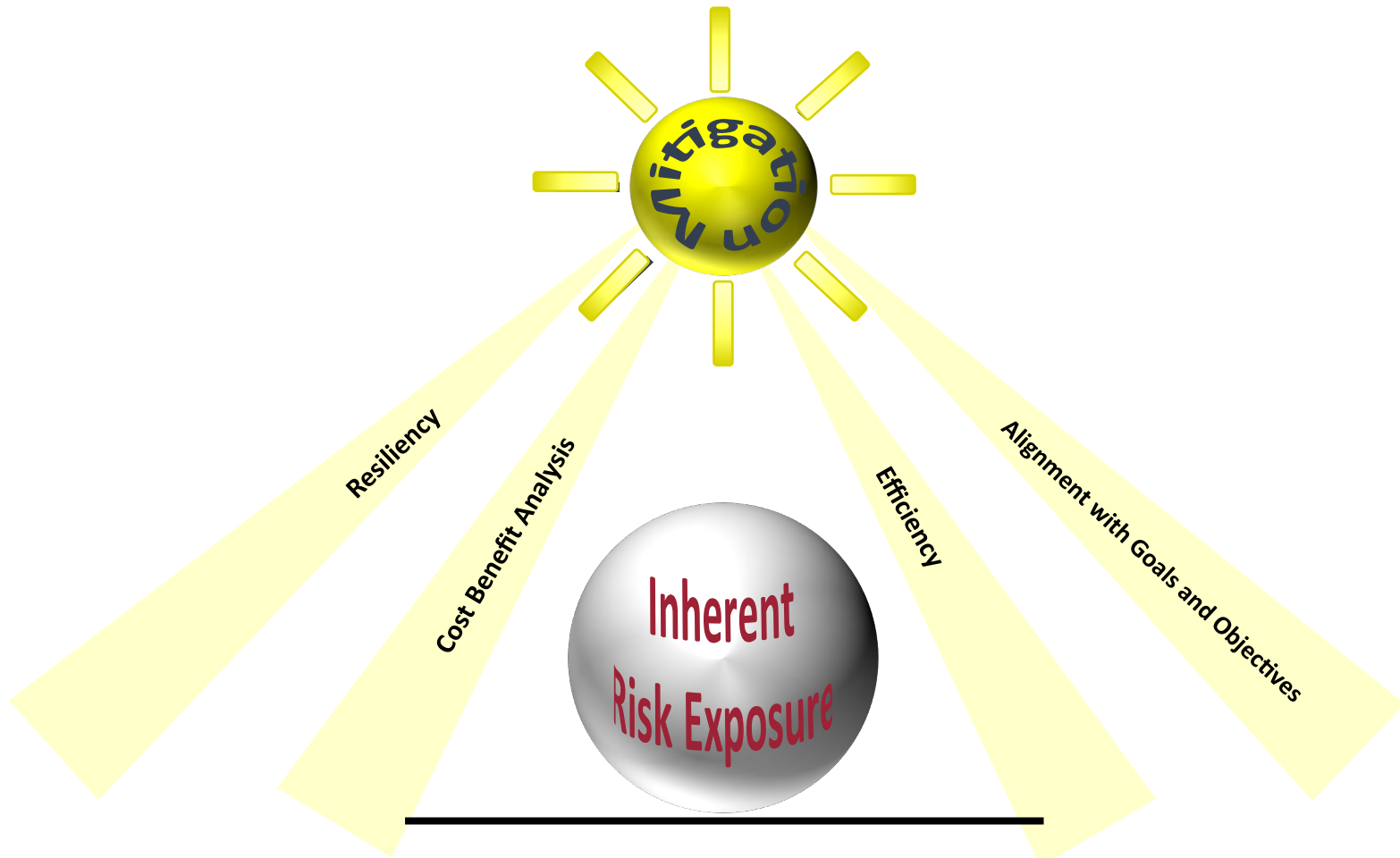
To achieve these goals, we needed to create our own assessment tool.

Why?

Assessment of Risk Exposure



Traditional Mitigation Assessment



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Correlation of UMass Risk Assessment and Mitigation Assessment



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UMass Mitigation Assessment Tool for Reducing Risk Exposure

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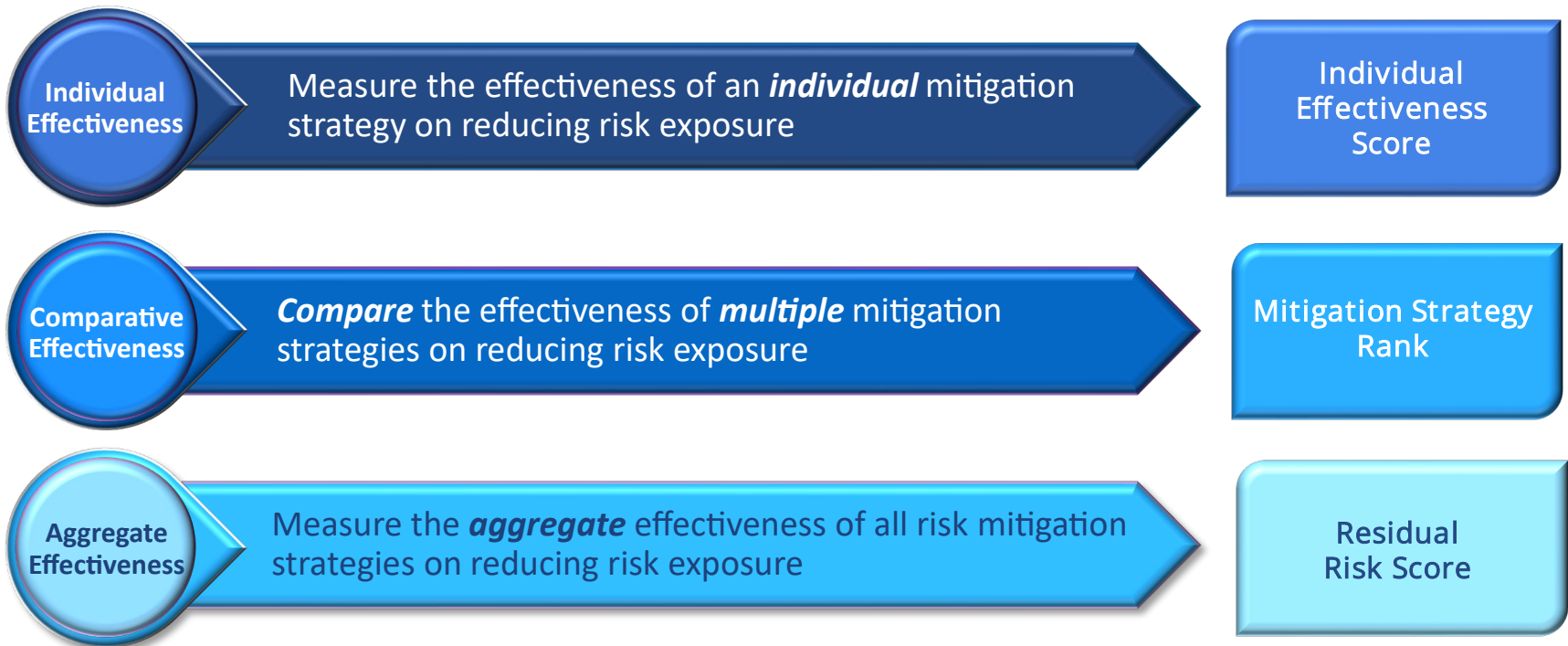


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UMASS MATRX™ Methodology

MATRIX assesses the effectiveness of mitigation strategies on each risk's specific range of exposure through three lenses.

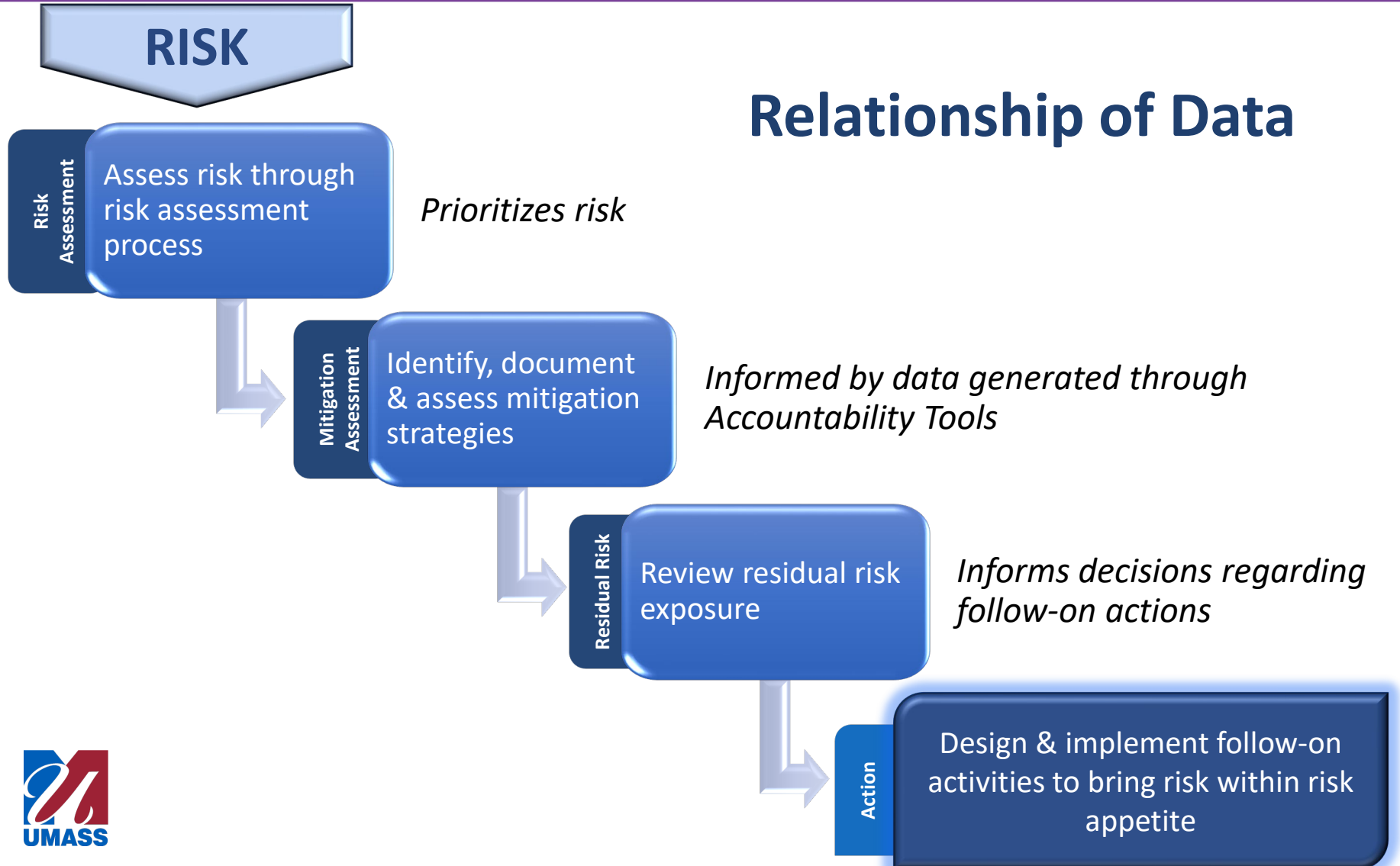


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RISK

Relationship of Data





Data Supporting ERM Analyses: Facilities and Deferred Maintenance

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Facilities & Deferred Maintenance

Relationship of Data

Risk Assessment

Assess the inherent risk **facilities and deferred maintenance** presents to UMass

No. 3 Systemwide Risk

Mitigation Assessment

Identified and assessed seven mitigation strategies

Informed by Deferred Maintenance Dashboard

Residual Risk

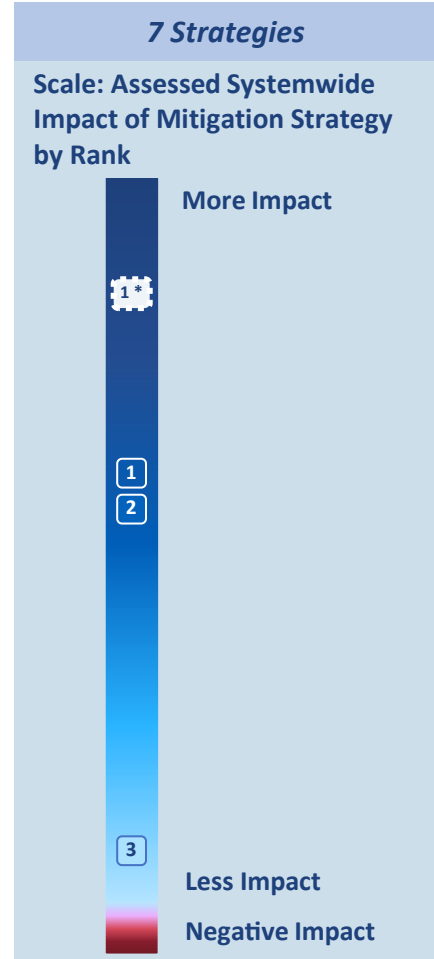
Residual risk demonstrates a moderate risk reduction

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Mitigation Data: Individual and Comparative Effectiveness of Facilities and Deferred Maintenance Mitigation Strategies

Rank	Mitigation Strategy as of June 30, 2023	Systemwide Status
1	Reaching/Maintaining Keep Up Targets	Partially*
	Reaching/Maintaining Catch Up Targets	Partially*
2	Annual Update of Campus Deferred Maintenance (Gordian)	Fully
	Capital Policy & Standards	Fully
	Reporting – Biennial Capital Plan	Fully
	Reporting – Quarterly Capital Reporting Including Keep Up and Catch Up	Partially
3	Tracking Spending Against DCAMM Contracts	Partially



* The impact of these strategies is significantly greater if these strategies were fully implemented. See scale.

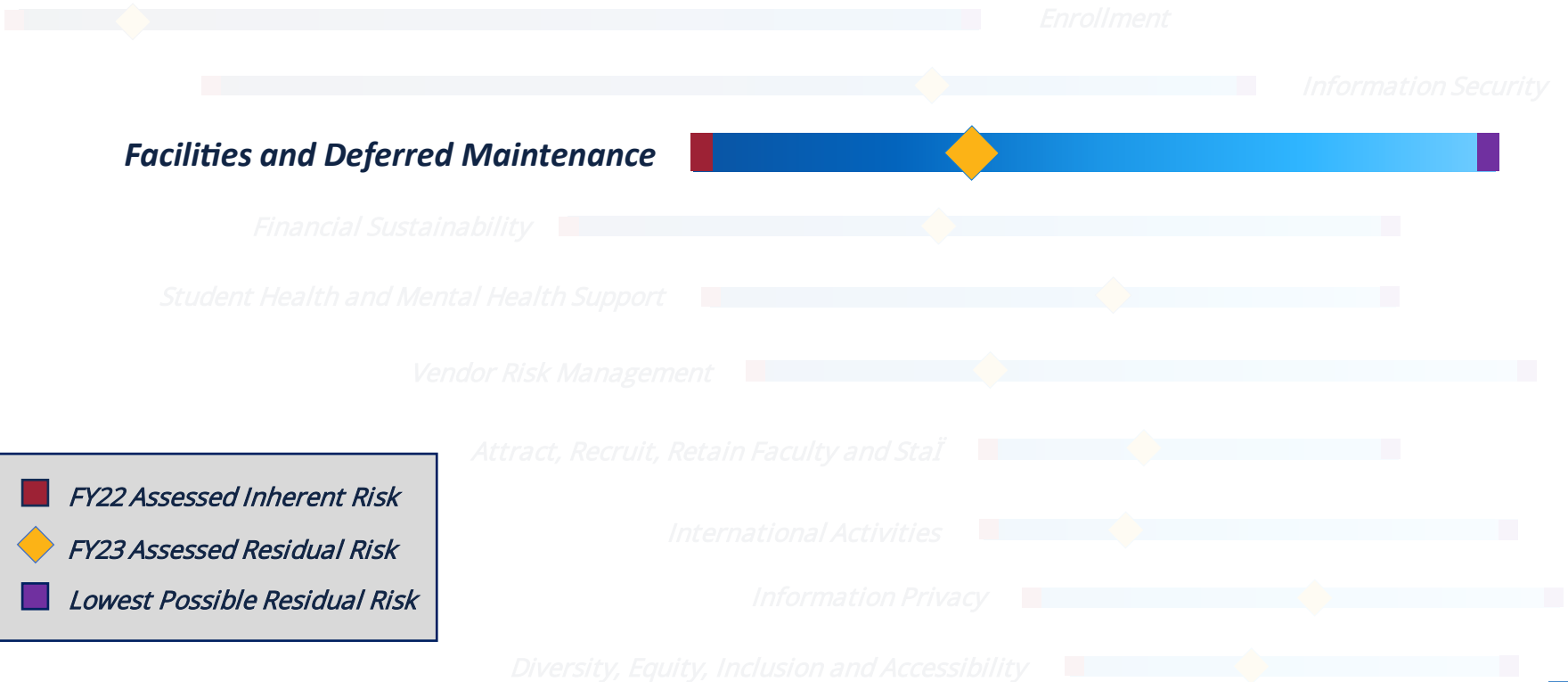
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Mitigation Data: Facilities and Deferred Maintenance Residual Risk

Highest Inherent Risk Range of Potential Risk Exposure Lowest Residual Risk



- FY22 Assessed Inherent Risk
- ◆ FY23 Assessed Residual Risk
- Lowest Possible Residual Risk

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University Deferred Maintenance: By the Numbers



\$4.8B 10-year backlog
(24% replacement value)



\$3.6B backlog in Education
& General (E&G)



\$3.5B timeframe A (1-3 yrs)
(71% of total backlog)



\$1.3B backlog in Aux

Deferred Maintenance - Annual Investment

Established Definitions and Set Targets Based on Industry Best Practice

Keep Up:

- Defined as the annual investment needed to ensure buildings perform properly and reach their useful lives.
- Includes projects funded from a recurring funding source.
- Includes preventive/proactive maintenance funded from the operating budget.

Catch Up:

- Defined as projects funded by one-time funds such as bond proceeds, State resources (also typically bond funds), and in some cases reserves.
- Large backlog that requires funding over a specified time period.

Annual Investment Targets:

- Keep Up - defined as the annual minimum investment required to prevent the deferred maintenance backlog from growing. Gordian calculates the target by discounting the total cost necessary to replace each building component at the completion of its useful life.
- Catch Up – defined as the annual investment needed to eliminate the backlog over a specified time period. This target is still to be determined.

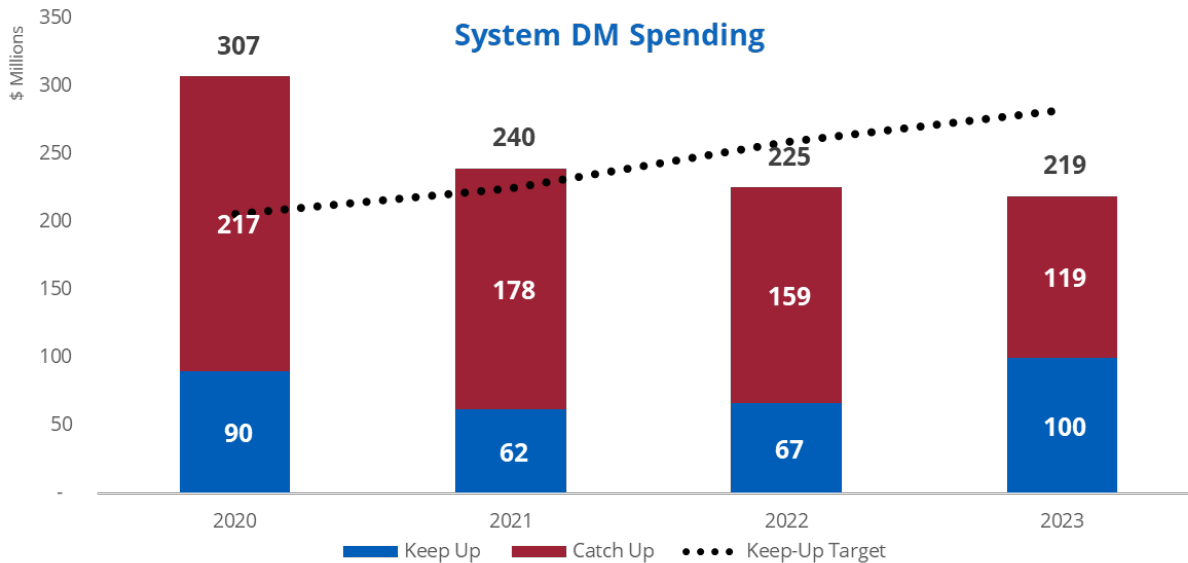
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Deferred Maintenance - Annual Investment

FY23 Keep Up \$100 M	FY23 Keep Up \$282 M	35% of target
FY23 Catch Up \$119 M	FY23 Catch Up \$322 M	37% of target



Note: UMass Chan data campus-reported; not derived from dashboard

- Created a deferred maintenance (DM) spending dashboard to report spending data in real time
- Allows for greater clarity on actuals against targets; enhances transparency
- Spending in recent years has fallen short of targets; total backlog has remained flat
- Current capital plan continues to address DM needs; significant investments required
- UMass will continue to advocate for state resources

Spending Key

Actual	Target
--------	--------

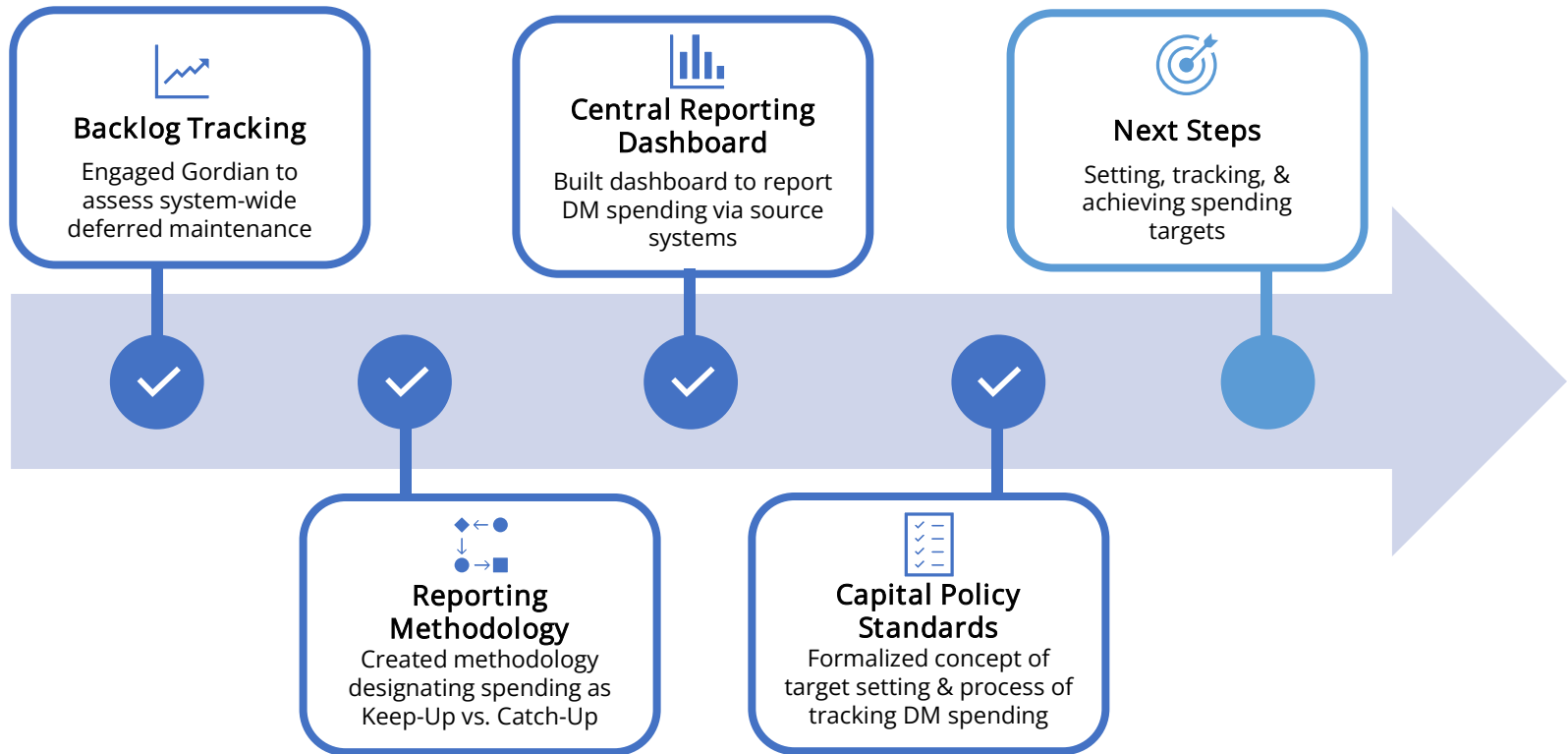


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Deferred Maintenance – Progress to Date



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Facilities & Deferred Maintenance

Relationship of Data

Risk Assessment

Assess the inherent risk **facilities and deferred maintenance** presents to UMass

No. 3 Systemwide Risk

Mitigation Assessment

Identified and assessed seven mitigation strategies

Informed by Deferred Maintenance Dashboard

Residual Risk

Residual risk demonstrates a moderate risk reduction

Not within risk appetite

Action

Increased focus on capital projects and tracking against deferred maintenance targets





Data Supporting ERM Analyses: Financial Sustainability

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Relationship of Data

Financial Sustainability

Risk Assessment

Assess the inherent risk **financial sustainability** presents to UMass

No. 4 Systemwide Risk

Mitigation Assessment

Identified and assessed 23 mitigation strategies

Informed by:

UM Plan • SPARC™ • SPARCPro™

Residual Risk

Residual risk demonstrates a moderate risk reduction



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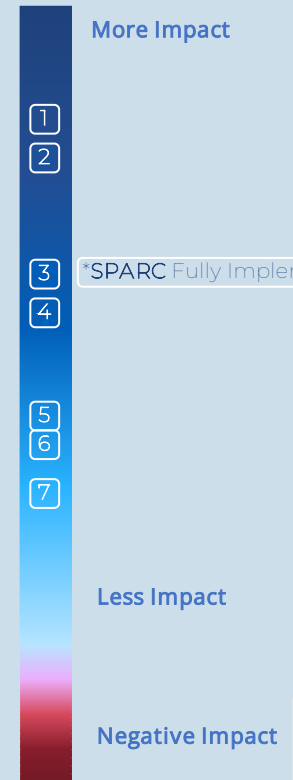


Mitigation Data: Individual and Comparative Effectiveness of Financial Sustainability Mitigation Strategies



23 Strategies

Scale: Assessed Systemwide Impact of Mitigation Strategy by Rank



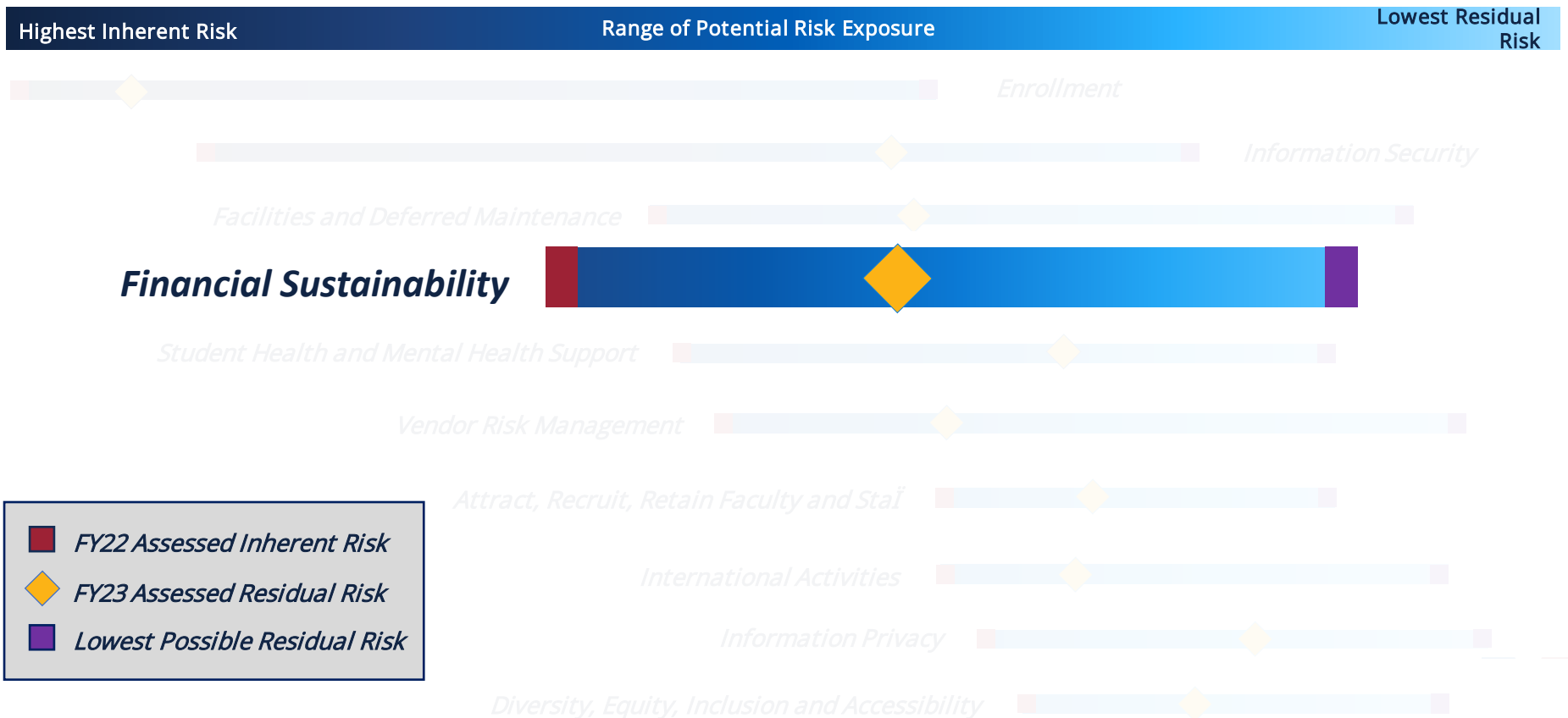
Rank	Mitigation Strategy as of June 30, 2023	Systemwide Status
1	State Financial Support	Fully
	State Funding of CBA Increases	Planned
2	Reporting – Quarterly Budget Projections and Annual Budget Reporting	Fully
	Reporting – Quarterly Capital Reporting and Biennial Capital Plan	Fully
3	Cash Flow Modeling and Projections	Fully
	Reporting – Annual Five-Year Forecast Refresh	Fully
	Reserve Policy	Fully
	UMass Global Financial Reporting	Fully
4	Maintaining Line of Credit	Fully
	Operating Cash Invested with Foundation	Fully
	Implementation of UMPlan for Annual Budgeting	Fully
5	Chart of Accounts Update	Partially
	SPARC Dashboard*	Partially
6	Reaching/Maintaining 2% Operating Margin	Partially
	UMPlan – Financial Forecast Model	Partially
	UMPlan – Tuition Planning Module	Partially
7	Compliance with Federal Grants	Fully
	Monitoring Standard Metrics	Fully
7	Adoption and Forecasting of Changes in GASB	Fully
	Appropriate Account Treatment for P3s	Fully



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Mitigation Data: Financial Sustainability Residual Risk



■ FY22 Assessed Inherent Risk
◆ FY23 Assessed Residual Risk
■ Lowest Possible Residual Risk

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What is SPARC?

Delivering a home-grown best-in-class tool with real time data from disparate source systems

Why?

Management
Insights

Financial
Intelligence

Proactive
Analysis



How?

Data from Disparate
Sources

Dynamic
Visualizations

Multi-Dimensional
Filtering

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Long-Term Planning

Data creates transparency and drives risk mitigation



HR

- Position data
- Employee data



Financial

- Expense actuals
- Revenue actuals



Procurement

- Contracts
- Utilization



Student

- Admissions data
- Enrollment & tuition data



SPARC

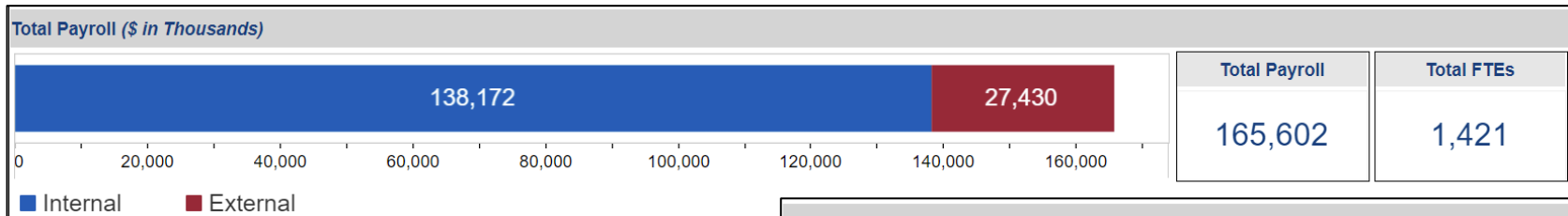
Strategic Planning Analytics & Reporting for Campuses

- Advanced analytics
- Financial aid, enrollment analysis
- Revenue and expense analysis
- Procurement savings and contract tracking

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SPARC: Payroll



Description:

Simple payroll and FTE information

Example Data:

- Faculty by Tenure Status
- Student Employees
- Earnings by Type
 - Payroll
 - Ad comp
 - Overtime

Employee Detail (\$ in Thousands) Summary

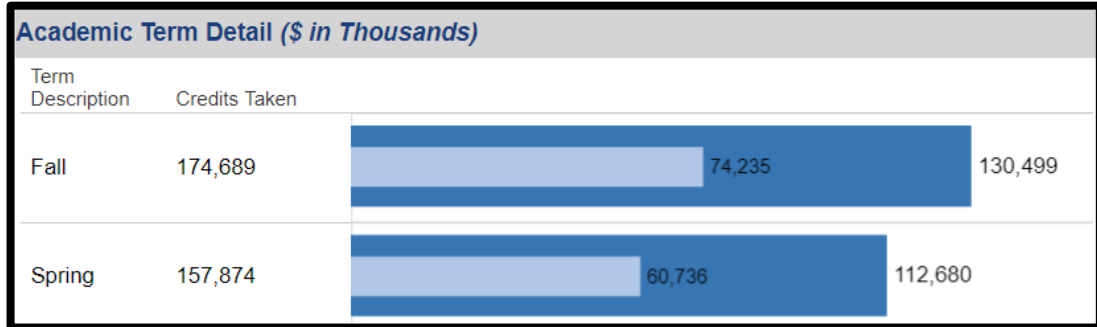
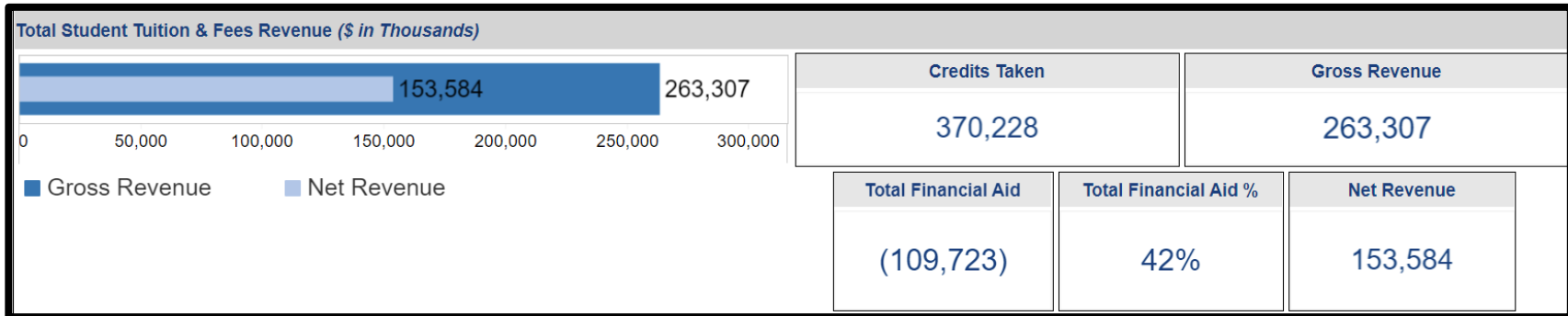
Employee Type Description	Allocated FTE	Internal (\$ in Thousands)	External (\$ in Thousands)
Faculty	854	85,161	0
Executive/Admin/Managerial	46	~5,000	0
Professional Nonfaculty	420	25,743	16,101
Secretarial/Clerical	76	~5,000	0
Technical/Paraprofessional	25	~2,000	0
Skilled Crafts	Null	0	0
Service Maintenance Workers	Null	0	0
Student	Null	12,384	~1,000



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SPARC: Student Revenue



	Credits Taken	Gross Revenue	Total Financial Aid	Total Financial Aid %	Net Revenue
Fall	174,689	130,499	(56,264)	43%	74,235
Spring	157,874	112,680	(51,944)	46%	60,736

Description:

Allocation of Tuition revenue by department (otherwise revenue is consolidated into one general fund and not viewable by department)



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SPARC: Financial Summary

Description: Simple trending of total revenue, expenses and university support at a particular college or department

Financial Summary (\$ in Thousands)		Show Internal / External				
		FY19 - Actuals	FY20 - Actuals	FY21 - Actuals	FY22 - Actuals	FY23 - Actuals
Revenues	Gross Tuition & Fees	29,196	29,211	28,102	27,563	35,066
	Total Financial Aid	(7,461)	(8,314)	(8,828)	(9,525)	(8,408)
	Net Tuition & Fees	21,735	20,897	19,275	18,038	26,658
	Grants Revenue	117	35	5	13	186
	Sales & Services	9	1			
	Other Revenues	546	481	330	368	566
	Total Revenues	22,407	21,414	19,610	18,419	27,410
Expenses	Payroll	14,171	13,694	13,645	14,855	14,939
	Fringe	4,648	4,634	4,820	5,254	5,532
	Other Expenses	1,212	673	498	741	807
	Total Expenses	20,031	19,001	18,962	20,849	21,277
Summary	Total Revenues	22,407	21,414	19,610	18,419	27,410
	Total Expenses	20,031	19,001	18,962	20,849	21,277
	University Support	(2,376)	(2,414)	(648)	2,430	(6,133)

* Revenues do not include State Appropriations that get allocated to campuses

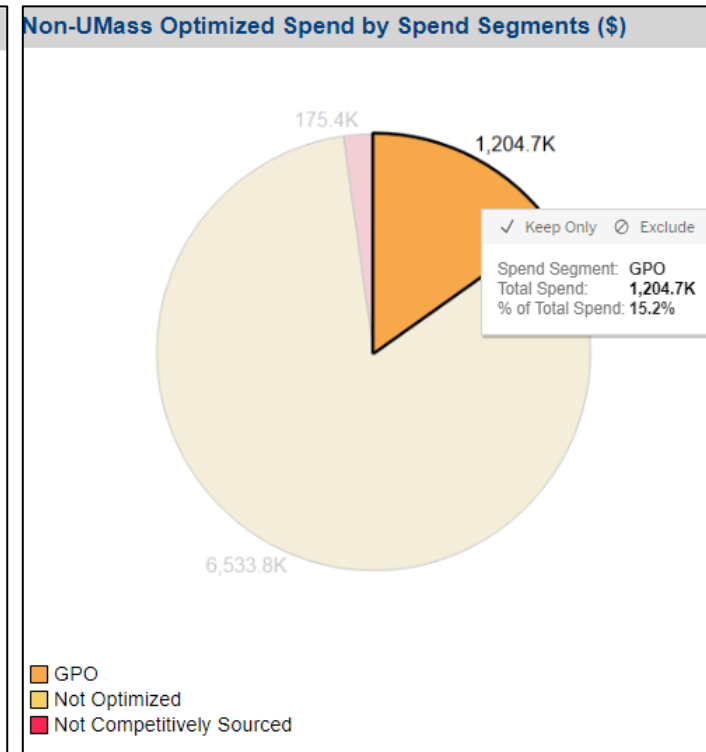
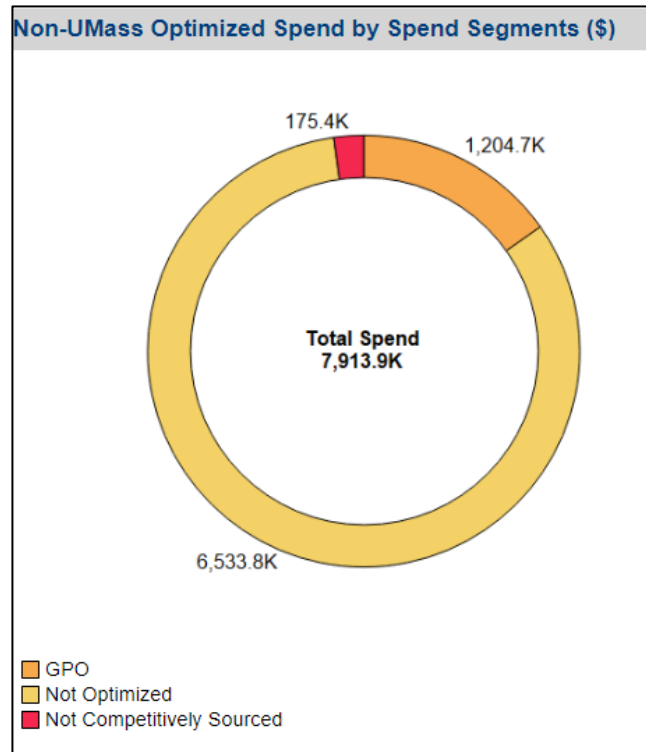




SPARC Pro: Contract Utilization

Description:

- High level view of non-optimized spend
- Detailed spend data by transactions including key data points to better understand user behavior



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Relationship of Data

Financial Sustainability

Risk Assessment

Assess the inherent risk **financial sustainability** presents to UMass

No. 3 Systemwide Risk

Mitigation Assessment

Identified and assessed 23 mitigation strategies

Informed by:

UM Plan • *SPARC™* • *SPARCPro™*

Residual Risk

Residual risk demonstrates a moderate risk reduction

Within risk appetite

Action

- Maintain current controls
- Continue to increase transparency through Accountability Tools





Data Supporting ERM Analyses: Enrollment

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Enrollment

Relationship of Data

Risk Assessment

Assess the inherent risk *enrollment* presents to UMass

No. 1 Systemwide Risk

Mitigation Assessment

Identified and assessed 14 mitigation strategies

Informed by:

- *Real-time Enrollment & Admissions Tracking*
- *SPARC™*

Residual Risk

Residual risk demonstrates minor risk reduction



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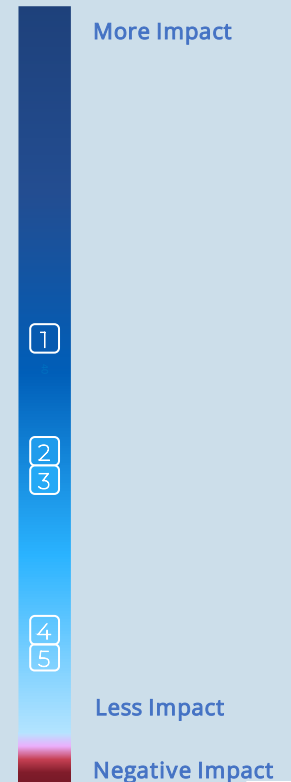


Mitigation Data: Individual and Comparative Effectiveness of Enrollment Mitigation Strategies

Rank	Mitigation Strategy as of June 30, 2023	Systemwide Status
1	Real-Time Admissions and Enrollment Tracking	Fully
2		
3		
4		
5		
6		

14 Strategies

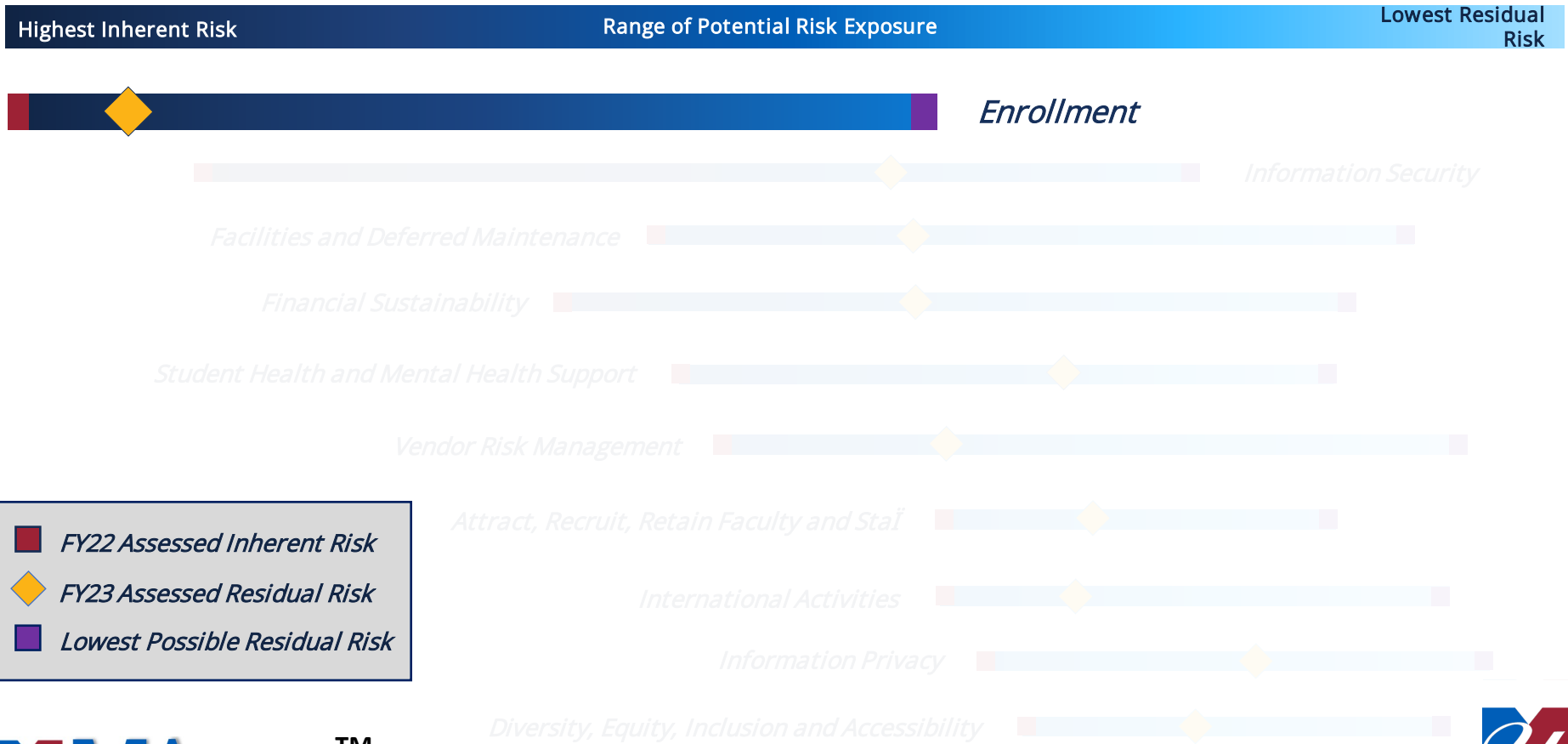
Scale: Assessed Systemwide Impact of Mitigation Strategy by Rank



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Mitigation Data: Enrollment Residual Risk



- FY22 Assessed Inherent Risk
- ◆ FY23 Assessed Residual Risk
- Lowest Possible Residual Risk

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SPARC: Enrollment Residency & Demographics

Guiding principles:

- Preserved filtering by college and department
- Preserved 'views' of enrollment by credits taken, course enrollments, unique class participants and financial FTE
- Utilized source system data

Data added:

- Residency detail
- Student demographics
- Filtering capabilities

• In State
• Out of State
• International
• Regional

• Undergrad
• Grad
• Continuing Ed
• Law

• First Time Freshmen
• Transfer
• Continuing

• New England
• NY
• NJ
• PA

Filters: Campus: All Functional Area: Academic Affairs College: All Department: All

Campus	Functional Area	College / Division	Department	Residency	Academic Career	Student Category	Northeast States
(All)	Academic Affairs	(All)	(All)	(All)	(All)	(All)	(All)

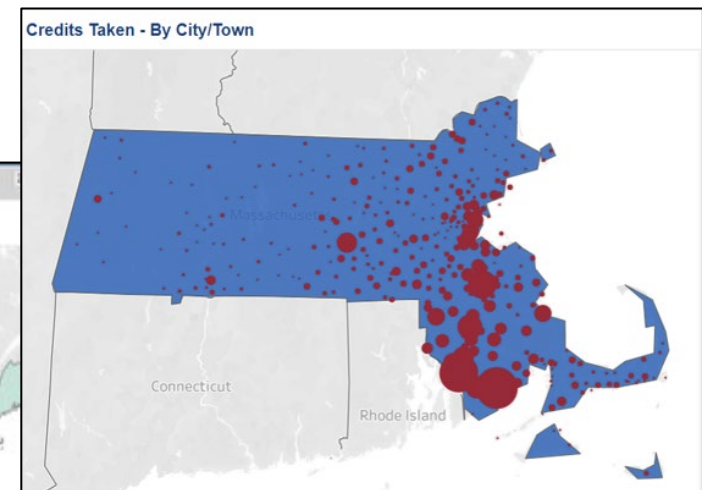
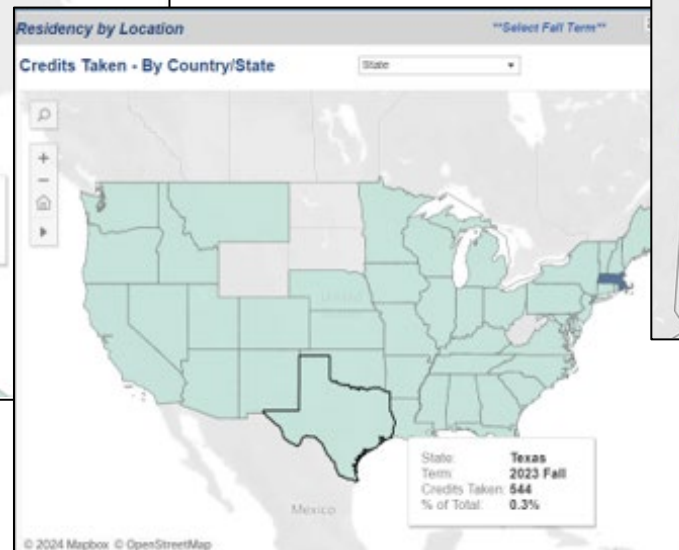
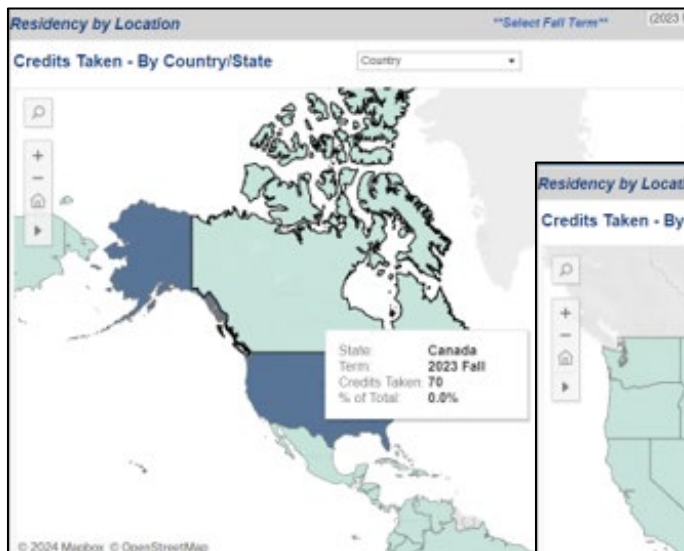


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SPARC: Enrollment Residency

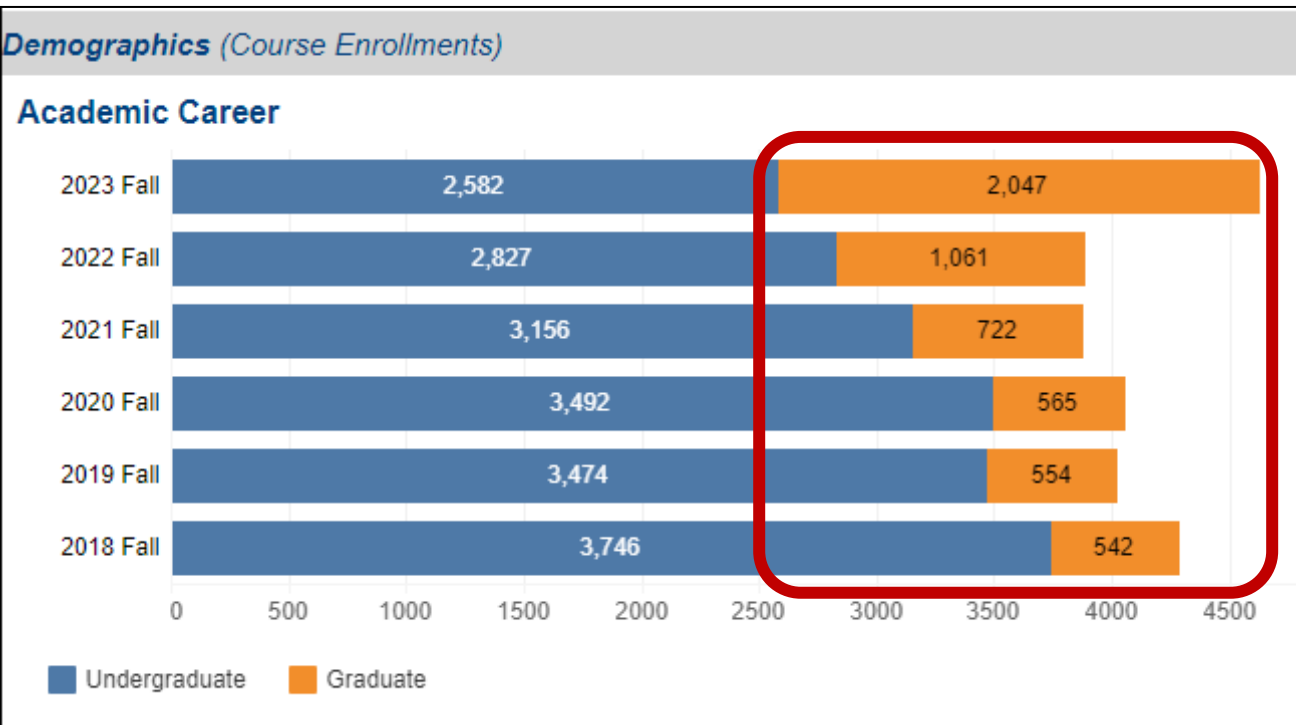
Description: Mapping allows for detailed view of residency by Country, State, City/Town; trend data (Fall 2018-2023)



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Using SPARC to Assess Enrollment Opportunities



Strategy:

Improve Graduate Enrollment in the College of Engineering

Findings:

Fall 2023 (YTD as of 8/23/23) enrollments shows positive results compared to prior full year data (Fall 2018 – Fall 2022)



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Using SPARC to Assess Enrollment Strategies: Credits & Net Revenue

FY2023	Credits Taken	Gross Revenue	Total Financial Aid	Total Financial Aid %	Net Revenue
Grand Total	6,339	7,514	(1,961)	26%	5,553

FY2022	Credits Taken	Gross Revenue	Total Financial Aid	Total Financial Aid %	Net Revenue
Grand Total	3,745	4,302	(1,646)	38%	2,655

Findings:

- 109% growth in Net Revenue
- 69% growth in Credits Taken



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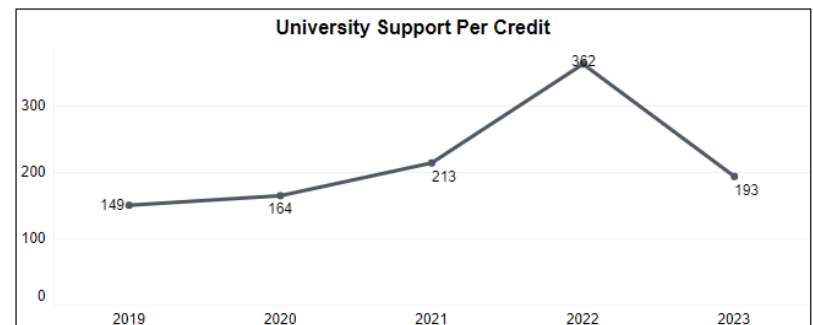
Using SPARC to Assess Enrollment Strategies: University Support

Financial Summary (\$ in Thousands) Show Internal / External

	FY22 - Actuals	FY23 - Actuals
Revenues		
Gross Tuition & Fees	15,705	18,136
Total Financial Aid	(7,769)	(7,466)
Net Tuition & Fees	7,936	10,670
Grants & Contracts	5,659	8,293
Sales & Services		
Other Revenues	295	328
Total Revenues	13,890	19,291
Expenses		
Payroll	14,310	14,116
Fringe	4,204	4,217
Other Expenses	3,624	5,577
Total Expenses	22,138	23,910
Summary		
Total Revenues	13,890	19,291
Total Expenses	22,138	23,910
University Support	8,247	4,620

Findings:

- Revenue growth is outpacing expense growth
- University support is declining



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Using SPARC to Assess Enrollment Strategies: Staffing

FY2023	Allocated FTE	Internal Funds	External Funds	Total Funds
Faculty	64	7,834	1,162	8,996
Student		655	1,260	1,915
Secretarial/Clerical	8	1,020	366	1,386
Professional Nonfaculty	13	1,133	174	1,307
Executive/Admin/Managerial	2	315	8	323
Technical/Paraprofessional	2	2	187	189
Service Maintenance Workers		1		1
Grand Total	89	10,961	3,156	14,116

FY2022	Allocated FTE	Internal Funds	External Funds	Total Funds
Faculty	64	8,734	951	9,686
Student		702	829	1,531
Professional Nonfaculty	13	1,112	193	1,305
Secretarial/Clerical	9	952	307	1,258
Executive/Admin/Managerial	1	323	10	332
Technical/Paraprofessional	2		196	196
Service Maintenance Workers		1		1
Grand Total	90	11,825	2,485	14,310

Findings:

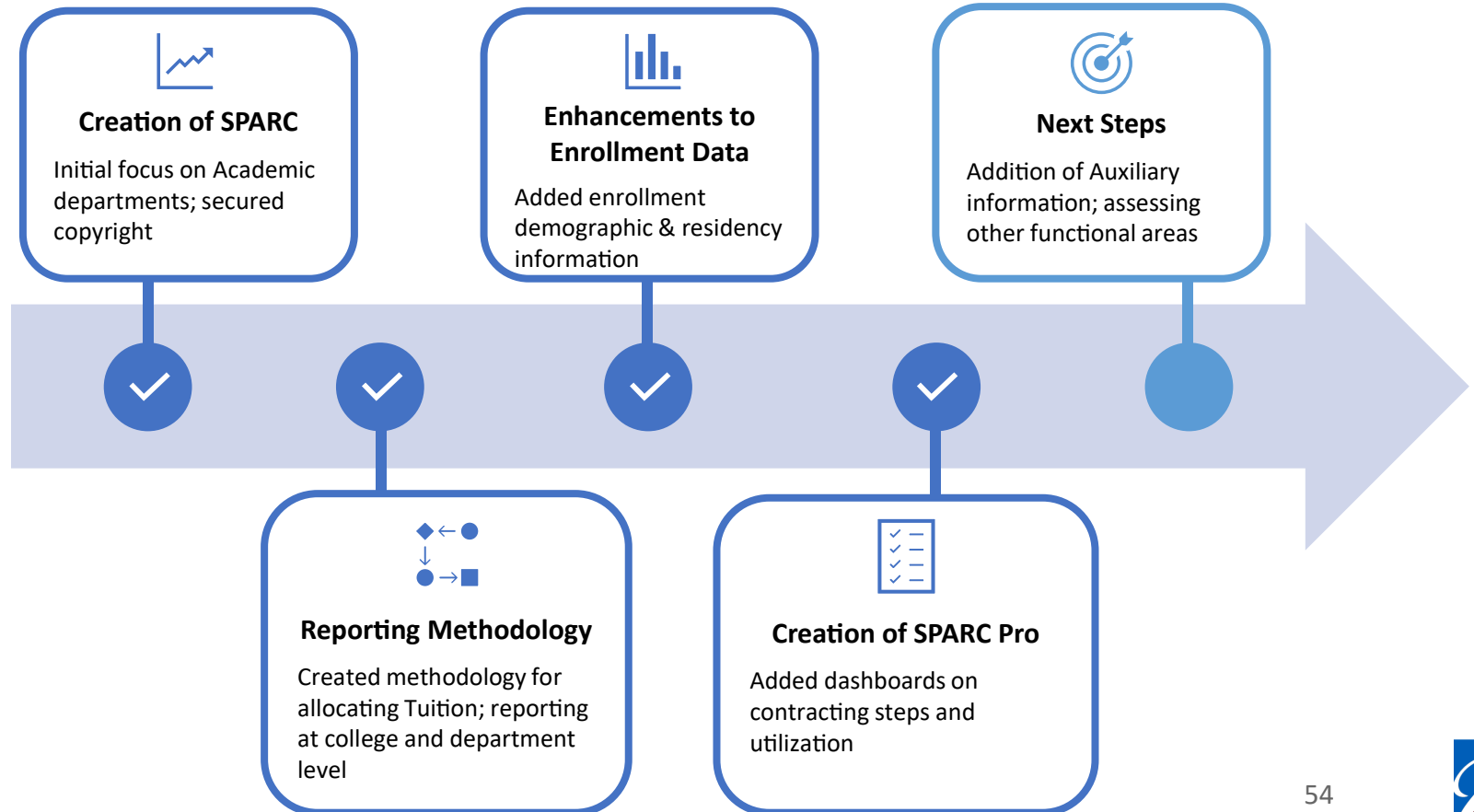
- Existing resources support enrollment growth:
 - Total FTEs decreased by **1.1%**; faculty remained flat
 - Total payroll decreased by **1.4%**



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SPARC Progress to Date



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Enrollment

Relationship of Data

Risk Assessment

Assess the inherent risk *enrollment* presents to UMass

No. 1 Systemwide Risk

Mitigation Assessment

Identified and assessed 22 mitigation strategies

Informed by:

- *Real-time Enrollment & Admissions Tracking*
- *SPARC™*

Residual Risk

Residual risk demonstrates minor risk reduction

Not within risk appetite

Action

- Evaluate additional opportunities for recruitment
- Evaluate additional opportunities for retention



Key Takeaways

- **Data is powerful:** it improves analysis and allows for proactive planning
- **Getting at the “right” data can be hard:** start somewhere, create versions, don’t stop pushing through the weeds
- **ERM cannot stand alone:** it must be intertwined in all planning (budget, forecasting, capital, etc.) and use data to assess effectiveness

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Questions?

THANK YOU!

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