

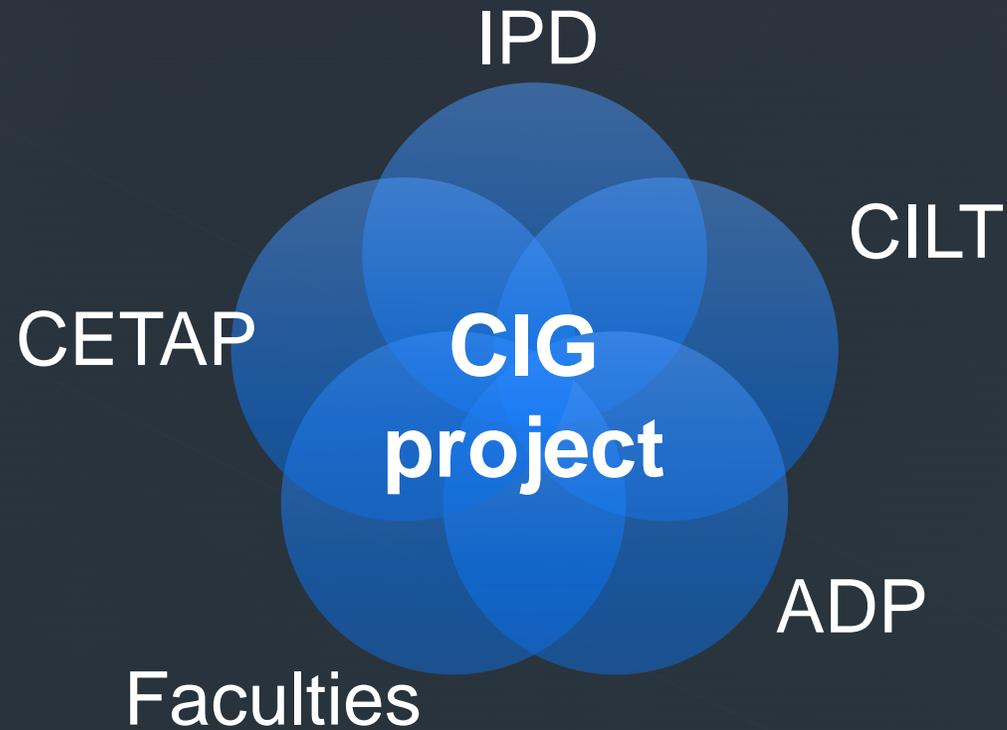


Presentation to DMISRS

8 July 2019

# CIG project

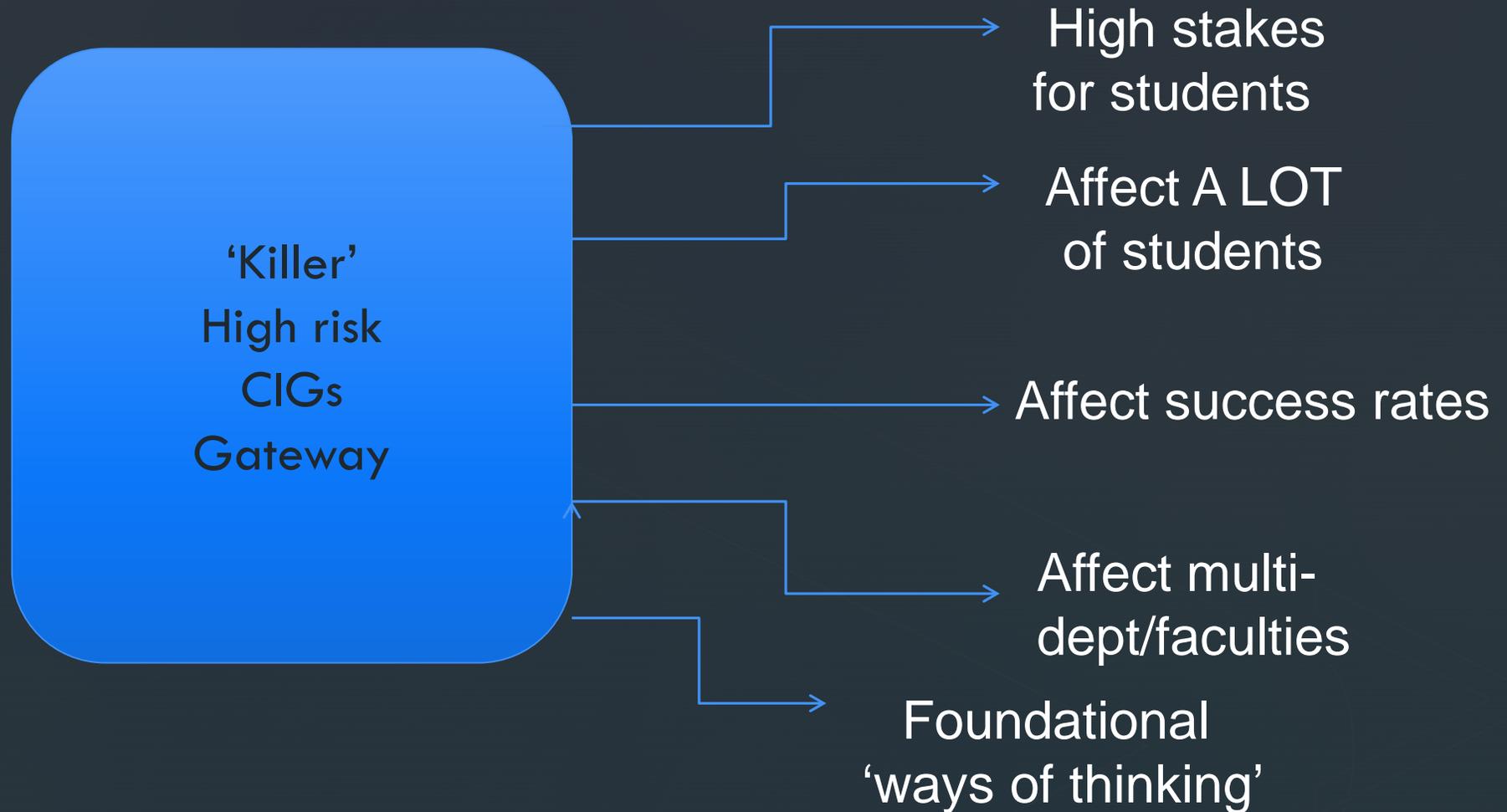
# CROSS-CHED // CROSS-institutional project



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MAM: Jonathan Shock, Bob Osana, Ruan Moolan, Patrick Adams, Claire Blackburn

# Why this matters?



▶ <sup>T</sup>  
Aim of CIG project:

The aim of this project is to address the problem of high failure rate with a particular focus on the experience of black students in selected high risk/impact courses.

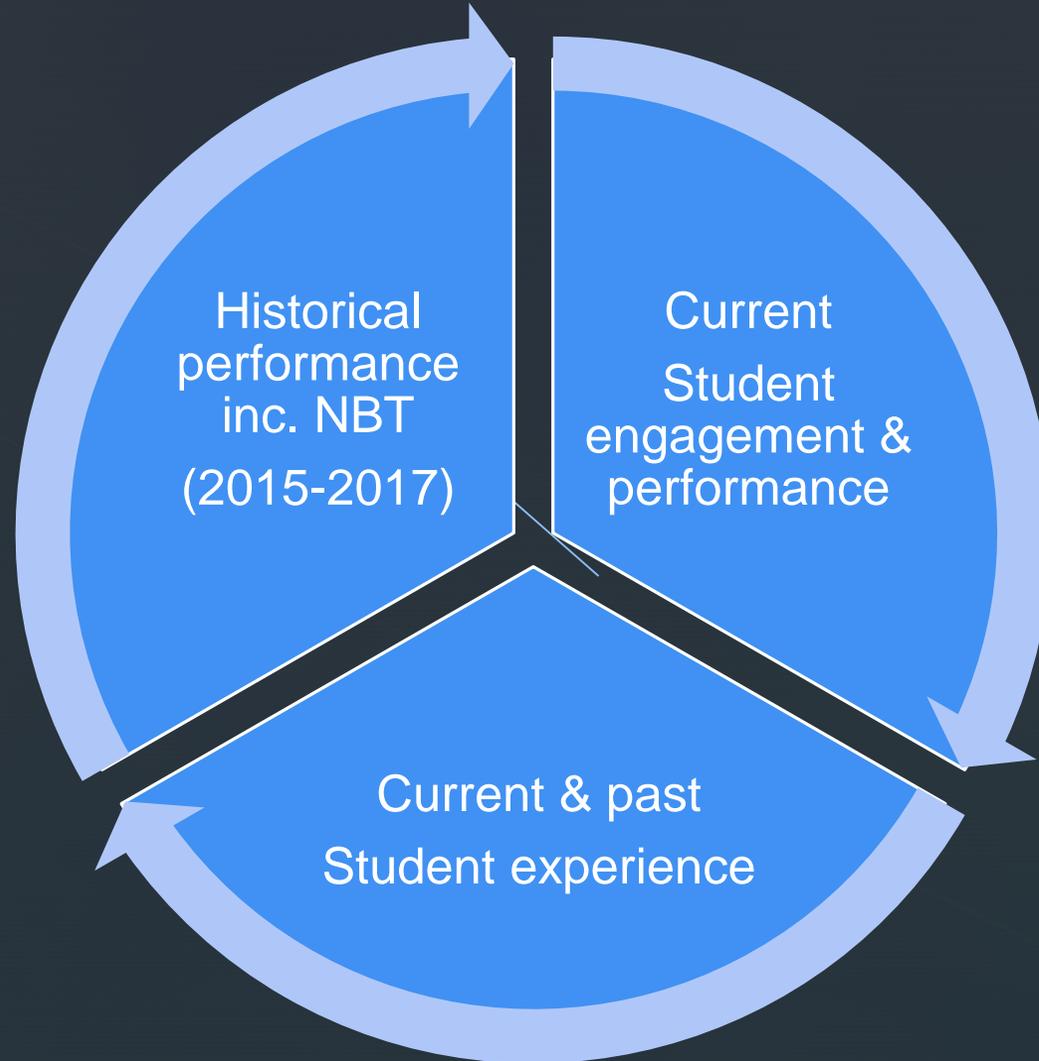
Develop a deeper understanding:

- For whom is the curriculum working?
- Why and why not?
- What do we do about it?

# Project Outcomes

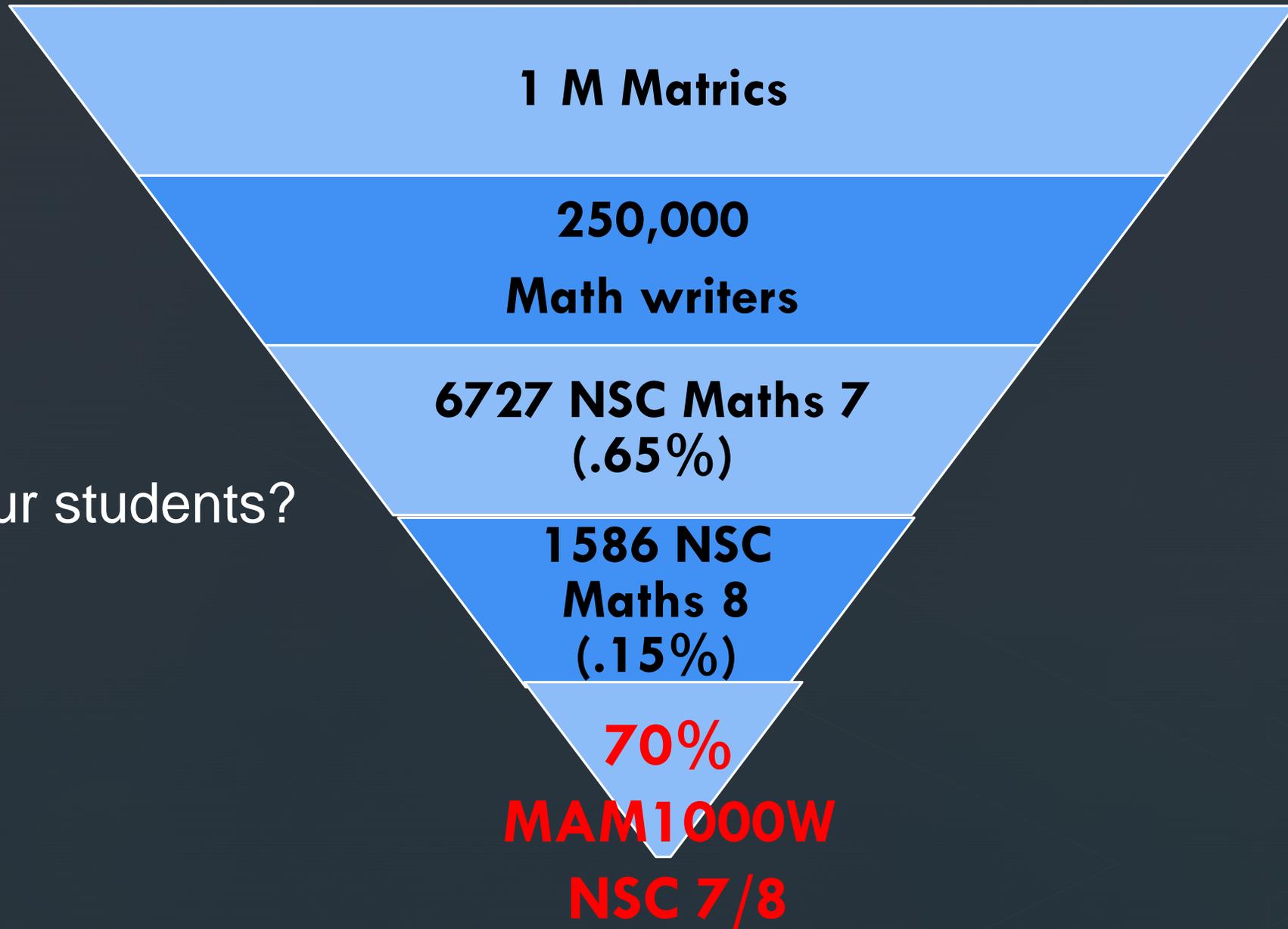
- Pilot learning analytics for VULA
- Pilot use NBT sub-domain analysis for diagnostics
- Inform 'early assessment'
- Inform academic advising
- Sites to explore pedagogical implications of 'open' textbooks
- Reduce failure rates
- Reduce gap in performance between black and white students

# CIG Design & Methodology





WHO  
are our students?



**Existing  
Curriculum  
Structure  
Mainstream &  
Extended**

MAM1000W

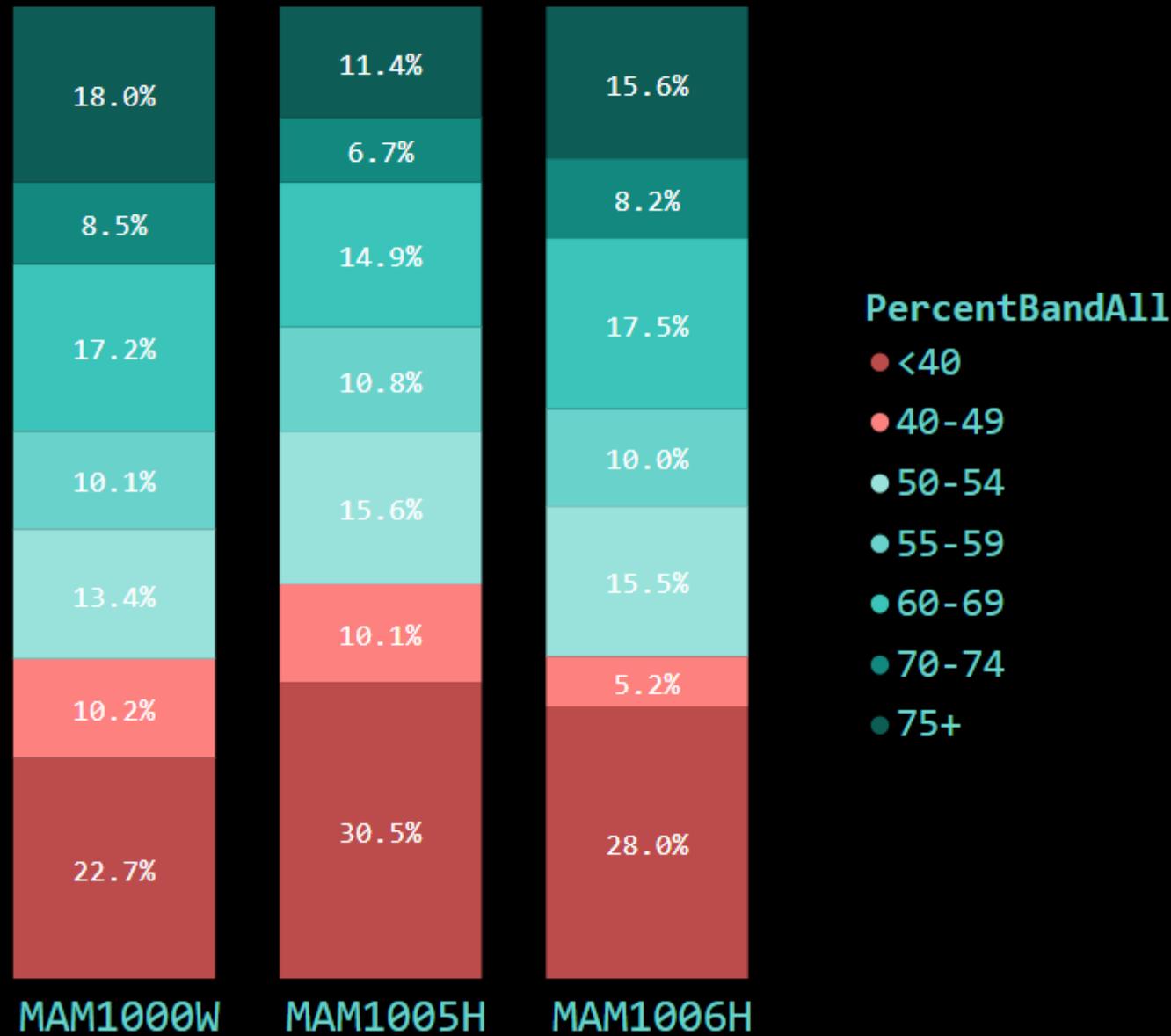


MAM1005H



MAM1006H

# Comparison of MAM1000W/1005H/1006H Course Performance 2015-2017





Demographic

Group	At Risk Sub-Groups	Trend	F	p	Significant diff between sub-groups?
Demographic	Black	White perform better than all other SA groups; Unknown perform better than Black	16.04292	0.000000	Yes
Gender	None	Male mean higher	0.769199	0.380605	No
Home Language Group	Other SA	English and Other language speakers perform better than all others	13.78672	0.000000	Yes
Home Faculty	Humanities	Commerce outperform Science and Humanities; Science Outperform Humanities	20.22196	0.000000	Yes

NSC

ENHN Performance	Symbols 04, 05 and 06	Linear upward trend between symbol 05 and 08	30.78455	0.000000	Yes
ENFN Performance	Symbols 04, 05 and 06	Symbol 07 outperform all others	2.418678	0.049292	No
MTHN Performance	Symbols 05, 06 and 07	Exponential upward trend between symbols 05 and 08	140.9595	0.000000	Yes
NSC Symbol	Symbols 04, 05 and 06	Exponential upward trend between symbols 05 and 08	65.21875	0.000000	Yes

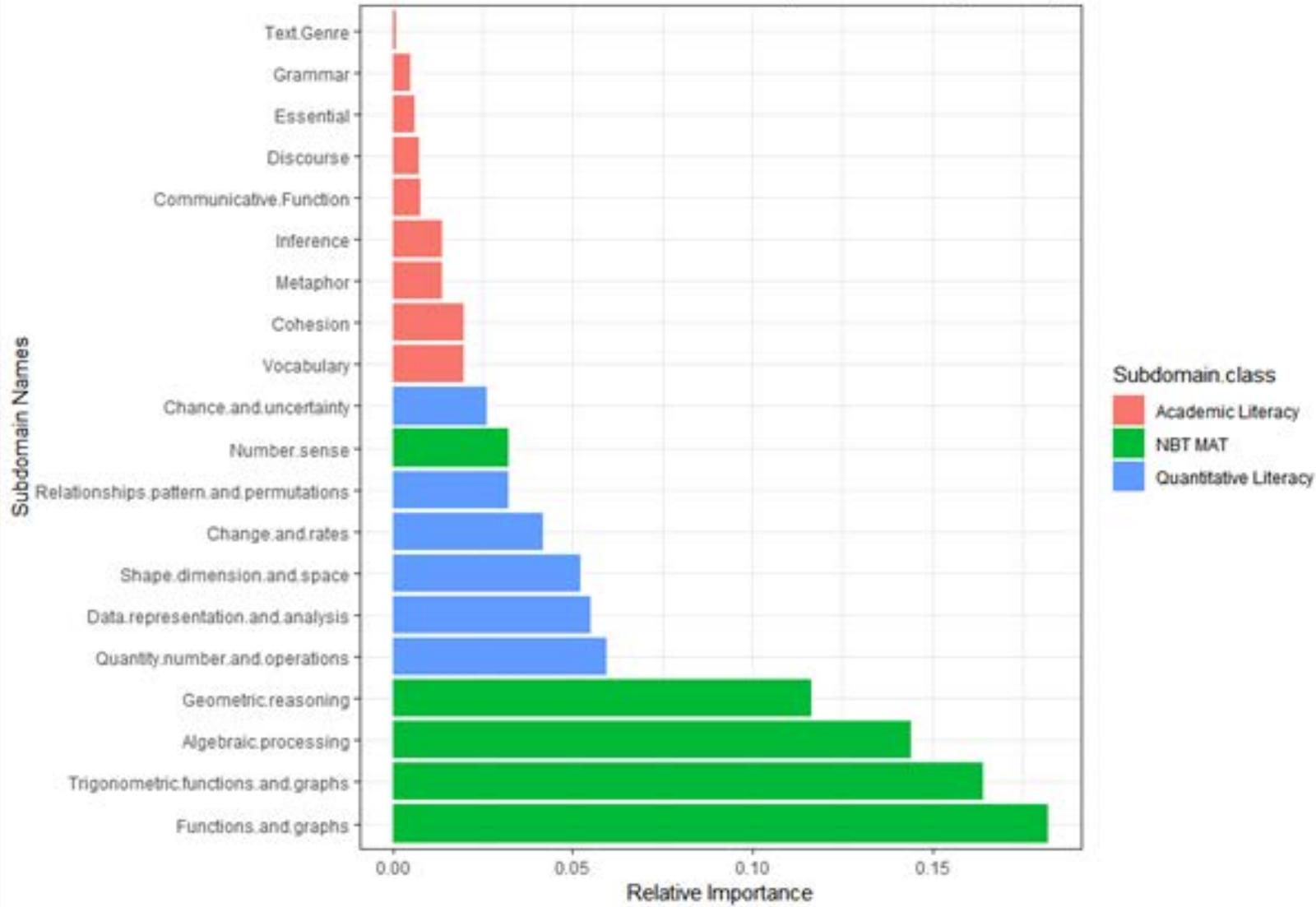
NBT

AL Performance	Basic, Intermediate Lower, Intermediate Upper	Proficient outperform all others	13.4743	0.000000	Yes
QL Performance	Basic, Intermediate Lower, Intermediate Upper	Proficient outperform all others	22.89675	0.000000	Yes
NBT MAT Performance	Basic, Intermediate Lower, Intermediate Upper	Proficient outperform all others	56.4561	0.000000	Yes
AL Quartile Performance	Q1 and Q2	Upward linear increase between Q1 and Q4	19.92011	0.000000	Yes
QL Quartile Performance	Q1 and Q2	Upward exponential increase between Q1 and Q4	32.0665	0.000000	Yes
NBT MAT Quartile Performance	Q1, Q2 and Q3	Upward exponential increase between Q1 and Q4	76.41774	0.000000	Yes
AQL Quartile Performance	Q1 and Q2	Upward exponential increase between Q1 and Q4	33.34333	0.000000	Yes
AQL MAT Performance	Q1, Q2 and Q3	Upward exponential increase between Q1 and Q4	48.75906	0.000000	Yes

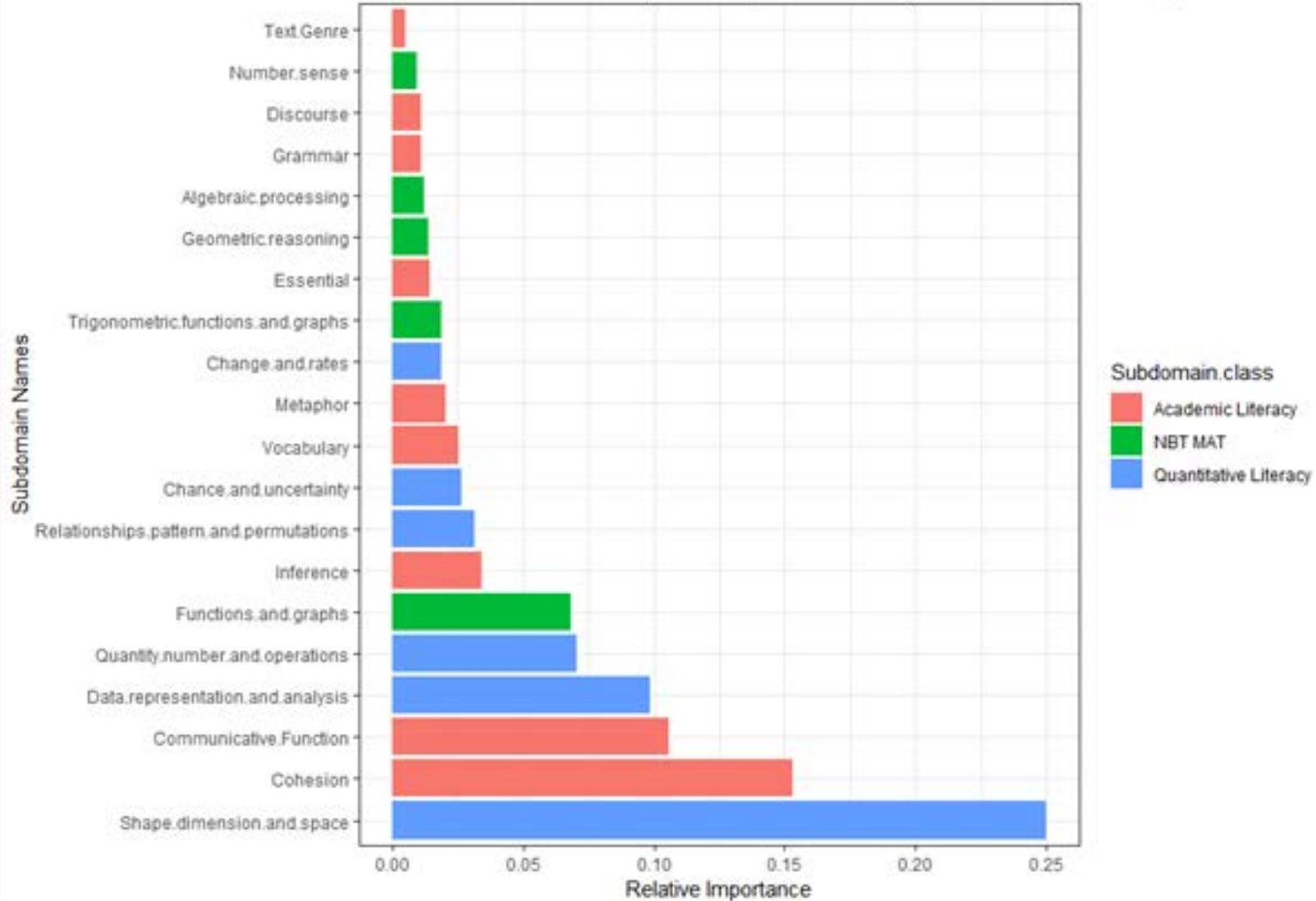
# Aggregate Mean

Englisg scores#Subject:ENFN						Mean±SE
						Mean±1.96*SE
<b>Breakdown Table of Descriptive Statistics (Copy of high risk courses 2015-17 complete data with N=1322 (No missing data in dep. var. list))</b>						
Course	MATHS SYMBOL	Percent Means	Confidence -95.000%	Confidence +95.000%	Percent N	
MAM1000W	05	34.26667	24.38142	44.15191	15	
MAM1000W	06	37.23077	34.62576	39.83577	208	
MAM1000W	07	47.57143	45.79563	49.34723	483	
MAM1000W	08	64.87825	63.38156	66.37493	616	
All Groups		53.85779	52.66373	55.05186	1322	

2015-2017: MAM1000W - Relative Importance of Explanatory Variables



2015-2017: MAM1000W(40to49%) - Relative Importance of Explanatory Variables



# Who is the course for? (1000W/10005H)

Summary of Science Faculty majors and their mathematics and statistics requirements (Jan 2019)

Class A	Class B	Class C
MAM1000W	(MAM1004F & MAM1008S) or MAM1000W	(MAM1004F or MAM1000W) and some statistics
<ul style="list-style-type: none"> <li>• Applied Mathematics</li> <li>• Astrophysics</li> <li>• Chemistry</li> <li>• Mathematics</li> <li>• Physics</li> </ul>	<ul style="list-style-type: none"> <li>• Business Computing</li> <li>• Computer Engineering</li> <li>• Computer Games Development</li> <li>• Computer Science</li> </ul>	<ul style="list-style-type: none"> <li>• Applied Biology (for students before 2019)</li> <li>• Biochemistry</li> <li>• Biology (for students from 2019)</li> <li>• Ecology &amp; Evolution</li> <li>• Genetics</li> <li>• Marine Biology (for students before 2019)</li> <li>• Marine Biology (for students from 2019)</li> </ul>
and some statistics	and some statistics	
<ul style="list-style-type: none"> <li>• Mathematical Statistics</li> </ul>	<ul style="list-style-type: none"> <li>• Applied Statistics</li> <li>• Quantitative Biology (for students from 2019)</li> </ul>	

WHO  
actually  
takes  
MAM1000  
W?

Academic Plan (Larger Size Plans)	#
Actuarial Science	241
Analytics	57
Applied Mathematics	46
Astrophysics	56
Business Computing	58
Chemistry	79
Computer Engineering	54
Computer Science	251
Economics & Finance	65
Finance with Accounting	91
Management Studies	58
<b>Total</b>	<b>1118</b>

Academic Plan (Smaller Plans)	#
Economics & Statistics	38
Finance	38

# The case of MAM1008S

		Credits	No of Students Registered	Pass Rate	Average Course Mark	Median Course Mark	Standard Deviation	First Class Pass	2nd Class, Division One, Pass	2nd Class, Division Two, Pass	Third Class Pass	Fail	Absent	Unclassified Pass
2017	MAM1000W - Mathematics 1000	36	148	52.03%	45.84459459	46	25.79582649	13.51%	4.73%	10.81%	19.59%	37.16%	0.81%	3.38%

		Credits	No of Students Registered	Pass Rate	Average Course Mark	Median Course Mark	Standard Deviation	First Class Pass	2nd Class, Division One, Pass	2nd Class, Division Two, Pass	Third Class Pass	Fail	Incomplete	Absent	Leave of Absence	Unclassified Pass
2018	MAM1008S - Intro to Discrete Maths	18	224	90.18%	71.26785714	78	24.46613185	57.59%	11.61%	17.41%	4.02%	0.89%	0.89%	6.70%	0.45%	0.45%

## Emerging Argument for MAM suite

- Three high failure rate courses -- all of who are CIGs
- Risk profiles point to a trimodal distribution
- The current MAM1000W is best serving the 'at least risk' group (90% and more for NSC Maths)
- The extended degree model is not working -- it is best serving the 'middle risk' group (aggregate 7 and above -- or 80% and above)
- Risk profile of 'most risk': The sub-domain analysis of 3 MAM courses point to various language sub-domain as contributing most significantly to student
- Approximately 40% from 2015-2017 go on to MAM2000 from MAM1000W.



# Curriculum Principles

## Level

- What level of Maths preparedness does the course expect?

## Purpose

- What is the purpose of the Maths? Maths for what?\*

## Flexibility

- What curriculum structure can provide greatest flexibility?

