

Barriers and Pitfalls to Systemic Learning Analytics

Adam Cooper

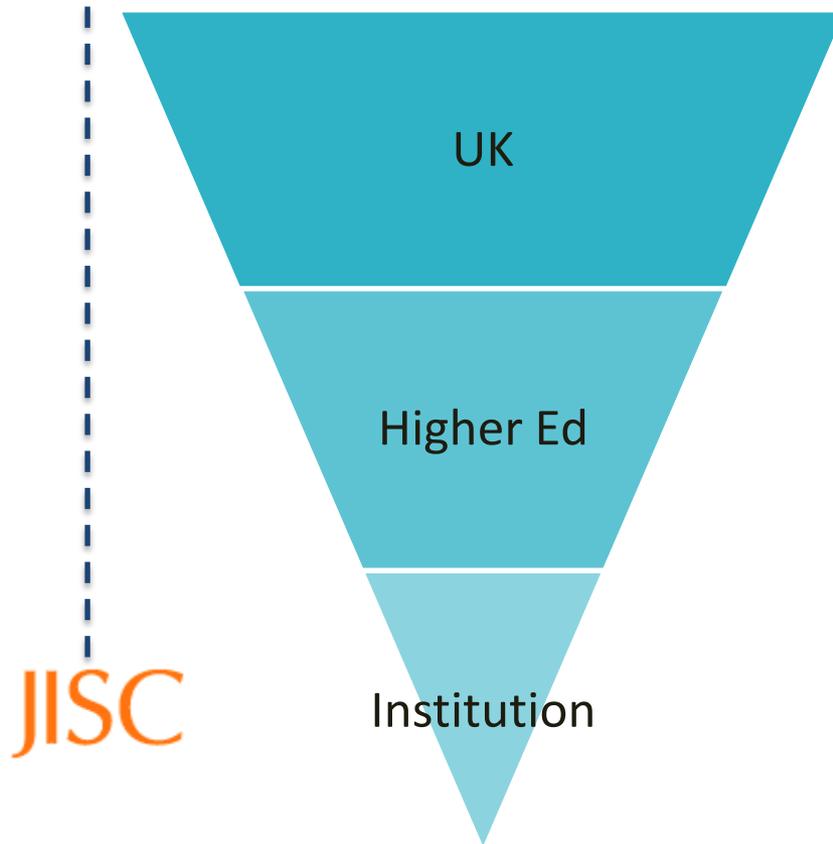


cetis

Centre for Educational Technology,
Interoperability and Standards

Perspective of this Talk #1

Where am I coming from?



Cetis is based in the Institute for Educational Cybernetics at the University of Bolton.

“Our mission is to develop a better understanding of how information and communications technologies affect the organisation of education from individual learning to the global system.”



Perspectives of this Talk #2

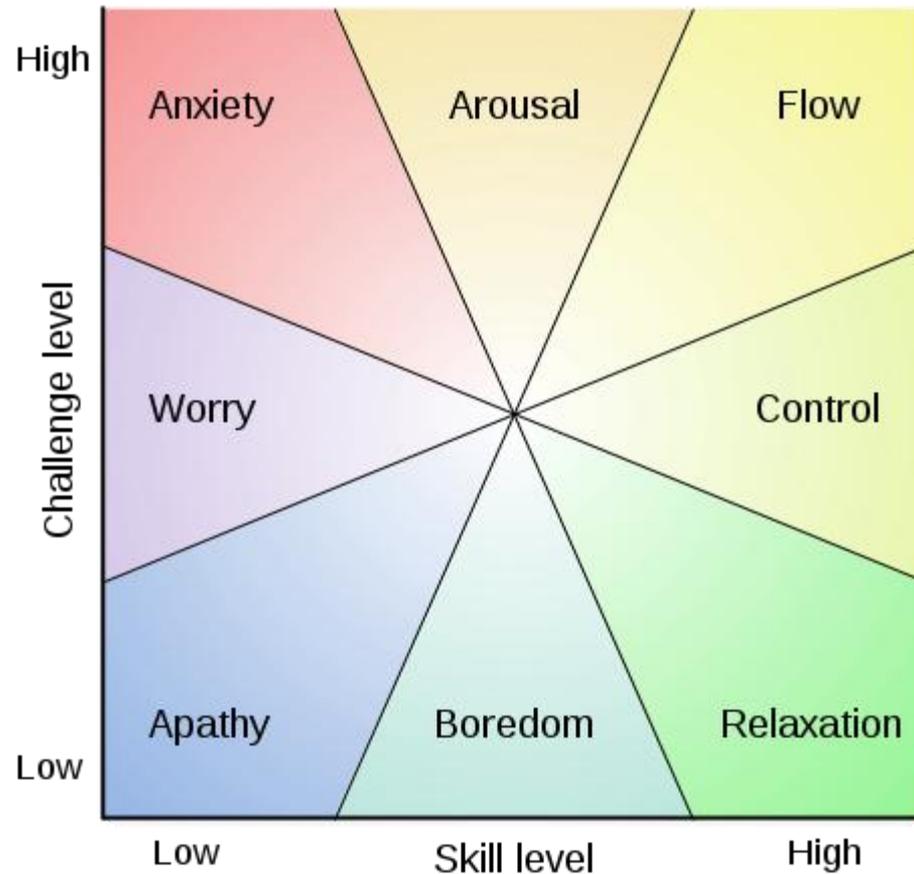


Image: public domain, by Oliver Beatson; mental state according to Csikszentmihalyi's flow model



Structure of the Talk

- Practical Issues
- Data Literacy and “Soft Capability”
- The Management/Practice Accommodation
- Potential Misadventure & Bad Role Models



Image:  Timothy Valentine



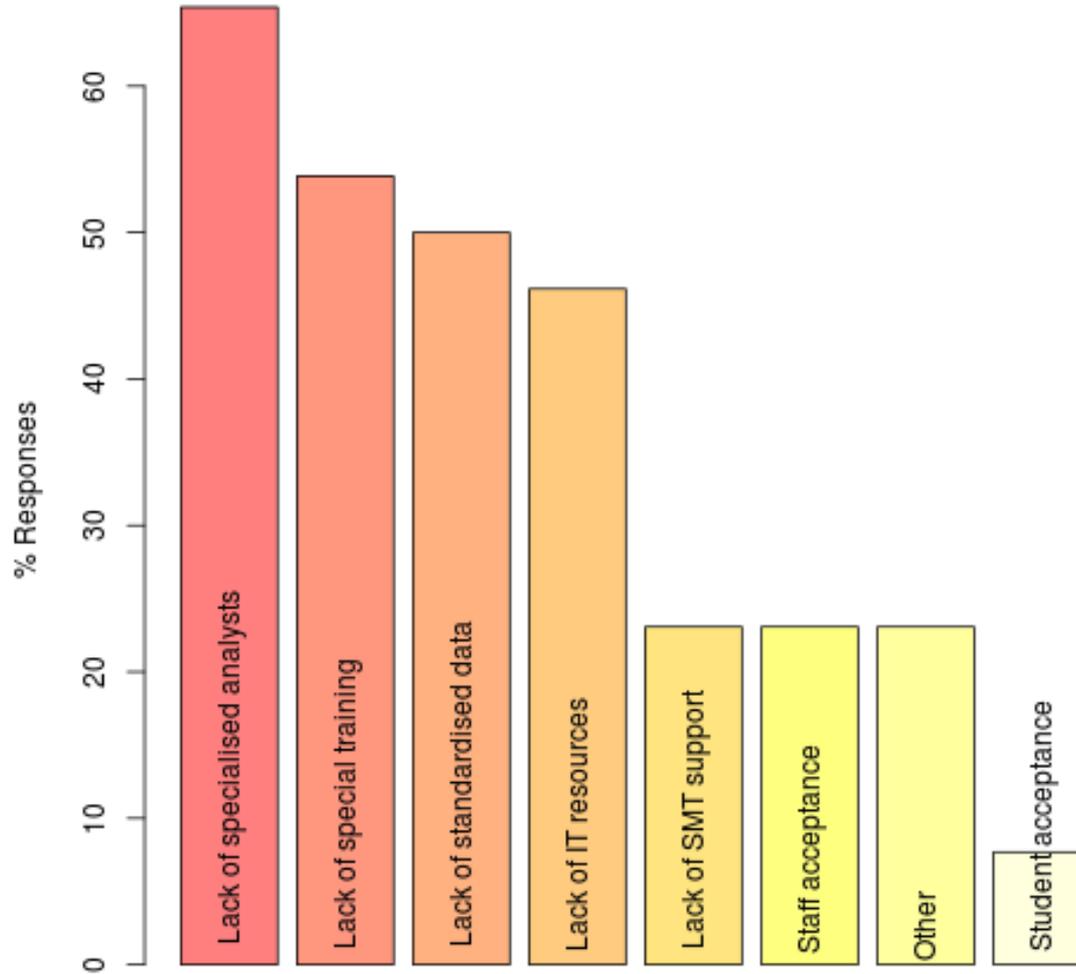
Image:  Jaskirat Singh Bawa



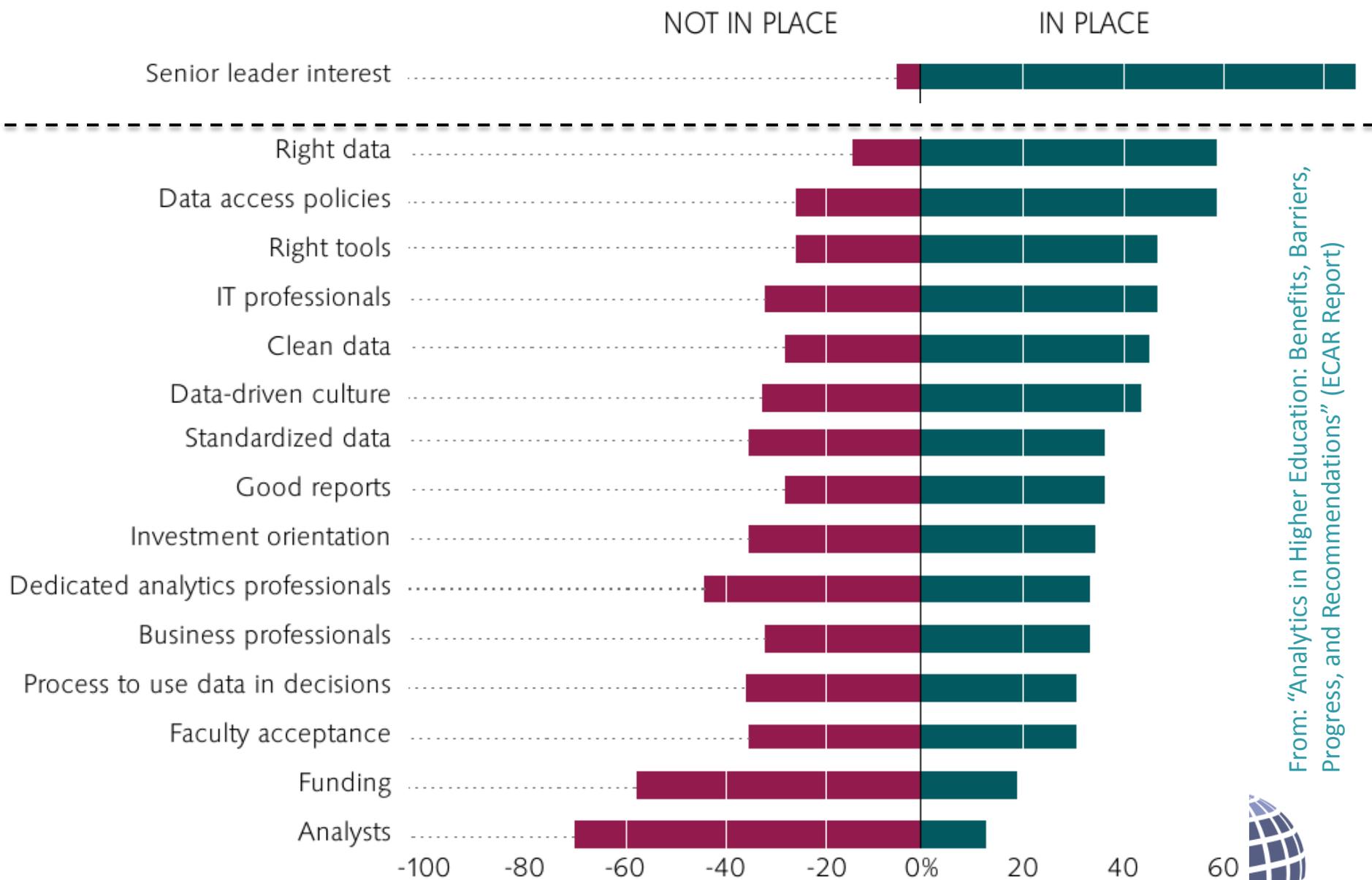
PRACTICAL ISSUES



Obstacles to Analytics #1



Obstacles to Analytics #2



From: "Analytics in Higher Education: Benefits, Barriers, Progress, and Recommendations" (ECAR Report)



These are mostly things you can:

- Directly invest in
 - E.g. OU, statisticians and data wranglers (Friday session)
 - ECAR Survey Report 2012: “invest in people over tools... hiring and/or training... analysis”
- Operate as a “shared service”
 - Predictive Analytics Reporting (PAR) Framework
 - Higher Education Statistics Agency (HESA)
 - Universities and Colleges Admissions Service (UCAS)



DATA LITERACY & "SOFT CAPABILITY"



Data Is Useless Without the Skills to Analyze It

'...employees need to become:

Ready and willing to experiment: *Managers and business analysts must be able to apply the principles of scientific experimentation to their business. They must know how to construct intelligent hypotheses. They also need to understand the principles of experimental testing and design, including population selection and sampling, in order to evaluate the validity of data analyses.*

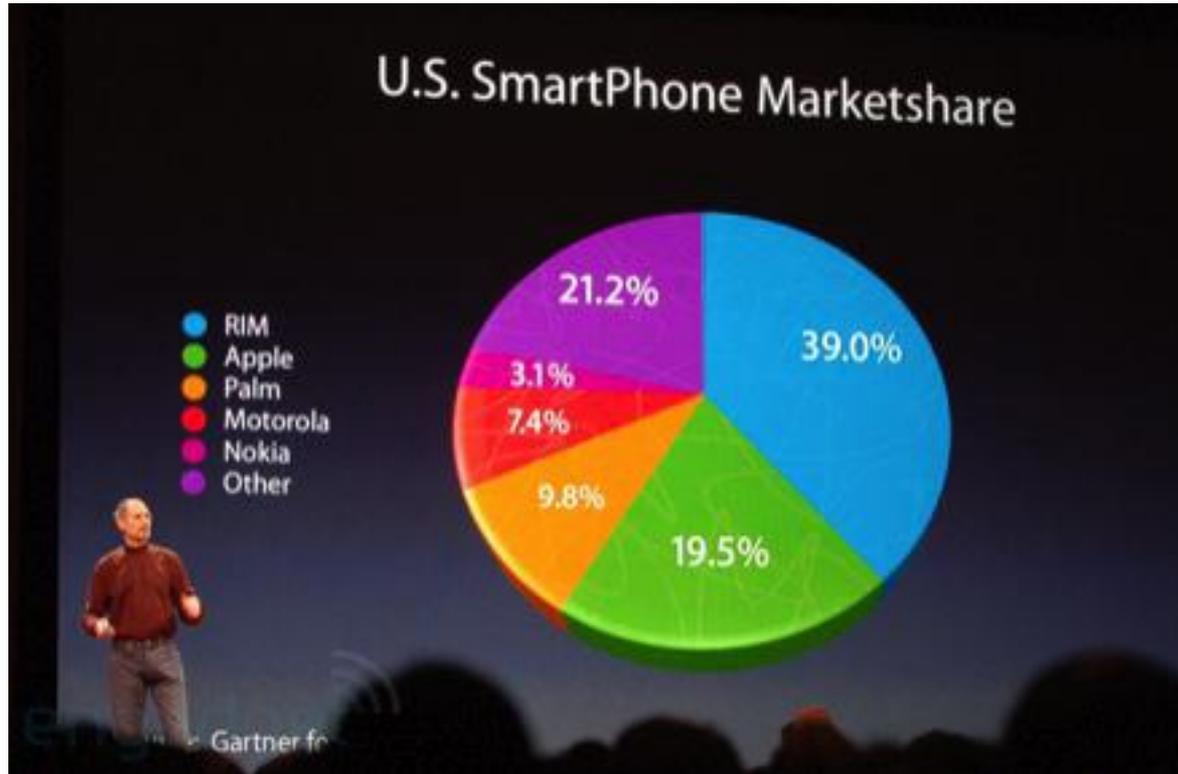
...

Adept at mathematical reasoning: *How many of your managers today are really “numerate” — competent in the interpretation and use of numeric data?’*

Jeanne Harris, HBR Blog, Sept 2012



Visualisations are the Opium of the People



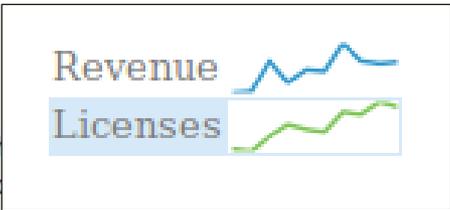
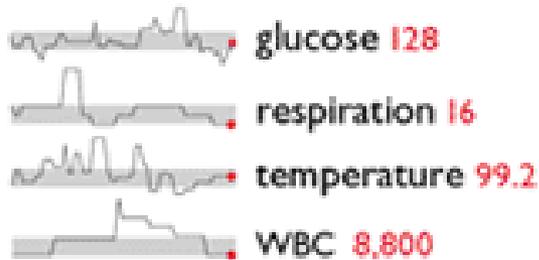
(c)2008, Ryan Block/Engadget



Sparklines: Tufte vs ...

2003.4.28 12 months 2004.4.28 low high

Euro foreign exchange \$ 1.1025 1.1907 1.0783 1.2858



```
function drawCh
var data = g
dataTable([
['Revenue', 'Licenses'],
[435, 132],
[438, 131],
[512, 137],
[460, 142],
[491, 140],
[487, 139],
[552, 147],
[511, 146],
[505, 151],
[509, 149]
]);
```

	A	B	C
1	Hour of the day	Best time for sales	0:00
2	Visits		633
3	Pages/Visit		1.45
4	Avg. Time on Site		57
5	Checkout		0.32%
6	% New Visits		95% 86%
7	Bounce Rate		83% 79%
8	Total Goal Completions		3 5
9	Newsletter		0.2% 0.9%
10	Goal Conversion Rate		0.5% 1.4%

Best time for all conversions

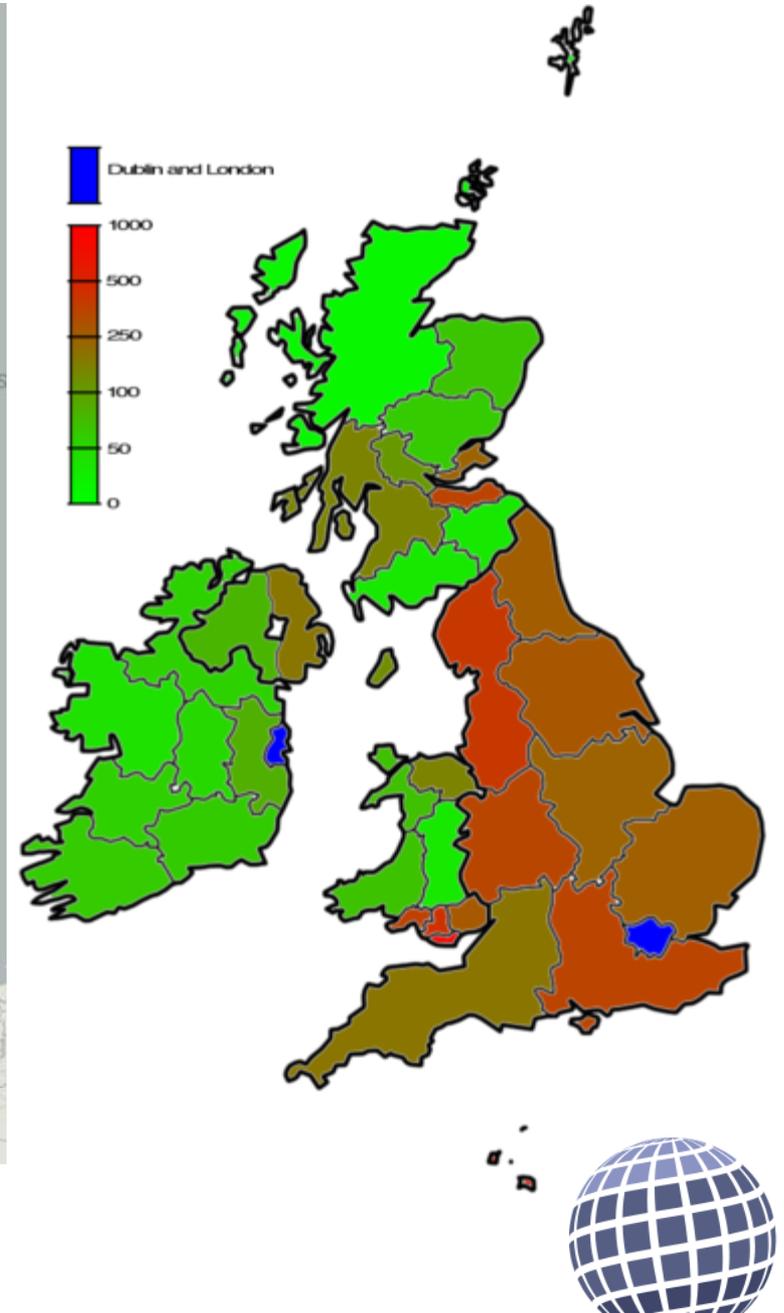


Significance

“Flagged for action because 74% of students felt they were well supported by their supervisor compared to 80% in similar institutions (difference >5%)”

“We need to talk to Mr. Benn; the drop-out rate doubled in his class this year.”





“Soft Capability”

- Appreciation
- Expertise to comprehend, query and converse vs originate

- A role for amateurs
- LA Innovation as social process

- Small data done right
(don't wait for perfection)



Discussion Time



THE MANAGEMENT/ PRACTICE ACCOMMODATION



Ashby's Law of Requisite Variety

"variety absorbs variety, defines the minimum number of states necessary for a controller to control a system of a given number of states"



The “Accommodation”

“The introduction of these techniques [Learning Analytics] cannot be understood in isolation from the methods of educational management as they have grown up over the past two centuries. These methods are conditioned by the fact that educational managers are limited in their capability to monitor and act upon the range of states which are taken up by teachers and learners in their learning activities. ... Over the years, an accommodation has developed between regulatory authorities, management and teaching professionals: educational managers indicate the goals which teachers and learners should work towards, provide a framework for them to act within, and ensure that the results of their activity meet some minimum standards. The rest is left up to the professional skills of teachers and the ethical integrity of both teachers and learners.”

Prof. Dai Griffiths, “Implications of Analytics for Teaching Practice in Higher Education”



So, you want to optimise student success?

- What does success look like?
 - Really?
 - Says who?
 - Is a “good education” indicated by student success?
- Are the following well-specified?
 - “optimise student success”
 - “maximise the probability of success”



Does everyone understand?

Attainment: an academic standard, typically shown by test and examination results

Progress: how far a learner has moved between assessment events

Achievement: takes into account the standards of attainment reached by learners and the progress they have made to reach those standards

Enrichment: the extent to which a learner gains professional attitudes, meta-cognition, technical or artistic creativity, delight, intellectual flexibility, ...



The Map is not the Territory

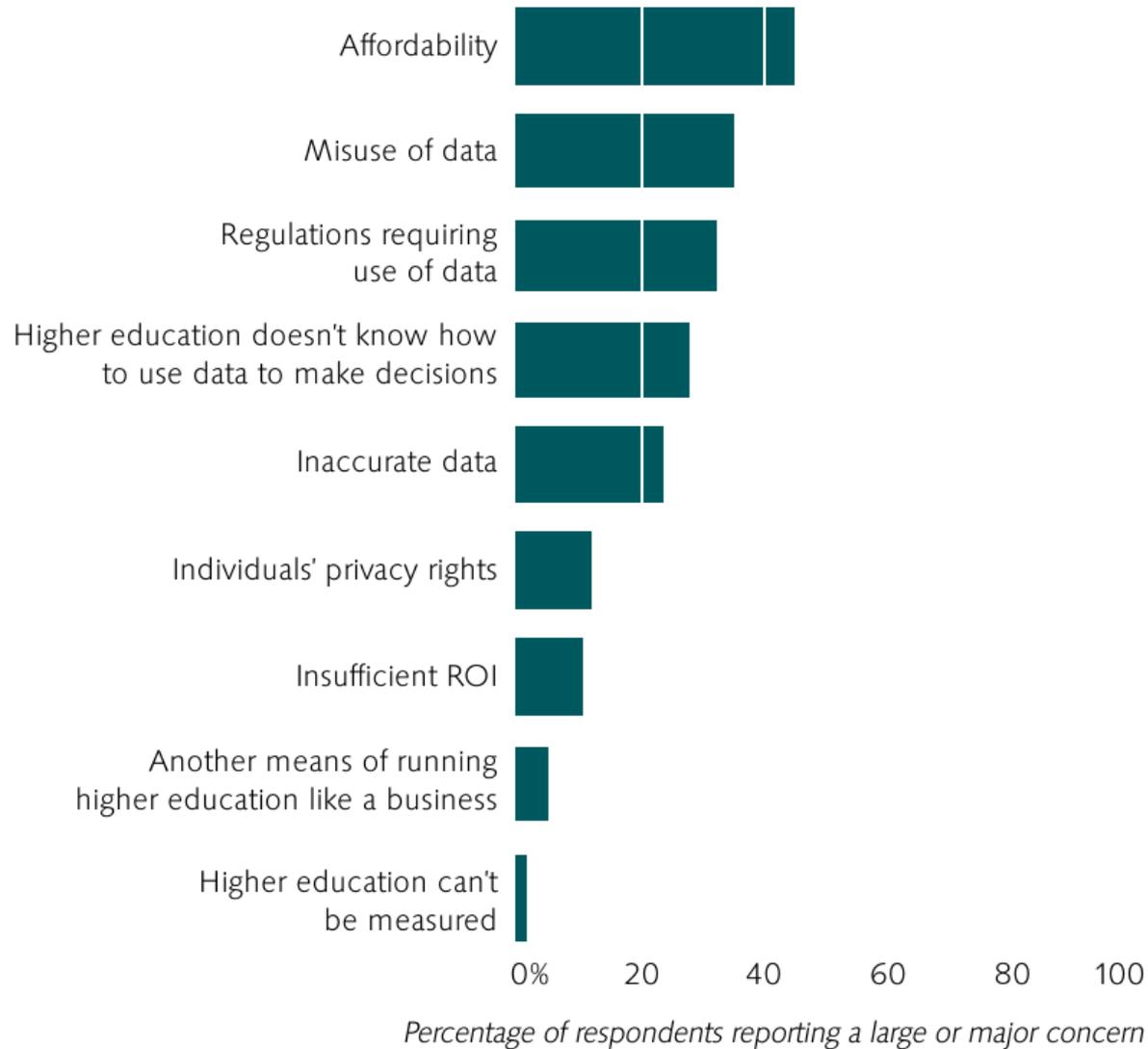


Image: Original René Magritte; digital image © Nad Renrel



Worried?

Figure 5. Concerns about the Growing Use of Analytics in Higher Education



From: "Analytics in Higher Education: Benefits, Barriers, Progress, and Recommendations" (ECAR Report)



POTENTIAL MISADVENTURE & BAD ROLE MODELS



1. For What is this a Good Metaphor?



2. Automation and Practice

- Automation can reduce variety
(and it might be demonstrably effective)

BUT...

- In Systemic LA, “system” includes teaching practice.



3.The Folly of Technological Solutionism

'Recasting all complex social situations either as neatly defined problems with definite, computable solutions or as transparent and self-evident processes that can be easily optimized—if only the right algorithms are in place!—this quest is likely to have unexpected consequences that could eventually cause more damage than the problems they seek to address.

I call the ideology that legitimizes and sanctions such aspirations “solutionism.” I borrow this unabashedly pejorative term from the world of architecture and urban planning, where it has come to refer to an unhealthy preoccupation with sexy, monumental, and narrow-minded solutions—the kind of stuff that wows audiences at TED Conferences—to problems that are extremely complex, fluid, and contentious ... solutionism presumes rather than investigates the problems that it is trying to solve, reaching “for the answer before the questions have been fully asked.” How problems are composed matters every bit as much as how problems are resolved.'



The Question Concerning Technology

'Everywhere we remain unfree and chained to technology, whether we passionately affirm or deny it. But we are delivered over to it in the worst possible way when we regard it as something neutral; for this conception of it, to which today we particularly like to do homage, makes us utterly blind to the essence of technology.'

Martin Heidegger, "The Question Concerning Technology and Other Essays", original 1954, quotation translated by William Lovitt 1977



4. The “What Works” Trap

- RCTs show what works in social policy ...
- Intelligent Tutoring Systems work ...

... don't they?

- Evidence-based policy is fashionable but, too often:
 - The scope & context of applicability is significant
 - Models of cause and effect are unexplored or ignored
 - Evidence relates to groups, not individuals

Is intuition worse than mis-made decisions on questionable evidence?



Rays of Sunshine



Phil Winne, SFU



That's NOT what I meant!

The appropriation of current common practice in business intelligence and management reporting as the method of learning analytics.

- KPIs, “learning metrics”
- Reports
- Dashboards
- An industrial perspective on “systemic”
- Epistemic blindness



A Counter-measure

Articulate the role of method, not only the outcome.

- Organic development & prototyping
- The principle of parsimony
- Realistic about scale/quality of data
- Design and develop with the educator IN the system
- Optimise the environment, not the outcome
- Reflect on the effect LA innovation has on practice



Discussion Time



Reading and References

Jacqueline Bichsel, "Analytics in Higher Education: Benefits, Barriers, Progress, and Recommendations"

Available from <http://www.educause.edu/ecar>

Adam Cooper et al, "Survey of the State of Analytics in UK HE and FE institutions"

<http://publications.cetis.ac.uk/2013/884>

Jeanne Harris, "Data is Useless Without the Skills to Analyze it"

<http://blogs.hbr.org/2012/09/data-is-useless-without-the-skills/>

PAR Framework

<http://wcet.wiche.edu/advance/par-framework>

Dai Griffiths, "CETIS Analytics Series: The impact of analytics in Higher Education on academic practice"

<http://publications.cetis.ac.uk/2012/532>

Evgeny Morozov, "To Save Everything Click Here: The Folly of Technological Solutionism"

ISBN-10: 9781610391382

Phil Winne, "Improving Education" (lecture)

<http://www.youtube.com/watch?v=dBxMZoMTIU4>

Ray Pawson and Nick Tilley, "Realistic Evaluation"

ISBN-10: 0761950087 (and several openly available papers on the web)



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