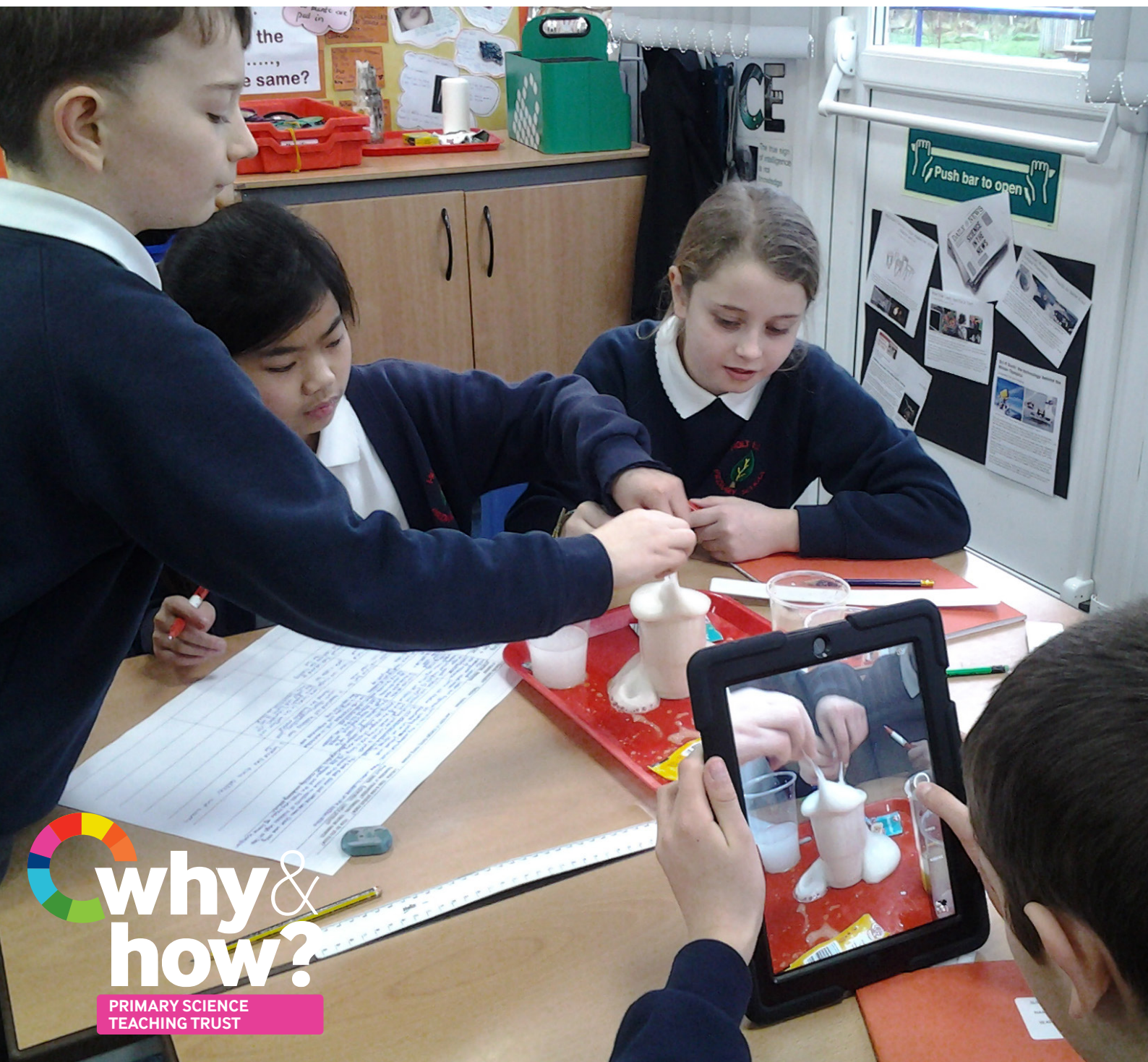


Approaches to Science Assessment in English Primary Schools

Teachers' Summary

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The Problem

For too long we have been pretending that we can measure pupils' science attainment and progress in increasingly fine detail (one APS 'point' being one sixth of an original National Curriculum level). The removal of levels in the 2014 National Curriculum in England has left schools and teachers feeling vulnerable and reluctant to discard the 'comfort blanket' of numerical tracking systems. Yet we should see the loss of levels as an opportunity rather than a threat; to bring formative and summative assessment closer together and ultimately to find more valid ways of assessing what it means to be a scientist.

The Project

The Teacher Assessment in Primary Science (TAPS) project (2013-16), based at Bath Spa University and funded by the Primary Science Teaching Trust (PSTT), aims to develop a recommended mode for assessing science which will support teachers to use the full range of pupil information available in the primary classroom to assess and move pupils' learning forward. In our first year we have focused on gaining an overview of what primary schools across England are currently doing, which is summarised here.

Evidence Base

The findings and recommendations in this report are based on evidence from:

- 91 submissions to the Primary Science Quality Mark (PSQM) Database, from schools across England (Earle, 2014).
- Four visits each to 12 TAPS project schools: observing practice, collecting examples, interviewing staff
- Visits to four additional schools where science is being led by PSTT College Fellows (Stockport, Lancashire, Lincolnshire, East London).
- Responses to presentations of our findings at the PSTT, ASE and Primary Science Teacher College annual conferences; teacher conferences in Oxford and Newbury, and the annual conference of the Association of Tutors in Science Education (ATSE) and National Advisers and Inspectors Group for Science (NAIGS).

Findings

- There is a wide variety of practice in primary science teacher assessment. This diversity has been encouraged by the UK government, firstly by the removal of science SATS at Key Stages 1 and 2 and more recently by the lack of prescription on assessment in the 2014 National Curriculum. Schools have been encouraged to design their own systems for monitoring and measuring pupil performance.
- This encouragement of diversity appears to be promoting a range of creative approaches to formative assessment of children's scientific skills and knowledge, from 'learning walls' to effective teacher feedback and peer assessment (Figure 1). It is unclear, however, how this rich array of formative assessment strategies is feeding back into teacher planning, and there is very little evidence of formative assessment being used to inform summative judgements.
- The lack of centralised guidance appears to be having a detrimental effect on summative assessment and the tracking of pupil progress as schools try to run a number of different systems simultaneously, raising questions about manageability (Figure 2). Many schools also remain wedded to the use of tests or bureaucratic numerical tracking systems.

Recommendations

The Nuffield Foundation (2012) recommend that the rich formative assessment data collected by teachers in the course of ongoing classroom work in science should also be made to serve summative purposes (reporting to parents, teachers of the following age group, government) through synopsis at the end of academic years or key stages. They developed a pyramid model for the flow of assessment information through a school, using the analogy of energy flow through a pyramid of numbers in an ecosystem. Our project has operationalised these recommendations by developing this pyramid model into a whole-school self-evaluation tool (see next page) to support schools in identifying strengths and weaknesses in their assessment systems and provide an exemplified model of good practice. The 'Pupil layer' and the 'Teacher layer' at the base of the pyramid encapsulate the principles of Assessment for Learning; schools should begin by focusing on these layers since this is not only the foundation of the whole system, it is also where changes will have the most impact on pupil progress in Primary Science.

Figure 1: Formative assessment strategies reported in PSQM database (n = 91)

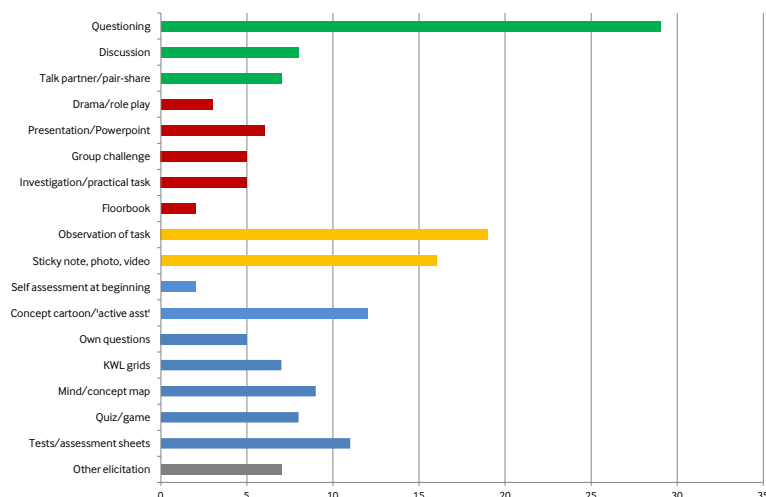
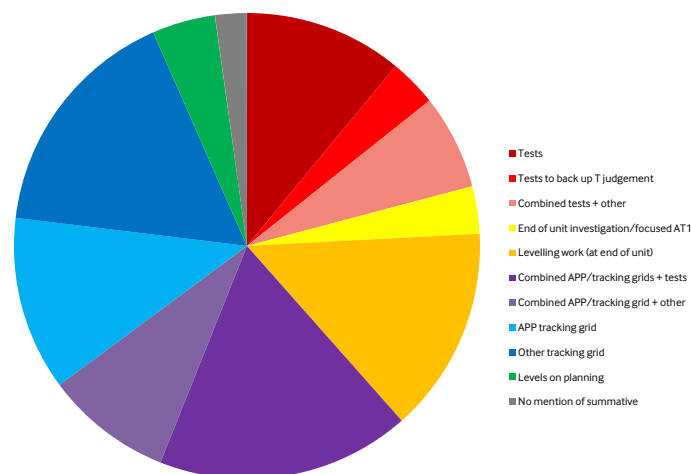


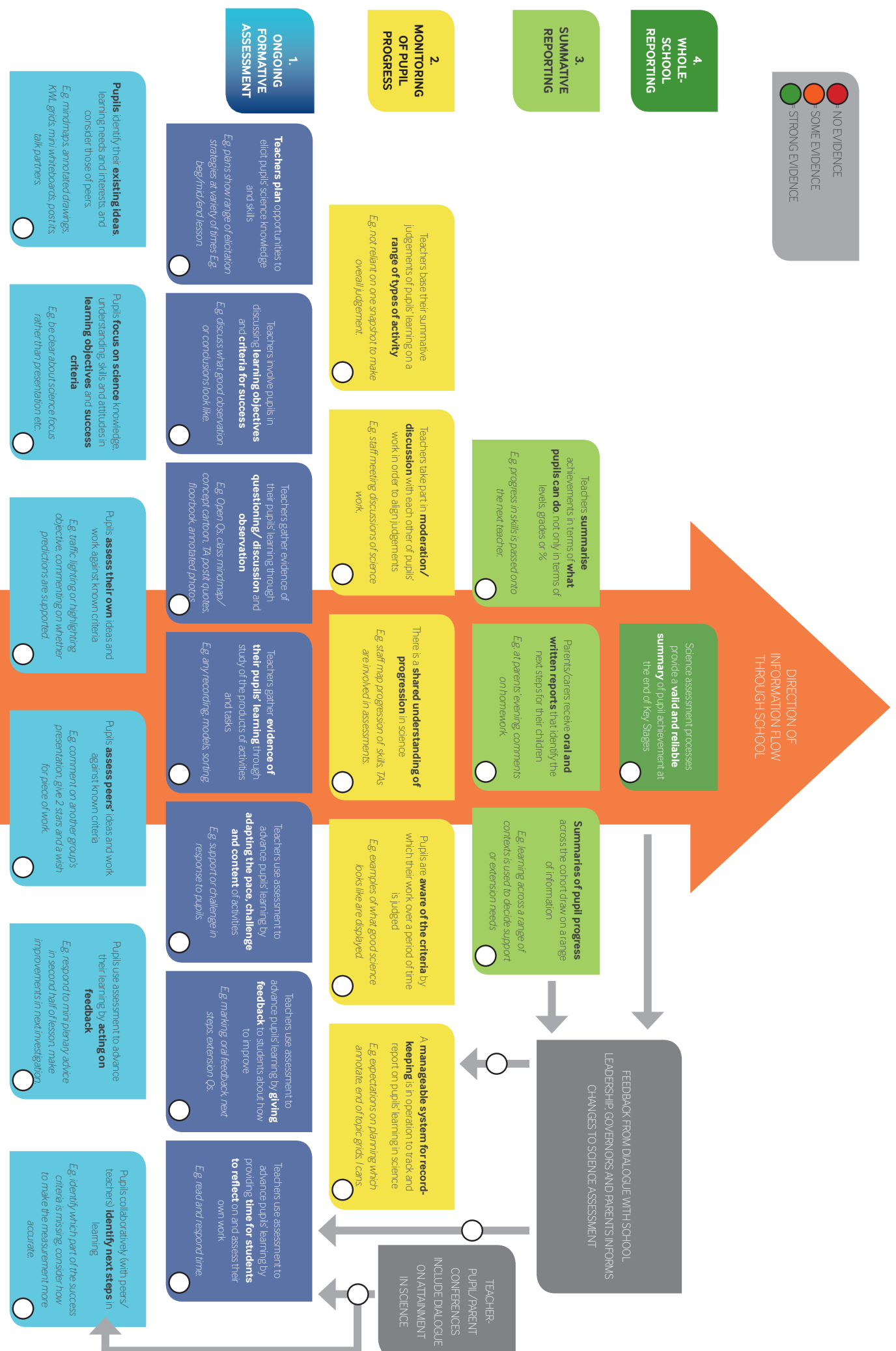
Figure 2: Summative assessment strategies reported in PSQM database (n = 91)



Science assessment: school self-evaluation tool

SCHOOL:

DATE:



Examples of good practice

During our visits into TAPS project schools, we have come across a number of examples of good practice in science assessment:

Pupils are involved in discussing learning goals through the collaborative process of constructing a 'Learning Wall' as a whole class. A '**Learning Wall**' is a display board in the classroom that is used to document the development of a topic for the whole class, using children's drawing, writing and photographs, annotated by the teachers for younger children. Individuals or groups develop **KWL grids** (What do I know? What do I want to know? What have I learned?) or Mind maps that identify relevant prior knowledge the pupils have and what questions they have about the topic. The teacher's role in this is to bear in mind the expected standards as set out in the curriculum and focus attention on these elements if needed.

Teachers gather evidence of their pupils' learning through **observation** by planning to work with groups to assess progress or making use of teaching assistants to make observations on specific children as they monitor the remainder of the class. The teacher might say 'I'm going to eavesdrop on your group' as she listens in, and make a post-it note of a key utterance to be used later to assess an individual's learning.

From the range of information gathered, scientific knowledge and enquiry skills are assessed against statements on a tracker grid that is included in the pupils' exercise books. The statements are expressed in the first person and in a language that makes sense to primary-aged children.

There are 10-minute science **moderation** slots within staff meetings across the year. Each slot consists of one class teacher bringing along some samples of work, which could be children's writing, drawings or speech, and the staff agreeing a level for each piece. This has led to the creation of a portfolio of evidence, examples of which can be found in a PSTT exemplar at: <http://www.pstt.org.uk/science-teaching/primary-science-quality-mark/exemplar-materials.aspx>

Pupils are asked to review and comment on formative **feedback** comments made by their teacher and the comments made by the pupil can be taken into account in making judgements.

Teacher judgements are **moderated** between groups of three colleagues, three times per year. These 'triangulation' groups look at planning, science books and assessment judgements together, using a sub-sample of children's work drawn from three points in the attainment range. Teachers also have the opportunity to moderate with colleagues in other primary schools, all of which the Assessment Co-ordinator believes has improved the reliability of teacher assessment.

Next Steps

To support schools in making the links between formative and summative assessment, and to move from numerical systems to more valid and reliable strategies for tracking pupil progress, we plan to:

- Provide examples for every cell in our school self-evaluation tool, to be made available online or as an 'app' to support schools in auditing their own assessment practice and identifying gaps or areas where reliability or validity could be improved.

- Develop and update the range of Focused Assessments (previous ones available on PSTT website) and include examples of pupil work to support judgements and moderation.

For further information please see <http://www.bathspa.ac.uk/schools/education/research-in-education/research-projects/cresl-teacher-assessment-in-primary-years> or email primary.science@bathspa.ac.uk

