

## **SySTEMiC - a response from schools to improving UK skills, growth, innovation and competitiveness.**

### **What is it?**

*SySTEMiC* is shorthand for “**Schools Skilling, Tooling, Enthusing and Motivating students towards STEM Careers**”. It is a national strategy to engage students in schools, academies and colleges with authentic STEM activities which help them to understand the central importance of technological innovation to our national development, to our current society and to our future economic prosperity and well-being. Teachers of school subjects such as mathematics, science and design technology (MST) together with computing, art & design and engineering work collaboratively to plan inter-disciplinary approaches and update their own knowledge, skills and practice to the benefit of all learners. Schools and employers work together to provide a coordinated range of experiences of technology at work. School and teachers’ professional associations provide the national network of coordination, support and professional development. It is a grass-roots, systemic approach to engage all aspects of school education, which makes use of the best of existing resources, practice and networks.

### **Why is it needed?**

Recent reports, such as from CBI, Engineering UK, the Aerospace, Defence & Security (A|D|S), CIHE, INTELLECT and *e-skills* sector employment groups, emphasise the need for schools to encourage more leavers to study STEM relevant courses in HE/FE and to take apprenticeships in STEM based companies. The acronym STEM was coined in Sir Gareth Roberts’ 2002 Royal Society report “*Set for Success*” which identified steps which the UK needs to take to maintain competitiveness in a knowledge economy. The Royal Society and the Royal Academy of Engineering have since expressed particular concerns over the current shortage of computing expertise. Nearly all major industrialised nations have established educational systems to support their own economic growth, such as the STEM developments in the USA and the MST approaches in the EU. Sir James Dyson’s *Ingenious Britain* report has paved the way for the current UK growth strategy, which does not, as yet, fully involve schools, teachers and pupils. This is our contribution from that sector. The acronym STEM is convenient, but does not fully reflect some of the key elements such as working in inter-disciplinary teams and the key role of digital technologies. We suggest that SMarT – **Science, Mathematics and relevant Technologies** – aligns more closely with the EU’s MST nomenclature as well as making explicit links with the knowledge economy.

### **How will it operate?**

Schools (including academies and colleges) will apply to provide a nationally accredited *SySTEMiC* scheme of SMarT Enrichment & Enhancement (E&E) activities for groups of students (initially in Years 8, 10 and 12). They will decide how the students are chosen and the way the activities will take place throughout the year. They will ensure that teachers and departments supporting students’ *SySTEMiC* activities engage in professional development to enable them to embed the SMarT approach in the teaching and learning of STEM subjects to make them more relevant, engaging, challenging and motivating for the benefit of all students.

### **How is it innovative?**

Schools can, and do, currently engage with any of a large number of SMarT relevant components such as projects, awards, challenges, E&E, clubs, teachers’ continued professional development (CPD), support, resources and careers advice. *SySTEMiC* provides a new vehicle to stimulate a joined-up approach to the coordinated use of these valuable assets within a framework which introduces some important new components directly relevant to current SMarT skills shortages. It will not ‘reinvent the wheel’ but will provide a chassis within which the existing wheels can be powered by a new form of engine – a digital one – and work together to help meet the skills crisis. As well as providing a model linking student E&E with teachers’ CPD, it will also enable schools to have more effective engagement with employers and industry.

### **What has been missing?**

There is a great disparity between IT use by SMarT professionals at work and the way students encounter ICT at school. The application of IT as a tool to support SMarT activities is a new component. Students and teachers need ready access to personal portable computing devices with which they can perform experiments, capture & analyse data, formulate mathematical models, perform simulations - all of which they can use to inform the design and manufacture of technically complex artefacts and systems. Recent developments in hardware and software mean that powerful digital tools can be provided at low cost. Teachers need support and professional development. Much of this can be provided economically using digital technology.

### **Who will manage it?**

*SySTEMiC* is a ‘grass roots’ strategy managed by a consortium of teachers’ subject professional associations. The core group consists of the Association of School and College Leaders (ASCL), the Association for Science Education (ASE), the Computers At School group (CAS), the Design & Technology

Association (DATA), the Mathematical Association (MA), the National Society for Education in Art and Design (NSEAD) and Primary Engineer. It will work closely with other subject associations, employers, national bodies, organisations, higher education and government to ensure that the strategy is fit-for-purpose, cost-effective, far-reaching, sustainable and robust enough to weather any changes in national infrastructure. Accreditation will be provided for participating schools, teachers and students in cooperation with existing schemes.

**How might it work?** Small groups of students work in teams on five authentic and practical activities each of which involves around 10 hours of meeting time in a year. Activities are chosen which reflect between them (a) students' own interests, (b) teachers' interests, (c) society's future needs, (d) local employers' interests and (e) matters of topical interest. Students build up a portfolio of their work which demonstrates the skills, knowledge and understanding they have developed, including subject content.

**What does it need to get going?** Schools need to understand how urgent the current skills shortage is, and how they can help to meet it. This requires government to engage with schools, colleges and academies and to offer some form of recognition to those which make a positive response – perhaps along the lines of the 'Investors In People' awards. Such encouragement need not involve any public expenditure. The SySTEMiC strategy will require some funding and other support, of a comparatively modest nature, which may come from industry, employers, charities and other organisations. It is up to the government to determine whether or not it will make any financial contribution, but it has a key role to play as the enabler to bring the various stakeholders to the table to ensure that the strategy is adequately supported.

**When can it happen?** An initial network could be in place to start in September 2012.

John Morgan (ASCL), Richard Needham (ASE), Simon Humphreys (CAS), David Barlex (DATA), Adrian Oldknow (MA), John Steers (NSEAD), Susan Scurlock (Primary Engineer) July 2011

