



Stemworks
Growing Scientific Culture Together

STEMWORKS is managed by the Education & Training group of the Nottingham City Science Technology Advisory Council (STAC)

- Bilborough College
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- British Geological Survey Service
- Central College
- Confetti
- GameCity
- Hackspace
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- PLACES
- Royal Society for Chemistry
- STEMNET East Midlands
- Sustrans
- Trent and Peak Archaeology
- University of Nottingham


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For more information about STEMWORKS please contact Jon Rea on [0115 8764817](tel:0115 8764817) or email jon.rea@nottinghamcity.gov.uk or Karen Moss at karen.moss@ntu.ac.uk

www.nottinghamstemworks.co.uk

[@nottmstemworks](https://twitter.com/nottmstemworks)

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Local action plan
for engaging citizens in
science and technology
in Nottingham



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FOREWORD



Cllr Nick MacDonald, Portfolio Holder for Jobs and Skills, Nottingham City Council

The future of Nottingham is in the hands of our children and young people.

To be a prosperous knowledge economy with opportunities for all we have to equip the next generation with the skills, experience and qualifications to do the job. Businesses tell us that aligning skills with future industry demand is key to meeting the challenges of future growth.

The Nottingham Growth Plan is our roadmap for developing a skilled workforce for a 21st century knowledge economy. However we recognise that along with an economic plan we also need to become a city of scientific culture, a city where people of all ages – but especially our young citizens – are inspired to choose a scientific career path.

So in that way STEMWORKS is a growth plan too: it shows us how by working together we can grow community engagement with Science, Technology, Engineering and Maths – the STEM backbone subjects; how we can grow industry links to the classroom and open up new possibilities for students; and how we can grow a workforce that can inspire children, young people and their families to think STEM first.

The STEMWORKS partnership brings together education, industry and local government but most importantly it also includes children and young people. Understanding their vision of the future and responding to their education and training needs is essential if we are to realise the ambitions of the Growth Plan.

STEMWORKS has been developed through the European Commission’s PLACES programme and I’m delighted to announce that through this plan Nottingham is adding its name to the PLACES Declaration and becoming officially a City of Scientific Culture.

Thank you to all the partners involved and we look forward to working together to create the future of Nottingham.

Nick McDonald

Mike Goulette, Chair, Nottingham City Science and Technology Advisory Council

As chair of the Science and Technology Advisory Council (STAC) I know how important it is that we all work together to create a world class knowledge economy in Nottingham.

Creating a local workforce to meet the demands of our growing digital, clean energy and bioscience sectors is a priority for the STAC.

We can only achieve this goal if we can inspire more young people to take a journey into a STEM career.

STEMWORKS provides us with a five year partnership plan for building a city of scientific culture that can inspire such journeys. Business, education and community partners will engage with more children and young people and improve opportunities for more STEM learning; we will build a culture of science in families so more children get an early start in STEM; and we will improve the quality of science and technology teaching, both in and out of the classroom.

Everyone can be an ambassador for Science, Technology, Engineering and Maths - in fact our future depends on it.

STEMWORKS has the potential to unlock the STEM ambassador in all of us, helping us ignite, nurture and champion the next generation into knowledge economy jobs.

What will you do to inspire a STEM career?

Mike Goulette



WHY DO WE NEED CITIZEN ENGAGEMENT IN SCIENCE AND TECHNOLOGY?



Nottingham is a Science City with an ambitious plan to be a leading knowledge economy city in Britain and in Europe.

The Nottingham Growth Plan has three priority strands for knowledge economy growth – bioscience, digital content and clean energy. Making sure we have a local workforce with the skills, knowledge and experience to meet the demands of these growing industries is the principal reason for this plan and responds to Nottingham Growth Plan action strand 2.2.

Educational attainment in the STEM subjects that form the backbone of a knowledge economy – Science, Technology, Engineering and Maths – is significantly below the national average for schools and colleges in the city. To address this schools have told us they want support to build stronger pathways into STEM further education and work. This plan addresses the Education Improvement Board's strategic key deliverable to support and challenge all schools in the city to be at least in line with their peers nationally in terms of attainment, progress and closing the gap.

The benefits of science and technology and their role in society are not always well understood by the general public. Science capital in the family – the level of understanding about, and engagement with, science and technology – is often low, especially in families experiencing deprivation. Research such as the recent SPIRES report from Kings College London shows that when science capital in families is low progression towards a STEM career does not happen.

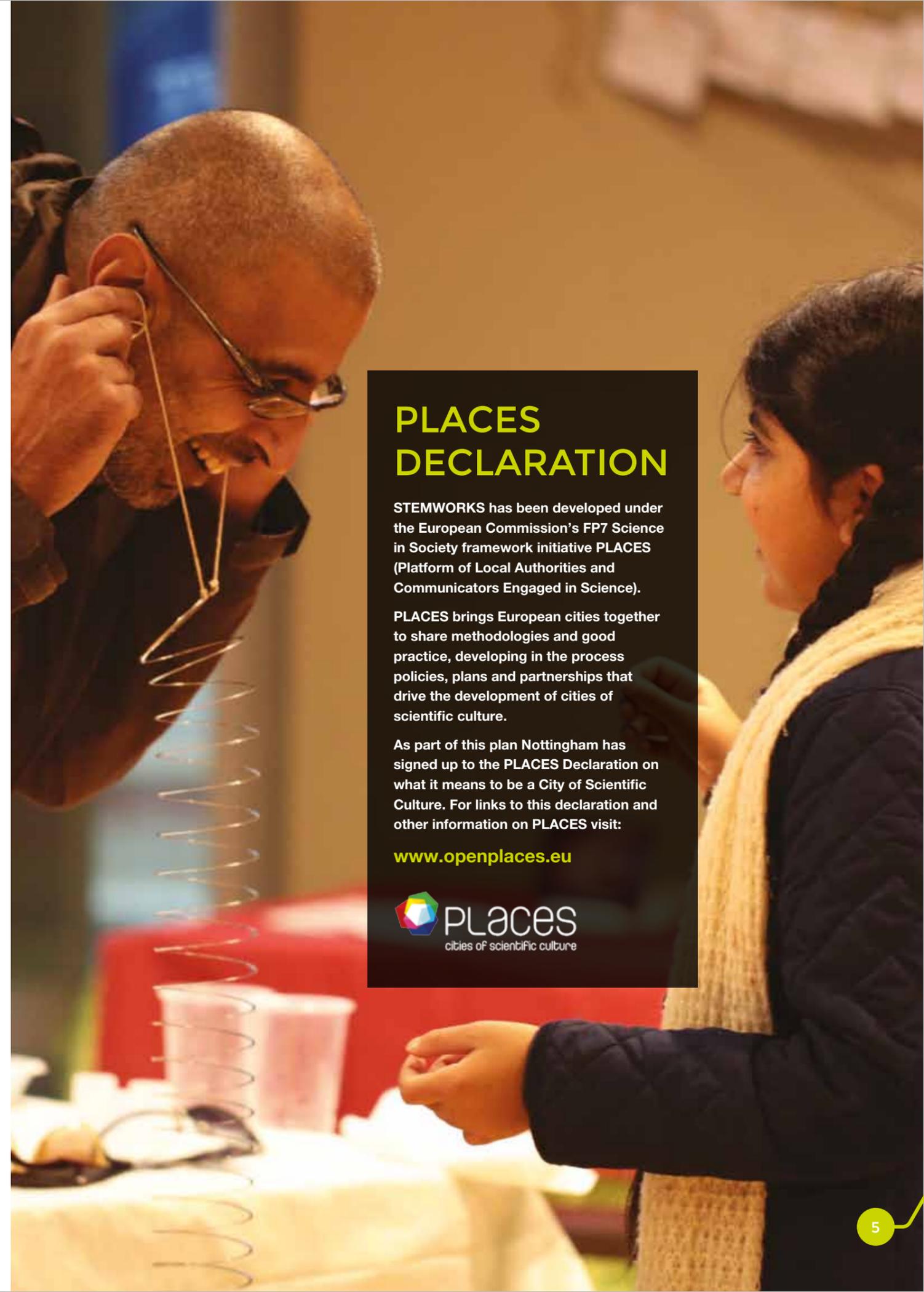
Citizen engagement in science and technology lies at the heart of the solution. Nottingham has high quality STEM learning institutions, world class STEM companies, and organisations and agencies committed to improving the level of public engagement in science.

Together we can make Nottingham truly a city of scientific culture; raise aspiration in science and technology careers; and develop a workforce skilled to meet the demands of a creative 21st century knowledge economy.

Children and young people have been equal stakeholders in the development of this plan. Through formal Youth Council and Primary Parliament events and informal group workshops and listening exercises their views, experiences and ideas have played a key role in defining the rationale, action strands and outcomes of STEMWORKS.

The Youth Conference hosted by Nottingham City Youth Cabinet as part of the 2014 North of England Education Conference agreed a series of recommendations for actions to encourage more young people to take up STEM careers education and training routes including:

- More industry presence in the classroom and more STEMNET ambassadors linked to schools
- More opportunities to experience what a STEM career looks like through visit programmes, working on real life industry projects and having enhanced STEM curricula opportunities
- More opportunities for children and young people to lead their own learning journeys e.g. through projects such as Lab_13 at Dovecote Primary in Clifton
- More opportunities for community level engagement to build science capital in families and establish a better understanding of the benefits and rewards of a STEM career through initiatives like pop-up science shops in communities and citizen-led science investigation
- A STEM manifesto for schools to improve science and technology culture in education, stimulate creative approaches to STEM learning and build STEM skills across the workforce
- Young people to play an active role in the shaping of future plans and strategies for developing the knowledge economy



PLACES DECLARATION

STEMWORKS has been developed under the European Commission's FP7 Science in Society framework initiative PLACES (Platform of Local Authorities and Communicators Engaged in Science).

PLACES brings European cities together to share methodologies and good practice, developing in the process policies, plans and partnerships that drive the development of cities of scientific culture.

As part of this plan Nottingham has signed up to the PLACES Declaration on what it means to be a City of Scientific Culture. For links to this declaration and other information on PLACES visit:

www.openplaces.eu



MAKING STEMWORKS HAPPEN



STEMWORKS is a local action plan for engaging citizens in science and technology in Nottingham.

The Nottingham City Science and Technology Advisory Council – the STAC – has developed this plan to enable business, education, government and citizens to share the challenge of developing a city of scientific culture by working together on three key action strands:

- Growing community engagement in scientific culture
- Growing industry links to education and improving attainment
- Growing a pro-STEM workforce

The outcomes of this work will be:

- Increased community engagement in STEM, improving science capital in families and helping Nottingham become a city of scientific culture
- Improved attainment through better links between industry and the classroom, inspiring more children and young people to take up STEM careers and be part of the knowledge economy
- Improved STEM skills and knowledge in schools through teacher training and governor development; and a public sector workforce promoting STEM careers and learning opportunities to our citizens

STEMWORKS is a partnership plan for the period 2014 to 2020. It brings together new science communication and engagement activities with existing projects to give us a better picture of the impact of our work. It will help us set targets and measure progress and enable partners to work more effectively to achieve shared goals.

New science engagement activities emerging during the lifetime of STEMWORKS will be incorporated into the plan. The current action strand activities are therefore a snapshot of work that is currently happening or is planned to take place.

In addition to its own action strands and outcome targets STEMWORKS also complements other local action plans to build the knowledge economy. Some directly, such as the STAC initiative to increase Level 3 STEM progression, the introduction of the Nottingham Science Diploma and stimulating STEM entrepreneur activity to increase SME growth; others indirectly such as improving digital inclusion, tackling climate change and increasing the use of Telecare technology in adult health and social care. All these depend on a growing culture of citizen engagement in science and technology.

THE ACTION STRANDS



1. GROWING COMMUNITY ENGAGEMENT IN SCIENTIFIC CULTURE

To improve science capital in families and communities and help Nottingham become a city of scientific culture we will implement actions to:

- develop and deliver creative citizen science activities including the pop-up science shop model piloted under PLACES and increase the number of street-level science communication activities across the city
- co-ordinate partner science communication and engagement activity into an annual Nottingham Science Festival based around National Science Week
- increase partner support for GameCity through greater collaboration
- ensure sustained citizen co-production around the Growth Plan through the Sharing the Future participation model

2. GROWING INDUSTRY LINKS TO EDUCATION AND IMPROVING ATTAINMENT

To build better links between industry and the classroom, inspire more children and young people to take up STEM careers, and be part of the knowledge economy we will implement actions to:

- develop and deliver the CHEMWORKS programme of an enriched chemistry and science curriculum offer for disadvantaged and hard to reach students, measuring its impact in a longitudinal cohort study and providing evidence for future engagement actions
- increase the number and impact of STEM ambassadors in city schools by supporting the development of the STEMNET ambassador programme, and by increasing the number of STEM days undertaken
- develop a shared resource of STEM learning toolkits and support industry partners to develop real life learning plans linked to the curriculum for primary and secondary schools

3. GROWING A PRO-STEM WORKFORCE

To improve teacher training and governor development opportunities in schools and colleges, and encourage the public sector workforce to promote STEM careers and learning opportunities to our citizens, we will implement actions to:

- improve the quality of STEM teaching through improved CPD opportunities for both trainee and established teachers
- improve the ability of schools to deliver an enriched STEM curriculum through the adoption of STEM manifestos written in partnership with students
- improve the understanding of the benefits of STEM learning amongst the Children's Partnership workforce and other public and voluntary sector staff through training and development activities

THE STEMWORKS PARTNERSHIP

STEMWORKS has been developed by members of the Science and Technology Advisory Group's (STAC) Education and Training working group, a partnership of education, industry, government and citizen representatives who work together to increase the culture of science and technology learning in the city.

Members contribute to the planning and delivery of different actions under the plan, its monitoring and evaluation, and its overall development.

Members include:



This list is not exhaustive and the STAC Education and Training group welcomes new members. For more information contact jon.rea@nottinghamcity.gov.uk or karen.moss@ntu.ac.uk

CITIZEN PARTNERSHIP 'SHARING THE FUTURE'

Engaging, enabling and empowering citizens is the cornerstone of STEMWORKS.

An innovative new model for citizen engagement, **Sharing the Future**, has been developed to support and facilitate this principle. It provides partners with a simple yet powerful tool for citizen participation.

Sharing the Future enables citizens to participate in the sharing of ideas and information, views and experiences, decision making and leadership. Through these four domains citizens are empowered to understand the benefits, risks and implications of science and technology; define their needs and aspirations for the knowledge economy; co-create plans and strategies for knowledge economy growth; and share in the leadership of building Nottingham's scientific culture.

Sharing the Future programme actions for STEMWORKS include:

- Maintaining a youth representative on the Nottingham City Growth Board as a senior strategic level voice for children and young people
- Establishing the Nottingham City Youth Cabinet as a reference group for the STAC Education and Training working group
- Holding regular information sharing, consultation and planning meetings with the Youth Council and Primary Parliament; participation forums such as school and college student councils and locality youth forums; and community of identity participation groups including the Special People Group SEND forum and Children in Care Council
- Engaging adult forums and community participation groups including Nottingham Citizens, Disability Involvement Group, Equality and Fairness Commission and the Learning Disability Partnership Board; and bespoke groups and 'mini-publics' through community engagement activities such as pop-up science shops, GameCity events and National Science Week activity

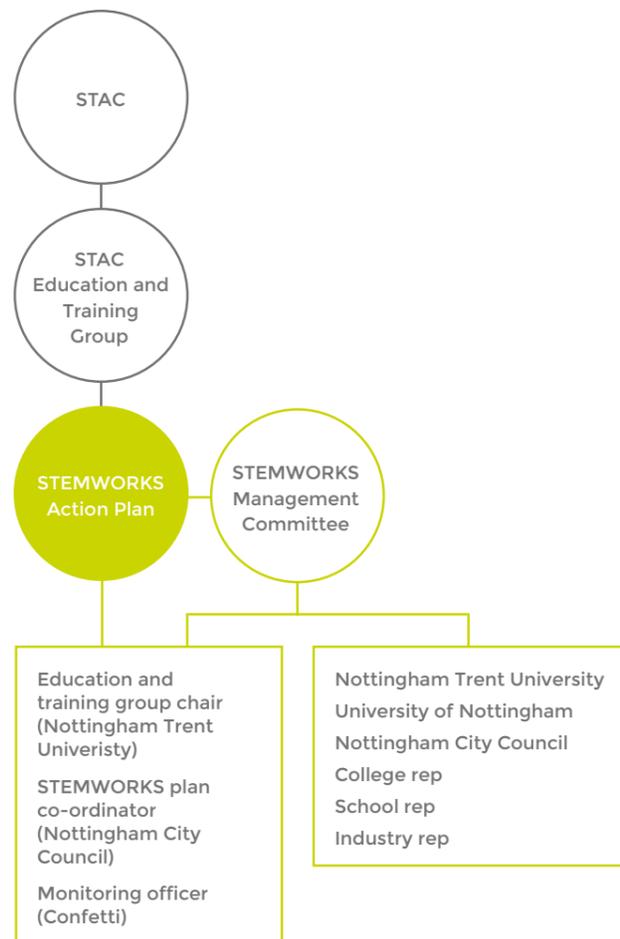
The **SHARING THE FUTURE** model has been developed with and for citizens. It has come from learning and experience at local and regional levels, including the work of the East Midlands Regional Participation Leads Group. It identifies four areas of participation:



PLAN MANAGEMENT AND MONITORING

STAC is the governance group for STEMWORKS and the STAC Education and Training group is the steering group.

Management of the plan is through a sub-group partnership management committee meeting quarterly and consisting of member representatives of the working group. Co-ordination of plan management activities will be led by Nottingham City Council and Nottingham Trent University. Plan monitoring will be delivered by Confetti on behalf of the partnership.



ACTION STRAND DETAILS

1. GROWING COMMUNITY ENGAGEMENT IN SCIENTIFIC CULTURE

1.1 Development of a National Science Week/ Nottingham Science Festival

➤ **Lead Partner:** University of Nottingham

Establish a brand for a Nottingham Science Festival; develop a programme of partnership activity around National Science Week; implement a shared calendar and programme of events for March 2015; and review through STAC working group and deliver annually through partnership.

1.2 Citizen Science activities

➤ **Lead partner:** Ignite!

Development and delivery of citizen science programme including pop-up shop activity in city centre and neighbourhood locations; development of a plan for pop-up activity; and shared citizen science activities in the new Central College and New College Nottingham Basford Hall campuses.

1.3 Citizen participation programme – Sharing the Future

➤ **Lead Partner:** Nottingham City Council

Delivery of a programme of activities, meetings and events to citizens to share in the development of plans and strategies for the knowledge economy, including monitoring and management of STEMWORKS and related Nottingham Growth plan work; annual performance assessment of STEMWORKS through Youth Council and Primary Parliaments; and hosting of annual STEM participation celebration event including first year STEMWORKS launch event December 2014.

2. GROWING INDUSTRY LINKS TO EDUCATION AND IMPROVING ATTAINMENT

2.1 CHEMWORKS - STEM curriculum enrichment and tracked cohort programme

➤ **Lead partner:** Nottingham Trent University

Delivery of Royal Society for Chemistry funded programme to engage hard to reach students in a long-term programme of enriched curriculum activities; impact assessment research.

2.2 STEMNET partner development

➤ **Lead Partner:** STEMNET

Supporting the development and expansion of the STEMNET programme through increased recruitment of STEMNET ambassadors, building stronger relationships with schools and school trusts, and developing the partner network of participating companies and other STEM organisations. Ongoing development with industry partners of toolkits for use by STEMNET ambassadors.

2.3 Support development of Level 3 progression

➤ **Lead Partners:** New College Nottingham, Central College, Bilborough College

Represent STEMWORKS partnership on STAC Level 3 Attainment working group, co-ordinating plans to ensure they are cross-referenced; incorporate Level 3 progression and attainment monitoring evaluation into STEMWORKS monitoring and management reporting.



3. GROWING A PRO-STEM WORKFORCE

3.1 STEM manifesto for schools

➤ **Lead Partner:** Central College

Distribution of template Nottingham City STEM manifesto based on Central College model, working through schools to develop individual manifestos to suit school type and STEM environment. Promotion of manifestos through STEMNET ambassador and networks including Nottingham City Schools Forum, Learning Trusts, Heads Conference and Governors Group.

3.2 CPD/STEM teacher training enrichment

➤ **Lead Partner:** Nottingham Trent University

Development of a programme of enriched teacher training and CPD activities and support at Nottingham Trent University. Closer links between teacher training programmes and STEM ambassador network.

3.3 Public and voluntary sector workforce development

➤ **Lead Partner:** Nottingham City Council

Integration of STEM engagement training into workforce development plans for Children's and Adult services, including statutory and voluntary sector health and social care providers; inclusion of STEM agenda content in annual Every Colleague Matters programme.

4. COMMUNICATIONS

4.1 Communications plan

➤ **Lead partner** - Nottingham and Nottinghamshire Futures

Development of online presence including STEMNET web pages and shared event calendar; development of communications plan and stakeholder feedback process.

