

REDESIGNING THE CIVIL ENGINEERING PROGRAMMES to deliver sustainability

Friday 20th April 2012



Stephanie Glendinning
Jean Hall

INTRODUCTION

- Overview of the major changes:
 - Drivers
 - Funding and processes
 - Outcomes

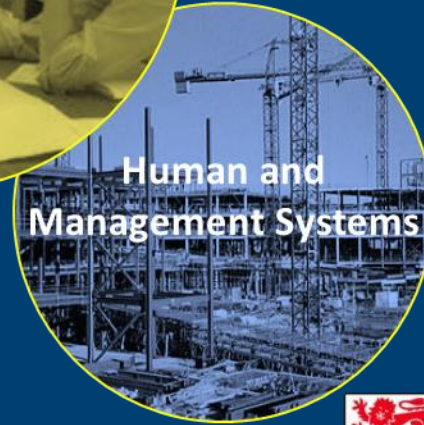
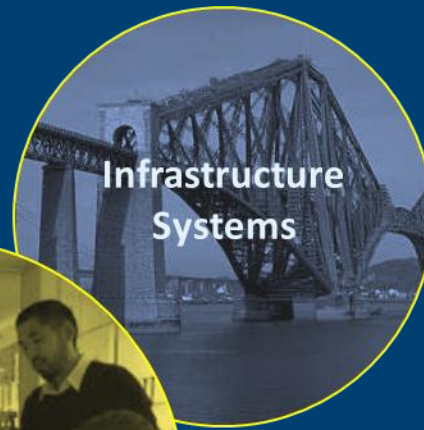
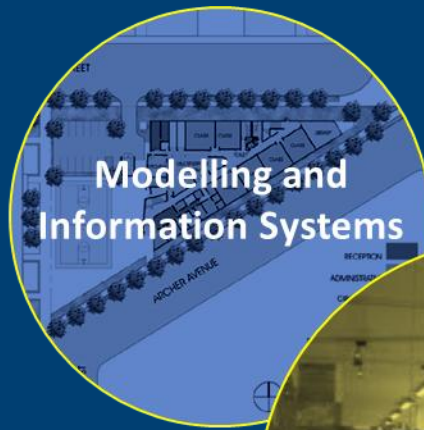
UG Programmes – major drivers

- Realising our ambition
- Research informed teaching
- Large and diverse staff profile
- Meeting (surpassing) accreditation targets
- Delivering sustainability

Process

- Strategy group
- External review
- Staff consultation and engagement
- External funding – Royal academy of Engineering

Thematic Structure of New Programme



New Programme

	DSES	Credits	Modelling and Information systems (PDG)	Credits	Infrastructure Systems	Credits	Environmental Systems	Credits	Human and Management Systems	Credits
Stage 1	Design of Sustainable Engineering Systems 1	20	Engineering Mathematics 1	20	Engineering Mechanics and Materials	20	Environmental Systems	10	Human System Demands and Impacts	10
			Geographic Information Systems	10	Fluid Mechanics	10	Geotechnical Properties of Soils and Rocks	10		
							Engineering Surveying 1	10		
Stage 2	Design of Sustainable Engineering Systems 2	30	Engineering Informatics	10	Structural Analysis	10	Treatment of Water and Wastewater	10	Land Traffic and Highways	10
			Statistics and Numerical Methods for Civil Engineers	10	Steel & Concrete Structures	10				
			Engineering Surveying 2	10	Geotechnics	10				
					Hydraulics	10				

Design of Sustainable Engineering Systems – Stage 3

- Masterplanning of the Science Central site
- A spatial layout including the buildings and transport layout, plus:
 - Sustainability framework
 - Geotechnical Appraisal
 - Surface water plan
 - Environmental Statement
 - Carbon footprint appraisal



Student presentation

science central

Newcastle University

- 20% of the site will be for the purposes of Newcastle University
- A Planning approach to design in line with the success of the project
- Provision of facilities for:
 - School of Marine Science and Technology, including a 1500sqm teaching tank
 - School of Computing Science
 - Development of Life/Work facilities

“Sustainability is right at the top of our agenda and we wouldn't be doing it that way”
- Barry Abernethy, Newcastle University

Newcastle City Council

- ~ 3,500 jobs to be created
- Enhancement of the North East's knowledge economy
- Retain Newcastle University and Northumbria University graduates
- Integrated mixed use development that engages the local community
- Use Science Central to build on the city's sustainability credentials - outlined in the sustainable city 2030 and 2015
- Regeneration of an area of historical importance

“To not through” - Len Wilson

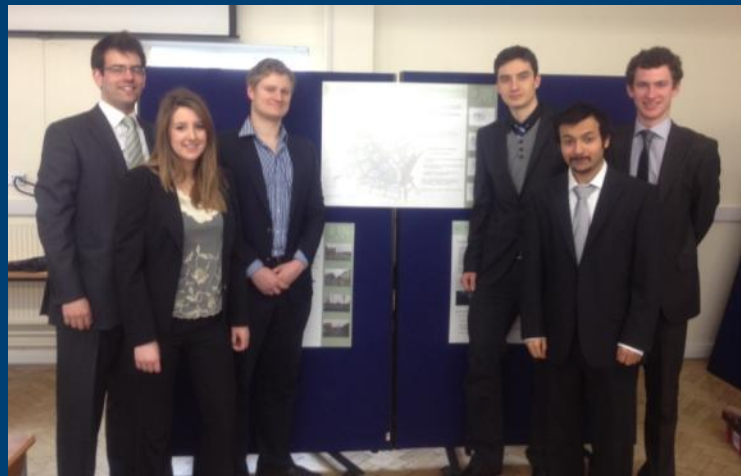
science central

Gateway Building

- High growth businesses and job opportunities
- Open structure - wide and vertical sections
- A number of innovation hubs with sustainable design
- Structure integrates with the topography of the site, compatible with underground car park
- Facilitates an active heritage, including cafes, small shops and open spaces

St James' Boulevard

- Major re-development of St James' Boulevard consisting of a new section of dual and cover tunnel, taking advantage of the existing topography, minimizing pedestrian interaction with the highway
- Creates new pedestrian boulevard between the city centre and the Science Central site
- Excavation of approximately 30,000m³
- Exposed material intended for use in the site remediation
- Improved environmental standards



science central

Sustainable Urban Drainage System

- Asymmetrical paving, which environmentally friendly
- The site will retain the existing hydrological properties of the area - achieving greenfield run off rates
- Small scale water treatment plants, in conjunction with reed beds, will be used on a building and street scale to encourage responsible use of water
- Attenuation of stormwater runoff will be achieved through extensive use of pond systems and swales

Waste Removal

- CSP biomass boiler system primarily fuelled using solid waste collected on site
- W3000/10000
- Waste collection will be automated across the site using the world leading Smart system

Energy

- District Heating
- One central power plant in which the heat from energy production is fed through a series of water primary pipes to all blocks on site
- Future potential to develop the geothermal energy resource, in conjunction with Newcastle University research

Ground Remediation

- CSP Excavator
- Primarily transform the development
- Enhance the sustainable credentials of the project through consistent management and careful planning
- Removal of approximately 60,000 tonnes
- No grading of approximately 140,000 tonnes of soil
- Remove the necessity for large scale grading across the site

Design of Sustainable Engineering Systems – Stage 1

- Design based teaching – 2 Projects
- Semester 1 - small groups
 - From theory to practice.....



Design of Sustainable Engineering Systems – Stage 1

- Semester 2 – larger groups (6 students)
- Sustainable development in Gateshead
 - ‘Real’ project with ARUP
 - Sustainability principles
 - Sustainable Urban Drainage scheme
 - Use of Space in Design
 - Regional Transport Strategy



External Review

William Powrie: our proposal was up-to-date, exciting and novel,

.... we had put our finger on what was needed - an excellent proposal

Colin Bailey:..... our vision was excellent, and that it would definitely attract 18 year olds to come and study civil engineering at Newcastle.

..... it would become what defines a Newcastle graduate

Student Quotes.....

... the sustainability framework concepts were a useful approach.....

... we now have an appreciation of the very complex and conflicting issues surrounding design

... we have enjoyed the application of the sustainability issues in real case examples

... the input from industry offered a much wider insight to employment opportunities available.....



 Civil Engineering
and Geosciences

