Digital Transformation:

Software Design,
Management +
Practical Implementation

CSC4008

Dr. Barry McCollum, Dr. Des Greer

Session Overview

- Aims
- Objectives
- Outline
- Skills / Benefits
- Content
- Assessment
- Structure
- Responsibility

Aims

1. Work collectively to develop an innovative industrially informed IT solution.
2. Revolutionise estate management with products and services employing available data.

Objectives

1. Work as part of a team
2. Plan, manage and execute a software engineering project
3. Understand Commercial and Industrial Setting
4. Identify potential opportunity and scope solution
5. Plan product development
6. Delivery of MVP and future plan
7. Appreciate, legal, social and ethical aspects

Areas Covered

- ‘Concepting’ and opportunity analysis
- Idea generation and realisation
- Identification and understanding of Innovation
- Commercial and Industrial Framework
- Project and team management
- Software design, testing and implementation
- Legal social and ethical considerations
- Solution delivery and Critical analysis

Skills and Benefits

- Background research, market evaluation, opportunity scoping
- Delivery of software design within a modern industrial setting
- Ability to develop and manage requirements and overall evaluation
- Ability to evaluate systems in terms of architecture, general quality attributes and possible trade-offs presented within the given problem
- Gain knowledge of the commercial and economic context of the development use and maintenance of computer-based systems

Skills and Benefits

- Able to frame the opportunity within an innovative business model outlining the overall requirements
- Recognise the legal, social, ethical and professional issues involved in the exploitation of computer technology and be guided by the adoption of appropriate professional, ethical and legal practices
- Be able to apply analytical skills within a team to a practical opportunity
- Appreciation of risk management within the development process from an end user, commercial, team and individual perspective.
- Deploy effectively suitable tools for the construction and documentation of computer applications and to use and apply information from technical literature.

Structure

Lectures

Discussions

Mentoring

Presentations

Team Meetings

Industrial Guidance

Introducing EventMAP

The Future of Transformative Optimisation

EVENTMAP®

Assessment

Background and Plan:	20%	Background Research and Innovation Plan to submit week 4 Introduction, Background Research, Opportunities, data sources, possible features, Benefits
Design:	20%	Software Process Choice, Software architecture and design to submit week 6 Create Design Document identifying individual contribution
Solution:	40%	Report outlining solution delivery, critical analysis of solution, team and individual performances. Lessons learned. Week 12
Pitch	20%	Presentation and Demo week 13

Assessment

- Plan
  - Opportunities, data sources, sensors, possible features, use cases
  - 6 pages

- Design Document
  - User Stories
  - Software Process to be used
  - Software Architecture Document
  - 15 pages
  - Appendix: Individual Contribution

Assessment

- Solution
  - Background
  - Scoping and market evaluation
  - Project planning
  - Software Realisation
  - Documentation
  - Product Roadmap
  - Legal, social and Ethical Implications
  - Critical Analysis and Lessons Learnt
  - Potential Business Context and Future Planning
  - Individual Contribution
- Pitch

Tools

- Gitlab – to manage documents, software commits etc.
- EasyBacklog – to manage requirements and delivery
- Trello – to visualise progress
- Slack – to communicate with team members
- Others as you see fit
- Add Barry and Des as team members/reporters for monitoring purpose

Digital Transformation: Session 2

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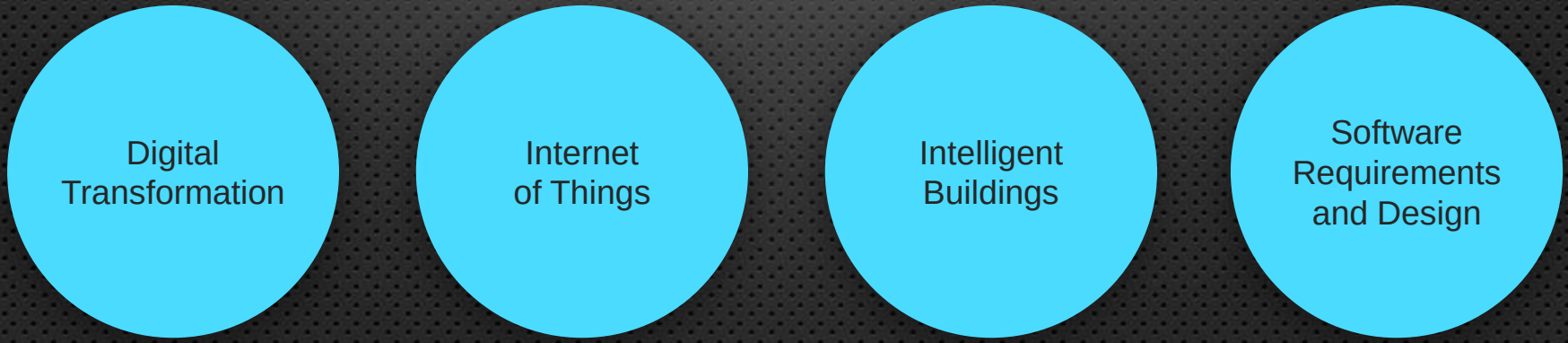
Session Overview



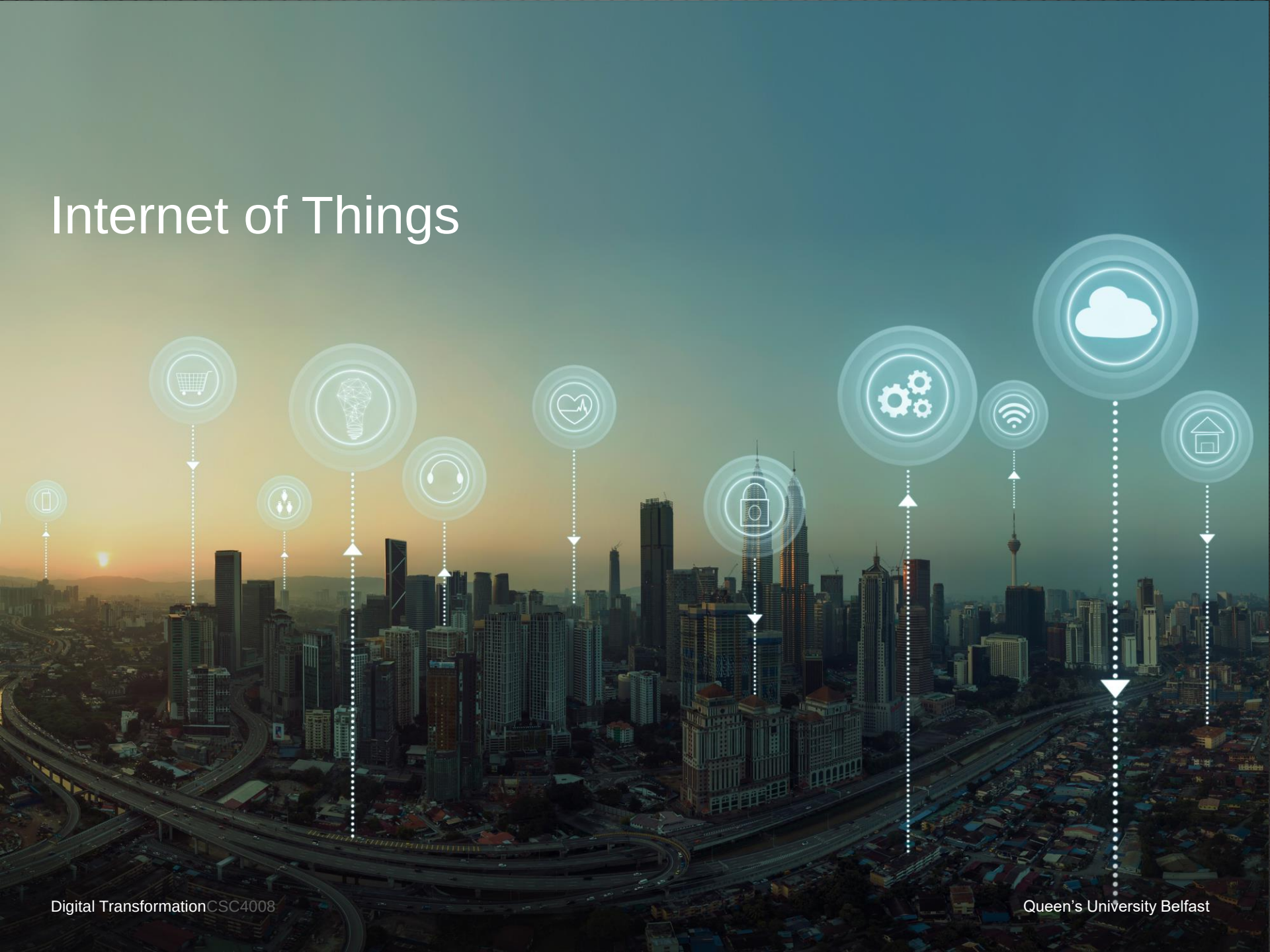
Digital Transformation

Digital Transformation

- Strategic change
- Reviewing operational activities and processes
- Business modernisation
- Innovation and disruption
- Taking opportunity of emerging technologies
- Dealing with legacy systems
- Introducing optimisation and automation
- How can organisational savings and rationalisations be introduced

- https://www.redpixie.com/blog/digital-transformation-examples

Internet of Things



IoT

- An increasingly interconnected cyber-physical-biological environment that links devices, systems, data, and people.
- At its core, IoT is simple: it's about connecting devices over the internet, letting them talk to us, applications, and each other

> Simply, the Internet of Things is made up of devices – from simple sensors to smartphones and wearables – connected together."

Matthew Evans
The IoT programme head at techUK

IoT

- By combining these connected devices with automated systems, it is possible to *“gather information, analyse it and create an action”* to help someone with a particular task, or learn from a process.
- IoT offers us opportunity to be more efficient in how we do things, provide better service, saving us time, money and often emissions in the process
- It allows companies, governments and public authorities to re-think how they deliver services and produce goods.
- Therefore at the centre of Digital Transformation

IoT

- Security, privacy and what the data is used for are key challenges
- At its best, the IoT has the potential to create an integrated ecosystem that can respond to a spectrum of needs, increasing efficiency and opportunity, and empowering people through technology, and technology through intelligence.
- At its worst, the IoT can open a Pandora's Box of inappropriate and unsafe behaviour, unintended consequences, and intrusiveness.

- Document: How organisations are implementing iot.pdf

Intelligent Buildings

Background

- Creates an environment which maximises the effectiveness of the building's occupants while at the same time enabling efficient management of resources.
- Documents:
  - MarketDriverAnalysis.pdf
  - Smart Cities Start with Smart Buildings.pdf
  - Dell SmartBuildingsAutomation.pdf
- https://www.youtube.com/watch?v=d55rBuB9D7s

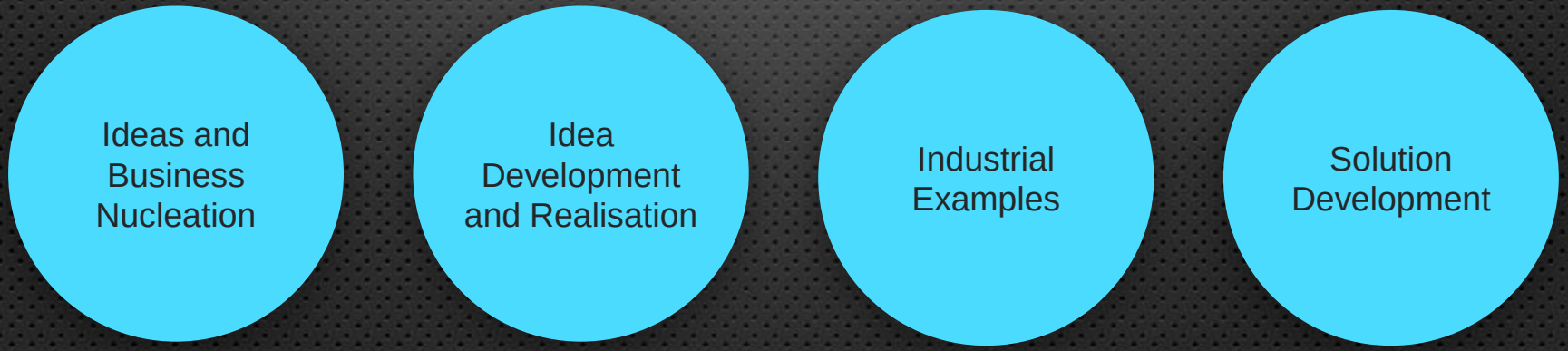
Other Resources

- https://www.youtube.com/watch?v=LxP0bqaXyfc
- https://www.dell.com/en-uk/work/learn/internet-of-things-labs
- https://www.youtube.com/watch?v=HPOkEpU-nfg
- https://www.youtube.com/watch?v=XCG41ec5RAY

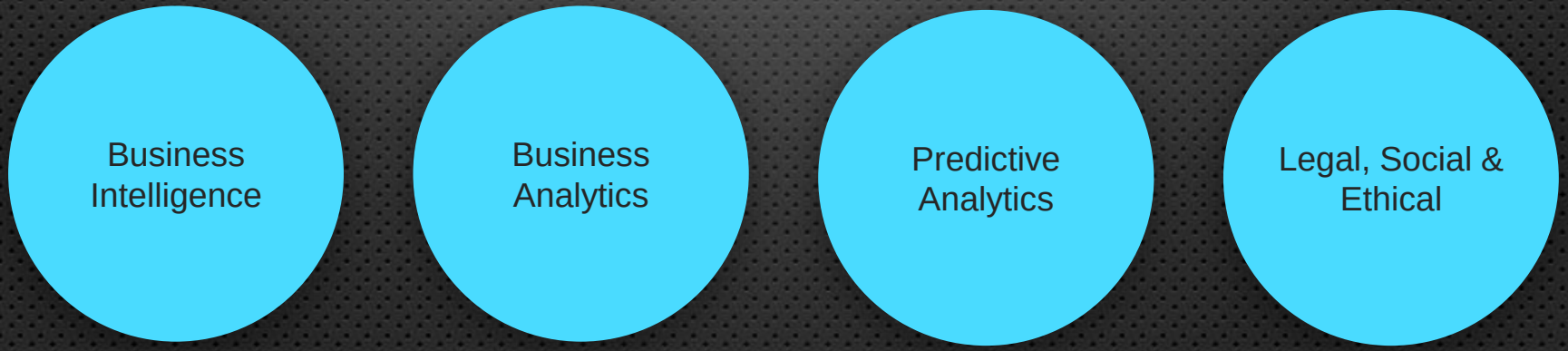
Getting Started

- Background research into the area
- What companies are working in the area and what contribution they are making
- Understand and document what data is available
- Think about opportunities and possible features
- Illustrate what other data would be useful?
- How could this be collected?
- Development of system that helps facilitate a more intelligent building

Lecture Themes



Lecture Themes



What Data Is Available?

Data Examples

Carbon/Electricity usage from estates and weather feeds.

- Fob utilisation
- Class lists
- Timetable
- Events
- Project booking (QOL)
- Electricity/carbon usage
- Desktop login
- Wifi login
- Access data
- Weather feed

Software Design

Queen's University Belfast

Software Design

Lecture Topics:

- Software Process, Planning and Coordination
- Requirements to Design – how do we get from use cases/ user stories / features / requirements to a software design
- Software Design principles and patterns;
- Software Architecture;
  - Quality Attributes & Tactics
  - Architectural Patterns

Solution Examples

Solution Examples

- Introducing efficiencies in building usage
- Better management of existing asset and resource
- Planning for new space and/or appropriation of space
- Student group allocation, communication and resource usage
- Efficient module delivery