Contents

Introduction 1

Key Competency Areas 2-3

Digital Content Technology 4

Future Networks 5

Graphics, Vision, Visualisation 6

Future Cities 7

Statistics 8

Software Performance & Correctness 9

Student Internships 10

Student Internship Industry Partners 11

Taught Masters Programmes 12

Careers Advisory Service (CAS) 13

ADAPT Centre at Trinity 14

CONNECT Centre at Trinity 15

Learnovate Centre at Trinity 16

AMBER Centre at Trinity 17
Introduction

Following the economic downturn Ireland’s economy is now growing again. A large part of the growth is being driven by Foreign Direct Investment (FDI) and export-orientated businesses. Ireland is now building an investment case based on talent and research as key investment factors. Trinity has the Top ranked CS Department in Ireland, top 100 globally in 2015 QS Ranking. Trinity leads four large-scale national research centres impacting the ICT sector.

Investing in research produces many tangible impacts: scientific learnings; intellectual property which can be commercialised and international collaborations which enhance our capacity to innovate. Graduates in a range of disciplines and at different levels make up the national talent pool but increasingly research-trained PhD graduates can help differentiate Ireland internationally.

The booklet outlines the key competencies of Trinity for the ICT sector. It highlights the taught masters programmes and internship opportunities.

If you want to learn more about how to engage with Trinity contact:

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“We must embrace the skills revolution, adopting strategies to ensure continuous upskilling and development of our workforce to allow our citizens to be at the forefront of new technology and create high-value jobs. The potential of our people is enormous.”

- Government Spring Economic Statement

**Education**
- Computer Science
- Management Science
- Information Systems
- Business Economics
- Engineering
- Computer Engineering
- Mathematics
- Theoretical Physics

**Research**
- Digital Content
- Statistics/Decision Science
- Future Cities
- Future Networks
- Security & Privacy
- Health / HCl
- Software Performance
- Graphics/Visualisation

**Innovation**
- Industry Partnership
- Commercialisation

**School of Computer Science & Statistics:**
- Top ranked CS Department in Ireland, top 100 globally in 2015 QS ranking
- Average of approx. €9M p.a. competitive research income
- Leads three large-scale national research centres
Key Competency Areas

ICT Research Excellence at Trinity

- Graphics, Vision, Visualisation
- Digital Content Technology
- Statistics & Decision Science
- Health/HCI
- Security & Privacy
- Future Cities
- Future Networks
- Software Performance & Correctness
Digital Content Technology

Producing ground-breaking digital content innovations

Personalisation

• Adaptive composition/authoring
• Information retrieval, just-in-time visualisation
• Multimodal analysis and interaction, HCI

Knowledge-based modelling & system adaptation

• Semantic web and linked data
• Data curation and management
• Interoperability and federation

Content analytics

• Stylistics, politeness, events and meaning

Sample application areas

• Digital humanities, technology-enhanced learning, health & wellness

LEARNOVATE CENTRE

Engaging Content
Engaging People
Future Networks

Leading the national research, development and innovation activity in future networks, communications and the Internet of Things (IoT)

Future Wireless

- Small cell/C-Ran/WiFi/Supercell
- Dynamic resource management/sharing
- Multipath, low latency transport
- 5G, Internet of Things

Optical Networks

- Software defined networking
- Optical/wireless convergence

Security & Privacy

- PKI, traffic analysis/VPNs

Specialised Networks

- Content-centric, data centre, DTN, sensor
Graphics, Vision, Visualisation

Innovative research in computer graphics, computer vision and all aspects of visual computing

Character Animation

- Finger, facial, causality between characters
- Appealing characters, avoid “uncanny valley”

Real-Time Rendering & Animation

- Crowd & urban simulation
- Real-time 3D scientific visualisation

Image Processing

- 3D rendering from 2D images
- Colour transfer/mapping in videos

Computer Vision

- Gesture recognition, collision avoidance – SureWash, WingWatch

Computer Graphics/Vision Hardware, Illumination & Display Systems
Future Cities

Leading the application of sensors, communication and analytical technological solutions to sustainability concerns in urban infrastructure such as energy, water, waste management and transportation systems

Urban-scale Sensing

- Wireless sensor networks
- Participatory sensing

Middleware Architectures

- Autonomic management
- Model-free learning algorithms

Smart Services

- Intelligent transport (traffic control, driver assistance)
- Community microgrid management
Statistics

Applying the principles of statistical inference and decision theory to applications in a wide variety of areas of science and engineering

Bayesian Inference

- Time-series analysis, streaming data
- Robust statistics, inverse regression
- Scalable algorithms (Big Bayes)

Decision Theory & Optimisation

- Adaptive utility, sequential decision-making
- Lightweight and private optimisation

Applications

- Ecology, astronomy
- Vision/video
- Social networks, risk & reliability
Software Performance & Correctness

Designing algorithms, developing graphics cards, static and dynamics analysis

Software Performance

• Low-energy computing
• Compilers and parallelization for multicore
• Algorithm design for parallelism & locality

Foundations of Computation

• Programming abstractions for parallel computing
• Proof techniques for software correctness
• Verification & static analysis for critical systems

Applications

• Smart embedded, mobile and space systems
• Safety-critical medical systems
Student Internships

Computer Science (BACS/MCS) / Computer Engineering (BAI/MAI)
Electronic and Computer Engineering (BAI/MAI)

Features and Benefits

• Access to skilled students who have completed 3.5 years of computer studies.
• Internships of up to seven months paid
• A pool of potential future employees.
• The chance to connect with active researchers in Computer Science.
• An opportunity to cultivate in-house managerial and supervisory skills by mentoring interns.
Student Internship Industry Partners

Ref: https://www.scss.tcd.ie/internships/opportunities.php for this years opportunities
With demand for training ICT professionals at an all time high – Trinity is seeing an increase in Student numbers for both undergraduate and postgraduate courses.

With both full time and part time research oriented options available for postgraduate study, Trinity runs a very successful continuing professional development programme to meet the demands of Industry.

**School of Computer Sciences and Statistics**

MSc in Computer Science (Networks and Distributed Systems)

MSc in Computer Science (Mobile and Ubiquitous Computing)

MSc in Computer Science (Interactive Entertainment Technology)

MSc in Interactive Digital Media

MPhil in Creative and Cultural Entrepreneurship

MSc in Technology and Learning (evenings/weekends)

MSc in Health Informatics (evenings/weekends)

MSc in Management of Information Systems (evening)

Postgraduate Certificate in Statistics (evening)

**School of Engineering**

MPhil in Music and Media Technologies

MSc in Bioengineering

MSc in Engineering (Environmental / Structural and Geotechnical / Transport)

MAI (Ind.) (Masters in Engineering) course

Engineering (by module) (MSc) - Mechanical and Manufacturing Engineering
Supports for Employers:

**Advertise Vacancies**

- Work Experience & Internships
- Tap into Excellent Language Skills Pool

**Recruit Students & Graduates**

- Participate in recruitment fairs
- Take an Information Stand
- Make a presentation
- Use All Opportunities to Advertise

**Raise your Profile**

- Offer Skills Training
- Share Trinity Graduate Stories - Encourage recent recruits to share their story
- Sponsor Events
- Sponsor Projects

Contact: www.tcd.ie/careers
ADAPT

ADAPT Partners are developing ground-breaking innovations to turn the enormous volume of content into digital revenues by enabling unprecedented levels of global engagement between organisations and customers via world-leading research. Leveraging €50 million in new investment, ADAPT research focuses on:

- Analysing media, content and customer interactions to enhance communication, customer engagement and satisfaction
- Enhancing global reach via innovative machine translation of corporate and user-generated content
- Transforming and delivering personalised content to empower customers and companies
- Enabling innovative customer engagement across multimodal media (speech, video, image, text) to enhance the user experience
- Extracting actionable knowledge from all forms of digital content and user interactions

Contact: www.adaptcentre.ie
Extreme Sharing

Extreme sharing of bandwidth, base stations, sensors, processing power, and storage creates the illusion of infinite resources. And it does it in a sustainable, cost-effective way. This, in turn, supports cloud-based approaches to resource sharing.

How can networks share in this way? By employing sophisticated management so they can allocate different resources on an end-to-end basis. This will help them meet differing management goals. It will also mean they will understand the trade-offs between different resources used at different network locations. And be able to exploit them.

Open Communications

Right now, it’s challenging for operators to get the value they need from networks to justify large investment. What’s the solution? We believe network resources can be made available to an unlimited number of service providers.

Think of them as a pool of resources open to contributions from corporations and crowdsourced from individuals. In this approach, operators are compensated by a wide range of service providers who get value from their specific customers. In order to work, it requires open interfaces, open protocols and transparent interactions between stakeholders. But it also requires something more — extreme sharing. This is a significant focus of our research work.

Contact: www.connectcentre.ie
Learnovate Centre is a Trinity hosted research centre of excellence for innovation in learning technologies. The research is focused on investigating areas of interest to the 50+ members involved in Learning and Educational activities.

The membership of Learnovate is a rich ecosystem of innovation from High Potential Start-ups to Multi-national Corporations. The common strand through this membership is a passion to improve learning. The software sector tends to engage in two different ways with Learnovate, (1) leveraging research outputs to integrate and innovate their offering, (2) as a consumer of the innovations for their own training and learning needs.

The Learnovate Centre has four initial research themes selected by the Irish eLearning industry for their common interest across their core markets: corporate learning, schools (K-12), higher education and lifelong learning.

- Social and Informal Learning
- Mobile and Collaborative Learning
- Immersive Learning
- Metrics and Assessment

New project proposals are always welcome from organisations that require technology-enabled learning solutions to existing or future product challenges.

Contact: www.learnovatecentre.org/
AMBER’s expertise and research in the ICT arena is centred on investigation of new materials that will enable the development of nanoscale electronic devices with better functionality for sensors, data processing and memory applications, to enable next-generation consumer and business electronics. Example areas of research include

- Investigations of 2-dimensional materials, thin film stacks, and nanowire networks for novel material and device applications such as sensors, memory storage, silicon chips and novel lasers.
- Assess new approaches for the reduction of costs associated with miniaturisation of nanoscale electronic devices using novel techniques and processes such as directed self-assembly and nanoimprint.
- High-throughput screening and state-of-the-art processes for high quality, large scale materials production.
- Advanced Microscopy for materials characterisation using world class infrastructure including Aberration Corrected TEM and He-Ion Microscope capability
- In-house computational capabilities for large-scale materials screening
- Material patterning by various techniques including lithography and directed self-assembly.

AMBER Engages with all ICT industry types, from small to medium enterprises to multinationals. Current partners in the ICT sector are Intel, Western Digital, Eblana Photonics, Bell Labs.

Contact: www.ambercentre.ie