Scottish Universities Life Sciences Alliance (SULSA)

General Information:

1. SULSA1 was founded in 2008 with a £27M investment from the SFC (with support from partner universities: Aberdeen, Dundee, Edinburgh, Glasgow, Strathclyde and St Andrews).
2. SULSA2 was funded in 2015 with a £600k investment from the SFC, with matched funding from each partner university: Aberdeen, Dundee, Edinburgh, Glasgow, Strathclyde and St Andrews (giving a total budget of £1.2M).
3. SULSA has since increased its membership to ten partners, and now has four Associate Member universities (who also provide a funding contribution – 40% of full members): Heriot Watt, Napier, University of the West of Scotland, and Robert Gordon University. There is one membership application pending (Glasgow Caledonian).
4. Scottish Life Sciences (biosciences) research income has remained steady at approx. 20% of biosciences research income (of total UK) in the past 10 years. Compared to 8.3% of UK population this is an excellent outcome.
5. Scottish Universities performed better than the average UK university in REF2014. Compared to 2008, research outputs for SULSA Universities in Unit of Assessment 5, Biological Sciences, were more than for average UK universities; in REF2014 outputs increased by 52% and 42% respectively for 4* research, and by 25% and 24% respectively for 3* research (see Table 1 and 1.2).
6. The SULSA remit covers approximately 10,000+ life sciences researchers.
7. SULSA (1&2) has leveraged over £425M for the Scottish Life Sciences.

SULSA1 Summary and Highlights

I. SULSA1 was an initial investment of £27M between 2008-2014, hosted Edinburgh with Mike Tyers before moving to Dundee with Andrew Hopkins as Director and Den Barrault as Exec Director (1 FTE), with support of FTE staff.
II. SULSA1 leveraged over £400M for Scottish Life Sciences
III. Funded 22 academic appointments (8 Professors, 7 Lecturers, 7 Readers, see Table 2). Of the 22 academic appointments, 15 remain in Scotland. Of the 14 lecturer/reader positions, 9 have been promoted to Reader or Professor.
IV. Funded 90 studentships (see MSD letter).
V. Funded 24 Technologists.
VI. Delivered 4 new facilities (PET facility, Aberdeen; Scottish Metabolomics – now Glasgow Polyomics, Glasgow; European Lead Factory (ELF), Dundee; National Phenotypic Screening Centre (NPSC), Dundee, Edinburgh and Oxford). See Table 3.
VII. Enhanced a further 20 facilities including the DDU, Scottish Biologics Facility. See Table 3.
VIII. By funding the Scottish Metabolomics Facility, SULSA was instrumental in establishing metabolomics in Scotland.

IX. Delivered training programmes, including LEADERS for researchers making the transition to independence, BioSKAPE (industry PhD studentships, industry exchanges and masterclasses), supporting and coordinating BBSRC PIPs placements.
X. Of those 27 in the LEADERS programme 15 now have independent positions, 2 moved into industry, 1 moved into research support and 17 are still in Scotland. The current position of 2 are unknown. See Table 4.
XI. Secured industry placements via the BioSKAPE project. See Table 5.
XII. Drove synthetic biology (a trans-disciplinary field that seeks to redesign existing biological systems to perform useful functions and to model and construct biological components, functions and organisms that do not exist in Nature) in Scotland, concentrated in Edinburgh at the Centre for Synthetic and Systems Biology and UK Centre for Mammalian Synthetic Biology. Edinburgh is also home to the Edinburgh Genome Foundry, one of the largest and most fully automated genome assembly facilities in Europe. In SULSA2, SULSA funded some important research into the outstanding capability gaps in this fast-moving area of research. This has helped Edinburgh University define areas for future focus for both academic research and industrial translation and ensure we can generate the economic and social benefits of synthetic biology.
XIII. Scotland has a wealth of activity in this area, concentrated in Edinburgh at the Centre for Synthetic and Systems Biology and UK Centre for Mammalian Synthetic Biology. Edinburgh is also home to the Edinburgh Genome Foundry, one of the largest and most fully automated genome assembly facilities in Europe.
XIV. Promoted international collaborations with pump-priming funding between scientists in Hong Kong and Scottish Universities in the fields of Life Sciences and Energy (partnership with ETP pool).
XV. Delivered three large public-private research initiatives (ELF, NPSC, MSD-SLSF).
XVI. Approximately 10% of SULSA1 funds were ringfenced for interdisciplinary research projects
XVII. Funded 21 iGEM teams over seven years, with Edinburgh and Dundee reaching the European Finals in Boston.

SULSA2 Summary and Highlights

I. SULSA2 is a grant of £600k from SFC, matched by partner unis, now hosted in Glasgow with Mike Barrett as Director, Allison Jackson as Exec. Director (0.5 FTE) and Jill Inkster as Operations Officer (1 FTE). SULSA2 runs from 2015-2021, although staffing appointments were not made until late 2016/early 2017 due to transfer from Dundee to Glasgow.
II. SULSA 2 has leveraged over £25M to date for the Scottish Life Sciences research sector.
III. Supported four key facilities: newly established Scottish Centre for Macromolecular Imaging (CryoEM facility in Glasgow), Scottish High-Field NMR facility (Edinburgh). Plus ongoing support for ELF and NPSC.
IV. Driven the Scottish AMR agenda through a large conference with attendees from research, NHS, industry, government and policymakers. This was followed with a seed-funding call, plus a coordinated submission for the House of Commons Health and Social Care Select Committee: Antimicrobial Resistance Strategy inquiry, a SULSA

report *War on Germs,* a comic on AMR, and shortlisting for the 2018 Public Health England Antibiotic Guardian Award.

V. Launched a new ECR skills development programme which includes training for fellowship writing, entrepreneurship, project management skills, resilience, leadership skills.

VI. Supporting ECRs with a SULSA Prize for Best ECR in Life Sciences to facilitate promotion of our best and brightest researchers across Scotland (open for entries at the moment).

VII. Is planning a 2019 Conference – *Disruptive Technologies in the Life Sciences – from Single Molecules to Systems.*

VIII. Supported dementia research, from involvement in setting up the UK Dementia Research Institute, Edinburgh Hub, and has facilitated this via co-funding a seed-funding call with Edinburgh University.

IX. Supported scoping for synthetic biology (see XII above) and GENBIOME, a plant facility. Is currently scoping requirements for an Animal Tissue Bank.

X. SULSA2 is playing more a role in policy matters: Submitted evidence on behalf of the Scottish Life Sciences for the BBSRC strategy, the Life Sciences Industrial Strategy and the Science and Technology Committee Brexit Science and Innovation Enquiry 2018.

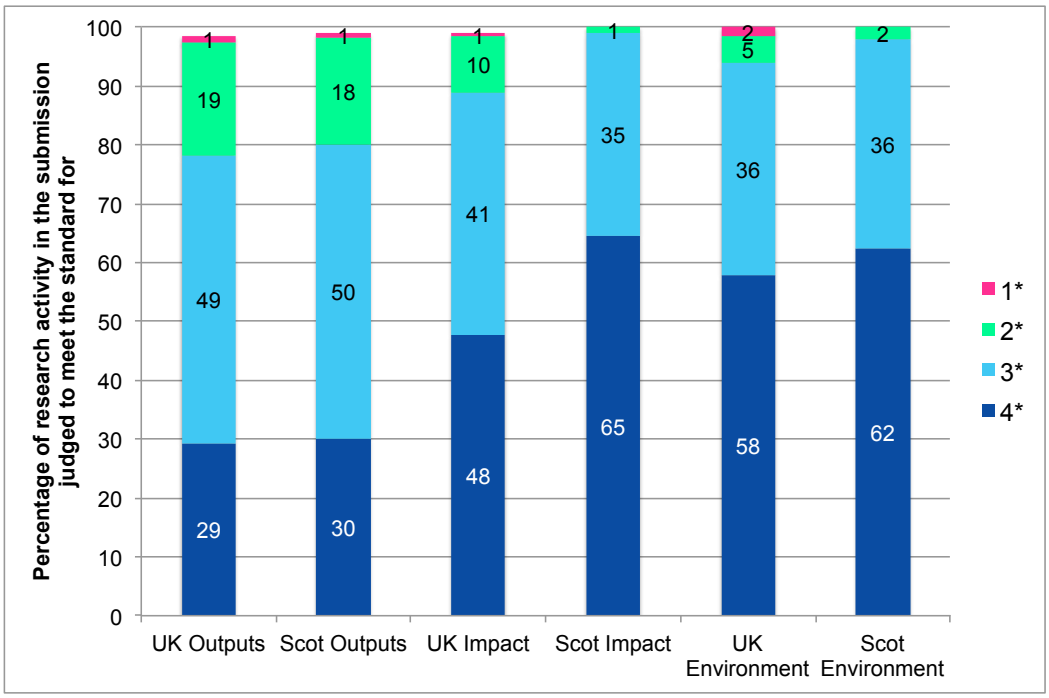
XI. Wrote a SULSA reports *The UK and Scotland's Changing Funding Landscape*, and *Engaging with Parliament*. SULSA representatives attend the Cross-Party Group on Life Sciences, and the Executive Director is on the Life Sciences Industry Leadership Group – Business Environment working group. SULSA also contributed to the Skills Investment Plan in Chemical and Life Sciences.

XII. Supported many Scottish networks including: the Scottish Metabolomics Network, Glasgow Microbiology Collective, NextGenBug, Glasgow Imaging Network, and the Scottish DNA Replication Network.

XIII. Developing international links with China and India via First Minister's visits.

XIV. SULSA works closely with SUPA and SINPASE, and together hold a grant to leverage Industry-Academic Optical Imaging Projects.

Table 1 and 1.2: Research Activity



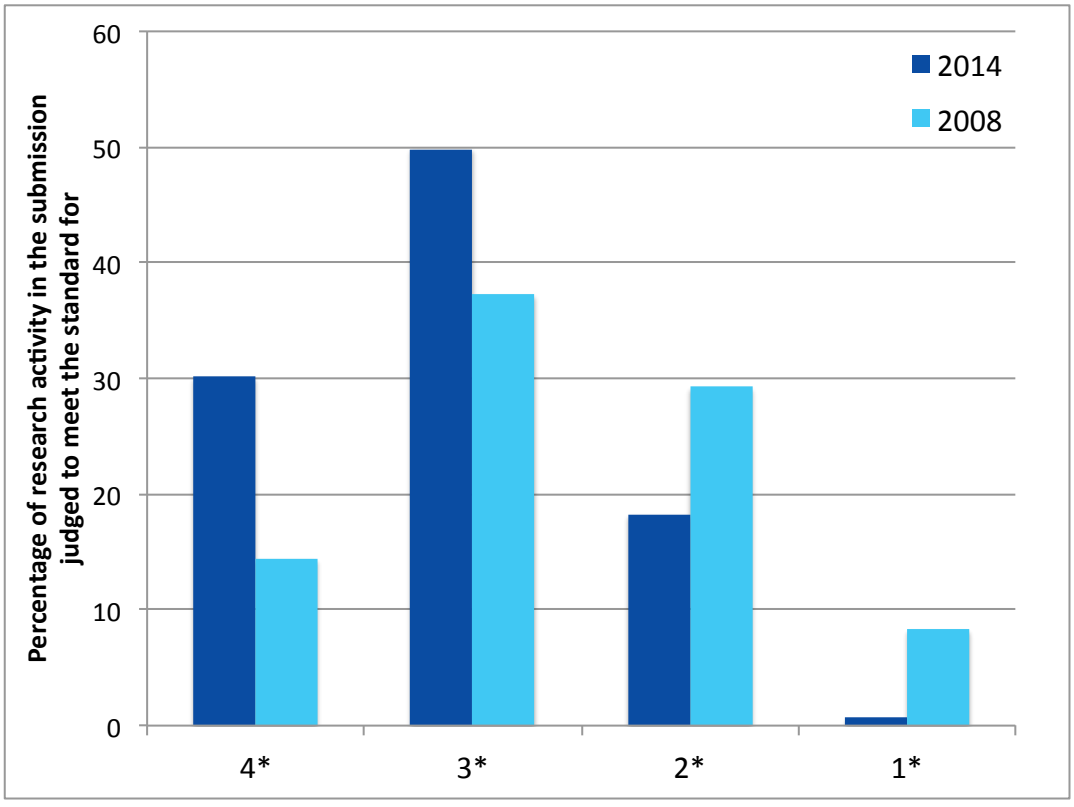


Table 2. SULSA Posts

SULSA Posts								
Title	**Forename**	**Surname**	**Institution**	**Hired As**	**Current Position**	**promoted**	**In Scotland?**	**Current Post**
Dr	Oliver	Ebenhoh	Aberdeen	Reader	Junior Professor	y	N	Junior Professor, Heinrich-Heine-Universität Düsseldorf, Germany
Prof	Tibor	Harkany	Aberdeen	Chair	Professor	n/a	N	University Professor and Head of Department, Center for Brain Research, Medical University of Vienna, Vienna, Austria
Dr	Carmen (Mamen)	Romano	Aberdeen	Lecturer	Reader	y	Y	Promoted to Reader, Still at Aberdeen
Dr	Yashushi	Saka	Aberdeen	Lecturer	Honorary Senior Lecturer	y	Unknown	Honorary Senior Lecturer at Aberdeen - not sure if has other post somewhere
Dr	Ekkehard	Ullner	Aberdeen	Lecturer	Lecturer	n/a	Y	Lecturer, Aberdeen
Dr	Mikael	Björklund	Dundee	Lecturer	Associate Professor	y	N	Associate Professor, Zhejiang University, China
Prof	Andrew	Hopkins	Dundee	Chair	Chair of Medicinal Informatics	n/a	Y	Same
Prof	Manfred	Auer	Edinburgh	Chair	Professor of Translational Biology	n/aa	Y	Same
Dr	Ramon	Grima	Edinburgh	Lecturer	Reader	y	Y	Promoted to Reader 2013, still at Edinburgh
Dr	Heidrun	Interthal	Edinburgh	Lecturer	Lecturer	n	Y	Same
Dr	Adele	Marston	Edinburgh	Lecturer	Chair	y	Y	Still at Edinburgh, promoted to Chair
Prof	Ferenc	Nagy	Edinburgh	Chair	Chair	n/a	Y	Same
Prof	Peter	Swain	Edinburgh	Chair	Chair	n/a	Y	Same
Prof	Mike	Tyers	Edinburgh	Chair	Chair	n/a	N	Universitie de Montreal
Prof	Rainer	Breitling	Glasgow	Chair	Chair	n/a	N	University of Manchester, England
Prof	Neil	Bulleid	Glasgow	Chair	Chair	n/a	Y	Still in post, now also Director of Institute of Molcular, Cell and Systems Biology
Dr	Markus	Meissner	Glasgow	Reader	Professor	y	N	Professor in 2013, now Chair for Experimental Parasitology at Ludwig-Maximilians Universität München, Germany
Dr	Stuart	MacNeill	St Andrews	Reader	Reader	n	Y	Same
Dr	John	Mitchell	St Andrews	Reader	Reader	n	Y	Same
Dr	Marie	Boyd	Strathclyde	Reader	Reader	n	Y	Same
Dr	Gunter	Mayer	Strathclyde	Reader	Professor	y	N	Professor now at Universität Bonn, Bonn, Germany
Dr	Luke	Chamberlain	Strathclyde	Reader	Professor	y	Y	Promoted to Professor, SIPBS, Strathclyde

Table 3. SULSA Funded and Supported Facilities

Facility	University	Update
Positron Emission Tomography (PET) Facility	Aberdeen	Facility still running and in use.
Scottish Metabolomics Facility (ScotMet)	Glasgow / Strath	The Scottish Metabolomics Facility has been incorporated into Glasgow Polyomics, an omics research facility with an annual income of £1M. The facility has been fully self-sustaining for 3 years. ScotMet was instrumental in establishing metabolomics in Scotland, and the Scottish Metabolomics Network has also arisen from this investment.
National Phenotypic Screening Centre	Dundee	The NPSC's PDi phenomics assay portfolio now includes 11 assays that are relevant to industry. In terms of finding the facility has gained the following in the last year: - IMI ESCULAB (follow on from ELF) : Scotland has gained : £1.1M for UoD + £6.5M for Bioascent [part of a €19M Euro EU-funded project] - Bill and Melinda Gates Foundation grant: £716,000 The facility is currently working on a large UKRI/InnovateUK ISCF Wave 3 proposal, a BBSRC sLoLA and smaller commercial contracts. Links established include Genus, Oxstem, MD Catapult, Penumagen, Definigen and the international collaboration with ESCULAB.
European Lead Factory	Dundee	Facility refunded by IMI ESCULAB project (with NPSC). IMI ESCULAB (follow on from ELF) : Scotland has gained : £1.1M for UoD + £6.5M for Bioascent [part of a €19M Euro EU-funded project].
CLIP-Live cell imaging facility	Aberdeen	The LSM710 has now been superseded by the new Wellcome trust funded LSM880 Airyscan fast confocal for live cell imaging which is greatly superior. We are still running the LSM710 for normal fixed tissue imaging and paying an annual service contract fee, but expect over the next few years to totally transition to the LSM 880 only.
Natural Products and Biologics Library Facility	Aberdeen	The library currently contains 350 pure compounds. Compounds used in screening were replaced by other new compounds. This process is continuous however it stopped recently because of the shortage in funding. Several collaborations including 11 academics from University of Aberdeen, 6 external academics and two industrial partners have been established to test the compounds in different validated biological screens. These activities resulted in a total of 11 publications to date several of which in high impact journals e.g. Nature Chemistry. The SULSA funding and the success above have led to a successful grant income from the EU under its FP7 programme which has been completed. As an outcome, two families of molecules have undergone animal trials in Alzheimer's disease and Epilepsy showing excellent activity and drug-likeness. Both are being patented. Further funding is currently being sought to maintain the library.

Scottish Biologics Facility	Aberdeen	The Scottish Biologics Facility (SBF) will celebrate its 10th year in 2019 and it continues to deliver on its original objectives: 1) the generation of biologics tools for translational biology (and not just translational medicine)- and (2) to provide a training environment for visitors to learn the very latest biologics and antibody engineering techniques (visitors come from across the globe). The facility has recently purchased another naïve human library of binders and currently maintains over 10 trillion different biologics clones (antibody fragments, domain binders and peptides) and has the capability to develop binders through a range of reagent, diagnostic and therapeutic formats. The facility continues to have close links to SULSA University partners (eg SULSA funded AMR diagnostics/biosensor project with Edinburgh University) but has broadened its reach to include academic partners outside of the original SULSA Universities (eg CF project with Nottingham University). The SBF has also continued its long standing commitment to commercialisation spinning-out the award winning biologics drug discovery company Elasmogen in 2016 (after securing £2 M pre-commercialisation funding from SE and BBSRC) and is currently working with the Aberdeen fungal group and expects to include assets within a second spin-out MycoBiologics Ltd in 2020 (£500 k funding from SE). The SBF has also worked with a series of industry partners. The most significant is TauRx Ltd who invested in the last 4 years alone approximately £1.5 M into diagnostic and immuno-therapeutic research. Our latest project is the possible creation of a “new” SBF in India with the team invited to visit a number of leading research institutes in March 2019.
Transgenics Facility	Aberdeen	Facility no longer in operation.
Data Analysis Group	Dundee	We had funding from SULSA for one position from 2009-2012 which helped build critical mass for what we now call the "Data Analysis Group (DAG)" and was supported by Wellcome Trust, BBSRC and MRC funding since first established in 2009. The group certainly continues, has core support from the School of Life Sciences and is now headed by Dr James Abbott who I have copied on this email. The DAG has continued to flourish as a pool of experts for collaboration on data analysis/bioinformatics and training in these areas. The group website (dag.compbio.dundee.ac.uk) includes a list of publications that have resulted from some of those collaborations as well as other information. Members of the group have contributed to several highly cited papers, including analyses of RNA-seq methodology: Schurch N.J.; Schofield P.; Gierliński M.; Cole C.; Sherstnev A.; Singh V.; Wrobel N.; Gharbi K.; Simpson G.G.; Owen-Hughes T.; Blaxter M.; Barton G.J. How many biological replicates are needed in an RNA-seq experiment and which differential expression tool should you use? 2016 RNA 22:839-851 (175 citations). and the application of machine learning in protein structure prediction: Drozdetskiy A.; Cole C.; Procter J.; Barton G.J. JPred4: a protein

		secondary structure prediction server 2015 Nucleic Acids Research gkv332 (528 citations).
Drug Discovery Unit (DDU)	Dundee	The University of Dundee Drug Discovery Unit is a fully operational, fully integrated drug discovery group working across multiple disease areas. We collaborate with partners to translate world-class biology research into novel drug targets and candidate drugs to address unmet medical need across our two areas of activity, Diseases of the Developing World and Innovative Targets Portfolio. Building on success in these areas we are also developing an Antibacterial Drug Discovery Accelerator.
SULSA OMX	Dundee	An OMX "v2" was installed in Dundee in late 2008, with funding from SULSA and has been available as a resource for Scottish, UK and European life scientists since early 2009. The Dundee OMX has received over 80 visits from research groups in the UK and Europe and contributed to >100 scientific projects, and several major publications. In 2012, the system was featured as a Euro-BioImaging Proof of Concept platform, with scientists visiting from all over Europe to perform experiments on the system. In 2013, with funding from the UK MRC, BBSRC and EPSRC (via a Next Gen Optical Microscopy Award), the Dundee OMX was upgraded to a v4 "Blaze" version, which enabled 3D SIM in time- lapse mode. Since this upgrade the system has continued to be a national resource, contributing to several more major publications. The success of the OMX system played a large part in leveraging funding for a new Zeiss Airyscan microscope. The capabilities of the OMX are now largely matched by the Zeiss AiryScan microscope, and the OMX will likely be retired now that the external award supporting it has ended.
Cryo-EM Facility	Edinburgh	Tecnai F20 instrument is incorporated into SCMI as a feeder machine for Edinburgh and external researchers who wish to generate preliminary data before visiting a high-end microscope such as the SCMI.
The Gene Pool	Edinburgh	GenePool, supported by SULSA through initially a core bioinformatics staff position and latterly support for Scotland wide research meetings and workshops, has grown to become Edinburgh Genomics, one of the UK's largest genomics facilities with a staff of over 40 and over £7M of turnover per year. Mainly serving the Scottish university academic sector, the facility offers support throughout the lifetime of genomics projects, from initial design to analysis and publication. In the period since the initial SULSA support we have merged with the ARK-Genomics facility (Roslin Institute), initiated a whole genome sequencing "clinical" facility (with £7 M of capital investment in sequencing and informatics) and build unrivalled expertise in large scale (thousands of genomes) and bespoke (single analyses requiring dedicated sample preparation and unique bioinformatics) projects.
Centre for Translational and	Edinburgh	Facility still running and in use.

Chemical Biology (CTCB)		
Sir Henry Wellcome Functional Genomics Facility	Glasgow	The SHWFGF has been incorportated into Glasgow Polyomics, an omics research facility. The NGS lab completes over 100 projects per year with an income of £0.5M, and specialises in bespoke sequencing projects.
IVIS Biophotonic Imager Facility	Glasgow	Has been incorporated into the Institute of Infection, Immunity and Inflammation Imaging Platform.
High Content Cell Screening Platform	Glasgow	Has been incorporated into the Institute of Infection, Immunity and Inflammation Imaging Platform.
Nanofabrication	Glasgow	Facility still running and in use.
Image Data Analysis	Glasgow	Has been incorporated into the Institute of Infection, Immunity and Inflammation Imaging Platform.
Bioworkstation	St Andrews	With regard to the Bioworkstation, this has been developed even further into now a bespoke super-resolution microscope, but also much of the technology has been patented and successfully licenced to M2 Life.
Scottish Structural Proteomics Facility (SSPF)	St Andrews	The SSPF equipment has been subsumed into the wider efforts into structural biology in St Andrews but also beyond, as Prof J Naismith is now Director of the Research Facilities at the Diamond facility.
Strathclyde Innovations in Drug Research (SIDR)	Strathclyde	The natural products collection was moved from Strathclyde to Robert Gordon.
Drug Discovery Portal	Strathclyde	Facility no longer in operation.

Table 4. SULSA Leaders – Position Update

SULSA Leaders - Position Update			
First Name	**Surname**	**University**	**Where Are They Now**
Victoria	McGuire	Dundee	
Laura	Hobley	Dundee	Research Fellow at Queen's University Belfast then Assistant Professor of Microbiology at University of Nottingham
Tom	Barr	Glasgow	Unknown
Richard	Reeve	Glasgow	Reader at University of Glasgow
Karl	Burgess	Glasgow	Senior Lecturer at University of Glasgow - moving to University of Edinburgh
Alexandre	Surget	Glasgow	Associate Professor, Université Francois Rabelais & INSERM
Elmarie	Myburgh	Glasgow	Assistant Professor in Immunology and Infection at the University of York
Tiziana	Lembo	Glasgow	Senior Lecturer and Associate at the University of Glasgow
Konrad	Lohse	Edinburgh	Research Fellow at the University of Edinburgh
Pedro	Vale	Edinburgh	Chancellor's Fellow at the University of Edinburgh
Le	Yu	Edinburgh	Beijing as Lead Data Scientist at GE Global Research and now Chief Technology Officer at Co-founded Organisation
Melissa	Ward	Edinburgh	Unknown
Ida	Bailey	St Andrews	Senior Ecologist at Natural Power, Stirling
Robert	Schick	St Andrews	MASTS Research Fellow at University of St Andrews
Helder	Ferreira	St Andrews	Lecturer at University of St Andrews
Katarina	Oracova	St Andrews	Lecturer at University of Glasgow
Dimitrios	Lamprou	Strathclyde	Reader in Pharmaceutical Engineering, Queens University Belfast
Kirsty	Ross	Strathclyde	Outreach Officer for OPTIMA CDT & TIC, University of Strathclyde
Phillipp	Seib	Strathclyde	Senior Lecturer at the University of Strathclyde
Nahoum	Anthony	Strathclyde	Senior Research Associate at University of Newcastle
Margaret	Cunningham	Strathclyde	Chancellor's Research Fellow at the University of Strathclyde
Wael	Houssen	Aberdeen	Senior Research Fellow at the University of Aberdeen
Bing	Lang	Aberdeen	Senior Research Fellow at the University of Aberdeen
Chih-Chung	Tseng	Aberdeen	Research Fellow at the University of Aberdeen
Tim	Rassmussen	Aberdeen	Research Scientist at Universitat Wurzburg, Germany
Lionel	Broche	Aberdeen	Research Assistant at the University of Aberdeen
Louise	Walker	Aberdeen	Research Fellow at the University of Aberdeen

Table 5. SULSA BioSKAPE Industry Placements

BioSkape Industry Placements			
Name	**University**	**Placement 2010-11**	**Where Are They Now**
Rebekah Morgan	Aberdeen	**ImmunoSolv**	Unknown
Aleks Toloczko	Aberdeen	**Controlled Therapeutics**	Unknown
Catherine Roger	Glasgow	**Novabiotics**	Unknown
Lee McMenamin	Aberdeen	**ImmunoSolv Aberdeen**	Dentist in Dunfermline
Monika Bednarczyk	Aberdeen	**Pfizer, Aberdeen**	Medical Student, University of Mainz, Germany
Katherine Johnson	Aberdeen	**Pfizer, Aberdeen**	Research Associate, Newcastle University
Dagmara Lewandowska	Aberdeen	**Pfizer, Aberdeen**	Application Specialist in Genomics, Tecan, Mannedoft
Nick Birse	Dundee	**CXR BioSciences**	PhD Student, Queen's University Belfast
Michael Stevens	Dundee	**CXR BioSciences**	Unknown
Nayla Jawaid	Glasgow	**PPD, Lanarkshire**	Optimization Specialist, PPD
Craig Brown	Glasgow	**PPD, Lanarkshire**	Senior Clinical Research Associate, IQVIA
Eirini Lampraki	Aberdeen	**Scientific Services, Glasgow**	Postdoctoral Researcher, University of Glasgow
Valters Stelmanis	Glasgow	**Roslin Cells Ltd, Edinburgh**	Regulatory Affairs Associate, Unilyn Pty Ltd, Sydney
Irena Klepacova	Aberdeen	**Roslin Cells Ltd, Edinburgh**	Unknown
Ben Ridder	Aberdeen	**Axis Shield**	Account Manager, ZEISS Microscopy
Jonathan Stevenson	Aberdeen	**Glasgow School of Sport**	Director, Resilience PPE, Glasgow

Name	**University**	**PhD 2011 Students**	**Where Are They Now**
Gemma Mudd	Edinburgh (SBS)	Pfizer PGRD	Senior Scientist, Bicycle Therpeutics
Cheryl Gibbons	Edinburgh (CMVM)	Pfizer	Epidemiologist, NHS, Glasgow
Mohammed AL QARAGHULI	Aberdeen	Grampian BioConsultants ltd	Research Associate, University of Strathclyde
Sonia Watson	Aberdeen	Eli Lilly & Company	Head of Community Engagement for North of Scotland, Founders4Schools
Nicola Drummond	Edinburgh (SBS)	Antoxis Ltd	Postdoctoral Researcher, The University of Edinburgh
Shane Smith	Aberdeen	Novabiotics ltd	Quality Control Manager, BrewDog, Aberdeen
Helena Goncalves	Strathclyde	Helperby Theraputics	Unknown
Lauren Webster	Dundee	Cellzome	Research Chemist, The Unversity of Dundee
Thomas Hardwood	Strathclyde	M Squared Lasers Ltd	
Alexander Ferguson McVey	Edinburgh (CMVM)	M Squared Lasers Ltd	Postdoctoral Researcher, The University of Edinburgh