OpenAIR@RGU

The Open Access Institutional Repository
at Robert Gordon University

http://openair.rgu.ac.uk

This is an author produced version of a paper published in

c4di Project Evaluation Report (ISBN 9781907349065)

This version may not include final proof corrections and does not include published layout or pagination.

Citation Details

Citation for the version of the work held in 'OpenAIR@RGU':

MALINS, J., 2012. c4di Project Evaluation Report. Available from *OpenAIR@RGU*. [online]. Available from: http://openair.rgu.ac.uk

Citation for the publisher's version:

MALINS, J., 2012. c4di Project Evaluation Report. Aberdeen: Robert Gordon University.

c4di **project evaluation** report

c4di
Centre for Design & Innovation
Project Evaluation

Prepared by Professor Julian Malins Project Director May 2012

The purpose of this review is to evaluate the work of the Centre for Design and Innovation, an ERDF and SEEKIT funded project established by the Robert Gordon University in October 2008. The project aimed to assist SMEs in Scotland to become more competitive, increase profits, and improve efficiency through the application of design thinking.

Contents

Foreword

The development of c4di was prescient. Riding on the back of the influential Cox Review and based on the evidential need to support innovation in SMEs, c4di presaged the rise of design as a problem-solving tool capable of transforming individuals, companies and organisations. Over the three years of its life as a project the demand for policies and actions at the national, European and global levels with design and innovation at the fore, multiplied, increasing appreciation of the vital role played by design in promoting economic growth, especially in the SME sector. Thus, c4di became part of a narrative arc that included design thinking, design strategy, service design and design management. c4di was a sensible and provident project. How?

As well as exceeding its targets, c4di engaged with a broad constituency from food and drink to tourism to oil-related business sectors, developed a novel range of transferable design methods and created useful case-studies, harvesting knowledge in terms of lessons learned for dissemination to business and academic audiences. Importantly, c4di made strides in assessing the impact of design, which is now a priority at the UK level. At the same time, a wide network was developed and new partnerships forged. c4di also learned (and this is a lesson for academia generally) that its target group - an SME sector evermore constrained by lack of scale and finance – would inevitably gravitate to the support provider whose services are cost-free.

This is not to vitiate the role for universities in helping to improve the SME sector's performance by using the tools of research to illuminate the link between design and innovation – if anything the need is even greater and the response more competitive. The recent interest in design thinking has spawned a rash of design-led initiatives ostensibly focussed on business transformation. To avoid the criticism of displacement, however, a university must manage the judicious relationship between research and knowledge exchange garnered through real world problem-solving and industry linkages that do not extend beyond the merely serviceable. c4di has surmounted this by innovating and licensing design-related tools that have been developed and tested across a span of small businesses and which add to the University's CPD offer. For those committed to "Designing Demand", finding cost-effective approaches to working with the hard-pressed but hugely important SME sector remains a pernicious issue. c4di, its research-based tools and processes, is part of the solution.

The current political emphasis on manufacturing, on services and on the "weightless" industries and creativity, and the indivisible connection between design and innovation will not diminish. It is affirmation, if needs be, of a continuing role, in some form, for c4di, whether the future is in partnership with a cognate consultancy or part of SFC's proposed Innovation Centres. Posing the question - where will future jobs and growth come from? - should be sufficient to concentrate minds.

Stuart MacDonald OBE
Emeritus Professor, Gray's School of Art

Acknowledgements

Executive Summary

The purpose of this review is to evaluate the work of the center for Design and Innovation, an ERDF and SEEKIT funded project established by the Robert Gordon University in October 2008. The project aimed to assist SMEs in Scotland to become more competitive, increase profits, and improve efficiency through the application of design thinking.
This review sets out the aims and objectives of the original project, describes the methodological approach adopted by the project team and assesses the effectiveness and impact of the project.

Key findings
• The methodological approach adopted by the project was based on design thinking, which was helpful in encouraging companies to adopt a shift in the way in which they perceived their customer's needs.

• It was found that establishing a common purpose amongst stakeholders was an essential starting point and that using visual imagery and key words, as part of group activities was a useful method for establishing the core values that represented the company and could be used as criteria for making any subsequent decisions. Workshops using a play/game metaphor helped companies to overcome barriers to creative thinking.

• Short introductions to DT were found be useful to stimulate new ideas. The 'Byte Size' taster workshops were very popular, allowing large number of companies to become familiar with the concept of Service Design Thinking. One to two day workshops with individual companies focused on their own issues produced more significant impacts, the most important of which was in the companies approach to innovative thinking. This cultural shift is difficult to measure other than anecdotally but potentially has the most lasting impact making future innovations more likely.

• Many SMEs are unwilling to invest in innovation particularly during a recession. Business support agencies have been relatively slow to acknowledge the value of design as a driver of innovation despite the evident success of initiatives like the Design Council's Designing Demand programme. One reason for this may be the lack of quantitative data to justify an appropriate return on investment and the uncertain time scale for seeing results. It may also be difficult to directly attribute improvements in innovation to a particular design intervention.

Overall conclusion
• The argument for the value of design as a driver for innovation has been clearly made and this is now embedded in SE and TSB and recognised as an important way forward. There is a tension between universities supporting this type of work as opposed to private companies undertaking it, or public sector business support organisations delivering this form of innovation support. Universities have a role to support knowledge exchange however they also have a responsibility to not undercut the market and thus prevent private companies delivering a viable and sustainable service. Organisations such as SE are not funded to support universities and therefore this again can make it difficult to fund the type of work undertaken by c4di.

• It is important that the intervention is well facilitated and the resources are of a high quality. Developing an experiential approach to working with companies is likely to have a lasting impact and is preferable to a one-off PowerPoint presentation no matter how eminent the presenter.

Summary recommendations
• Innovation support would be more valuable if extended over a period of time so that the company is revisited periodically.

• Developing workshop resources that uses a play or game analogy and adopting a lo-fidelity prototyping approach makes it possible for people to engage more readily and innovate earlier.

• Adopting a co-design approach involving key stakeholders is a very useful way of identifying opportunities for design improvement in both product and service delivery.

Glossary

DT- 'Design Thinking', the application of design methods to business.

SEEKIT - A Scottish Government programme aiming to encourage new and improved productive knowledge transfer activities between small to medium sized enterprises (SMEs) and the Scottish public sector science base.

ERDF - European Regional Development Fund

SFC - Scottish Funding Council

SE – Scottish Enterprise

TSB – Technology Strategy Board

Human Centered Design – *'an approach that integrates multidisciplinary expertise towards enhancing human wellbeing and empowering people. It leads to systems, machines, products, services and processes which are physically, perceptually, cognitively and emotionally intuitive to use'* (Brunel University) http://hcdi.brunel.ac.uk/

Co-design – an approach to design that seeks to involve end-users and key-stakeholders in the design process

Business Model Canvas – A technique for visualizing the nine fundamental building blocks of a business - http://www.businessmodelgeneration.com/

SME- Small and Medium Sized Enterprises (less than 250 employees and a turnover of less than or equal to £50 million)

TRIZ - A theory developed by the Soviet inventor Genrich Altshuller as *'the theory of inventive problem solving'.*

TOC – Theory of Constraints, adopts the common idiom *"A chain is no stronger than its weakest link"* as a new management paradigm. This means that processes, organizations, etc., are vulnerable because the weakest person or part can always damage or break them or at least adversely affect the outcome.

RTD – Research, Technology and Development.

Introduction

National and regional economic development policies and strategies across the UK recognize that investment in innovation should be a priority in order to ensure long-term competitiveness. Increasing the levels of innovation in the Scottish economy to move companies up the value chain is crucial for productivity growth and increasing prosperity.

The *Cox Review of Creativity in Business: building on the UK's strengths* was commissioned by the Chancellor of the Exchequer, Gordon Brown and published in 2005 and led by Sir George Cox. The report showed the need to address the creativity, design and innovation agenda in SMEs and set out the steps that the Government and the business, broadcasting and education sectors should take to ensure that UK businesses harness the world-class creative talents that the UK possesses to drive wealth and job creation. One of the key recommendations in the report was for the formation of a number of Design Centres of Excellence: *"Creativity' cannot be viewed as a skill possessed by the gifted few. It needs to pervade the thinking of the whole business, to be embraced within public services, to be embedded in the education system, and to be sought out by those who buy goods and services, whether that means a company, a public-sector body or the consumer. To this end, I recommend the setting up of a network of 'Creativity and Innovation' Centres throughout the UK, with a central hub in London".*

The UK Design Industry Skills Development Plan *High Level Skills for Higher Value* identified that *"one key growth area is in design-led innovation, with some organisations increasingly recognising the value that the design process can bring by connecting technology and innovation with user needs".* It also identified another key area for economic development as being *"supporting firms in their development of strategy by looking at all aspects of the business, identifying markets and customer needs, building brands, revamping mature and failing products and launching new products or services".* The Skills Development Plan' showed that a disjunction between 'designers' and 'managers' could hamper businesses, especially SMEs dependent on consultancies/freelancers, from achieving business benefit from design. Another area of expansion is the use of design as a strategic resource in business.

The use of design as a strategic driver of innovation has been promoted for many years. The Design Council has been running programmes since the 70s to promote the value of design as a way of improving business competitiveness through improved products or services. Their Designing Demand delivery targets to 2010–11 were adopted from recommendations made in the Cox Review. The delivery targets were divided between the different levels of service, and between Programme Introductions, Skills Assists and Business Support Services.

In Scotland, academics and members of strategic organisations came together to form the Design Innovation Scotland group that proposed the formation of a Scottish wide Centre for Design & Innovation. Although this group was unsuccessful in obtaining funding for this proposal the need for this resource was still recognized. Gray's School of Art carried out extensive research in 2004 with both 'user' and design companies, involving postal surveys, interviews and workshops to identify demand for design led support, what services are required and how they should be delivered. This research found a high level of recognition of the importance of design in user companies with three-quarters of in-

terviewees seeing design as playing a strong part in developing the business or improving its performance, while at the same time pointing to management challenges with concepts around design methodology often not figuring in the "corporate consciousness". Through this we identified needs to be addressed in the project, to support SMEs in addressing issues bridging design and management around:

(a) Using design and design skills more strategically.

(b) Making product management more effective; e.g. examining the role of the product manager and how this role can be made more effective.

(c) Communication in new product development.

(d) Improving communication on innovation across organisational boundaries and supply chains.

(e) Improving holistic brand management in SMEs.

(f) Innovation tools and techniques including creative problem solving methods, e.g. TRIZ and TOC (Theory of Constraints).

(g) Understanding and acting on emerging design trends.

In 2008 a funding proposal was submitted to the European Regional Development Fund under Priority 1 that aimed to improve the competitiveness of the Lowlands and Uplands Scotland enterprise base through increased innovation and a fuller use of its RTD base. Funding was agreed for a three-year project, which was to be matched by funding from the Scottish Government's SEEKIT programme and the Robert Gordon University. Total funding awarded was £450,871. Our partners included Scottish Enterprise, Skills Development Scotland, and Aberdeen City Council.

Project aims and objectives
The aim was to bring best design practice to companies, to improve international competitiveness, profitability and efficiency so that these businesses could maximize their design potential in support of the Scottish economy. This project would support SMEs in Design and Innovation Management in order to become more competitive through their application to product and service development. We would establish a research/knowledge transfer network to make available and promote the use of research and leading edge practice and interact with between 60 and 80 SMEs per year leading to significant systems development and new product development. The project objectives were:

(a) To establish a project steering group, appoint a Project Director, Business Manager and specialist staff, beginning the project in October 2008 with the aim of launching the new network and centre in June 2009.

(b) To work closely in collaboration with Scottish Enterprise and their Account Managers, to establish links with relevant SMEs.

(c) To organize events/workshops/seminars, produce papers for distribution directly to enterprises and to enterprise support/sectoral bodies.

(d) To establish and support a practitioners network to enable users and design SMEs to share experiences of managing innovation and design, learn from the practices of others and engage in the development of new approaches.

(e) With the help of Scottish Enterprise we will identify individual enterprises through their participation in workshops and via the practitioners' network. To work with individual enterprises to develop good practice in design and innovation management and take new products to market through this. We will carry out an initial audit of their current practices via one to one consultancy and use of audit/ benchmarking tools i.e. the product with which they want to test new approaches, work with them to strengthen capacity in areas of need identified in the initial audit, identify the value added through new capacity and how this could be integrated/ maintained in their future practices.

(f) To develop a commercialisation strategy in collaboration with Scottish Enterprise offering a range of consultancy services in order to sustain the service beyond the period of the award and mainstream the service within a Centre for Design and Innovation. A full-time Business Manager will be appointed to assist with this process. Over the period of the award we will work with SMEs in N.E. Scotland, and use the experience gained to mainstream on a national basis. The activity of the Centre will focus on priority industries as identified by the Scottish Government; in working with SMEs we will broker relationships with appropriate design companies and provide advice on issues relating to environmental good practice and design for all age groups. The Centre will assist Scottish Enterprise developing a creative network with SMEs across the priority industries in Scotland, running seminar events, undertaking initial design audits and one-to-one consultations. A specialist design team will assist with the development of visualisations and prototypes using rapid prototyping technologies, and give advice on web development working with other Scottish partners such as Napier University.

(g) Account Managers within Scottish Enterprise will identify SMEs who may benefit from involvement with the new Centre for Design & Innovation. The SMEs will be invited to seminar/ workshop events, which will focus on creative problem solving and innovation strategies, facilitated networking activities and one-to-one consultation surgeries. Brokering services will be provided which aim to create new business opportunities based on synergies between businesses including diversification of existing technologies.

(h) We will take forward the findings of research with SMEs and with SEEKIT support add value through new work to:

• Transfer knowledge/expertise between science base and SMEs and between large and small companies via developing an Innovation and Design Management research/technology transfer network and a practitioners' forum.

• In collaboration with Scottish Enterprise provide advice and consultancy services to 220 SMEs, supporting them in developing and taking to market new goods/services and embedding better practice through this experience.
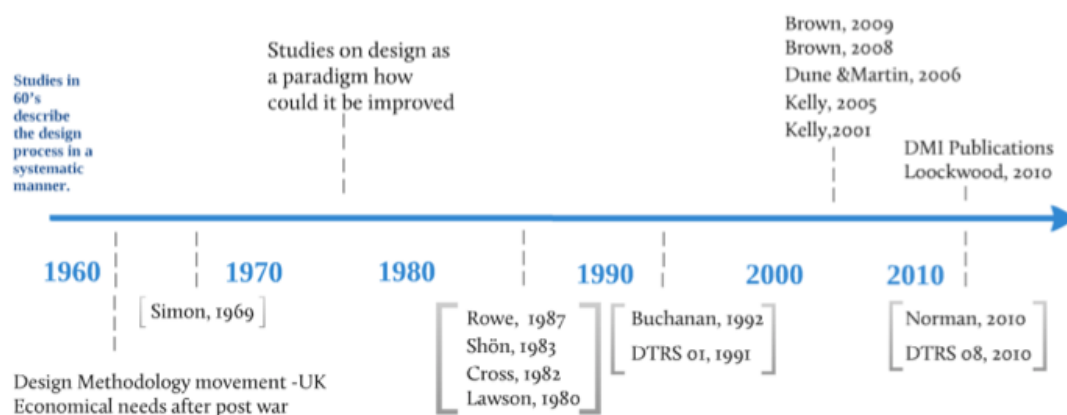
Project methodology

The project looked at other design led programmes to support SMEs including the Design Council's Designing Demand Programme and the Design Innovation Centre in Sligo, Ireland. For each of these initiatives the core approach was based on Design Thinking. It also looked at companies such as IDEO and Future Factory. http://www.ideo.co./uk/, Http://www.futurefactory.co.uk/.

Design Thinking has been evolving since the nineteen sixties as illustrated in Figure 1 below. There is some controversy among academics as to whether the term is a legitimate way of describing a genuine methodology or just another way of disrobing creative thinking. Whichever position you take it is clear there are some very useful methods and techniques that if properly applied by individuals with an aptitude for holistic thinking genuine improvements can be realized.

Figure 1 Key contributions on the history of DT (Adapted from Hassi, Laakso 2011)

Studies in 60's describe the design process in a systematic manner.

Studies on design as a paradigm how could it be improved

Brown, 2009
Brown, 2008
Dune &Martin, 2006
Kelly, 2005
Kelly, 2001

DMI Publications
Loockwood, 2010

1960   1970   1980   1990   2000   2010

Simon, 1969

Rowe, 1987
Shön, 1983
Cross, 1982
Lawson, 1980

Buchanan, 1992
DTRS 01, 1991

Norman, 2010
DTRS 08, 2010

Design Methodology movement -UK
Economical needs after post war

User centered design

C4di's practice was based on a human centered experiential approach using visualization and rapid prototyping as key methods, taking a collaborative and multidisciplinary approach to solving problems. C4di's cognitive approach was based on the reflective reframing of situations adopting a holistic integrated view. The mindset of the team was future focused, tolerant of ambiguity and experimental.

Service design

Service design is now a well-established discipline in its own right with companies such as Engine and Live|work specializing in service design work, but for many SMEs it is a relatively new concept particularly with companies who do not consider themselves service providers. For c4di it has become an increasingly important part of its' offering to provide service design advice. Explaining the value of high quality service as a strategy for competitive advantage for SMEs has become a significant part c4di's recommendations to companies.

Developing relationships with SMEs

Recognising the importance of building networks both locally and nationally to reach our target audience, c4di developed relationships during the course of the project with external agencies involved in supporting the SME community – Scottish Enterprise (national and regional basis) Business Gateway, Interface, ICASS, Scotland Food and Drink, Food Forums, Federation of Small Businesses, Women in Business, the Design Community itself including the Design Innovation Scotland group, Aberdeen City and Shire Councils, Chamber of Commerce, Invest Northern Ireland (for best practice exchange) EN-ergise and the Design Council. We also made contact with other SEEKIT projects, for example Kit-Out and De-Pict, to identify opportunities to collaborate and share good practice. We have delivered joint events with both Kit-Out (Strathclyde University) and De-Pict (RGU). Unfortunately our access to high growth company referrals was not as we had planned. Towards the end of 2010 Scottish Enterprise issued contracts to Scottish innovation consulting companies to deliver innovation support courses to both account managed and companies in the growth pipeline. The courses were free of charge to the companies and the timing of the launch of these programmes coincided with our own project activities. Account Managers who were initially recognized as key referral sources for the 'Innovation by Design' programme were naturally inclined to favour their own programmes and we received very little interest through the SE route as a result. In addition the opportunity for companies to access free innovation training adversely affected our plans to charge for our services and commercialise our offering.

As part of the Design Master class programme we organized our own networking events to bring design and non design companies together which proved to be successful as an additional element to the event

We worked with SMEs across key sectors, helping them to develop more effective communications and branding, generate new ideas, prototype and develop new products and customer-focused services. Evaluation to date has shown that c4di has been responsible for shifting businesses' perspectives and helped them embed design thinking as a strategic tool, leading to the development of new and profitable products, processes, services and increased sales.

Tools & resources

The c4di project team consisted of experts drawn from the fields of design, business management, communications, and information technology. Additional expertise was drawn from the extensive academic and administrative resources of the university.

C4di employed a range of unique, user-centered design tools and techniques to help companies address business challenges, increase their awareness of the economic benefits of engaging with design and employ design as a strategic management tool. We captured knowledge from the project, and developed our own toolkit of interactive workshop materials to enhance our offering. We have created a design methodology that is academically rigorous, practical, engaging and effective. We help businesses identify their problems, shift their perspective, generate, prototype and evaluate a range of ideas, and understand how to put this into practice. Underlying our activities is the concept of serious play. We help workshop participants to unlock their inherent creativity and generate insights and ideas that would not be possible in a formal business context, through a play-

ful, interactive use of specially designed workshop materials. Designed to help address a range of common business issues, identified through an initial market assessment, our extensive set of tools was developed in-house by c4di.

Tools developed to date have been designed to help companies articulate their core values, identify common business challenges and the range of possible design solutions available, and to visualize the highs and lows of a customer's journey through a service.

Our toolkit comprises
(a) foresighting (visual map of future political, economic, social & technological landscape to enable companies to make strategic decisions for the future)

(b) service prototyping (using simple materials to develop physical prototypes of possible new services)

(c) design options (materials designed to visualise the full range of design options available to companies)

(d) design brief building blocks (tools to help visualise the requirements and define the design brief, timescale and roadmaps of creating and implementing a design brief

C4di has developed visual cards that are used in combination with the capturing of key words to identify whether the company's self-image is consistent or contains inherent contradictions.

Figure 2 – Core values setting exercise, using image cards

1: The innovation landscape

C4di have experience of working with the wide range of support networks for design and business in Scotland to support our SME community. Over the past 3 years we have developed and strengthened our networks, identifying opportunities to collaborate where appropriate adding value to our offering.

We are active members of the design community and as we work across Scotland our networks are not exclusive to the North East and we maintain strong links across the country. Active participants in national science, technology and innovation exhibitions and events, we were invited as guest speakers to several network events in addition to workshop delivery.

Scottish Enterprise was a project partner and steering group member and our other networks included: Business Gateway, ICASS, Women in Business, KTP office, Knowledge Links for Business, NESTA, Scotland Food and Drink, Interface, Skills Development Scotland, Creative Industries Scotland, Creative Barcode, SMAS, Energise, 38 Minutes, Federation of Small Businesses, SCDI, DBA (design in business association) and the Design Council.

We were a Scotland Innovation Food and Drink network consortium member and a member of Design Innovation Scotland. C4di were also members of the AHRC-funded Design in Action, Knowledge Exchange Hub bid, led by Dundee University. We worked on a one-to-one basis on network referrals, which in turn provided material for joint case studies.

2: Project delivery

Innovation by Design Workshop programme:

• *Thinking by Design workshop aimed to assist companies to discover deep customer insights, create new products and services, diversify into expanding markets and prototype in minutes, not days.*

• *Creative Culture by Design, a workshop looking at how design thinking can help companies identify their core values, create alternative reward systems and make innovation part of everything they do.*

• *Service by Design, aimed to help companies visualise their service, find out how to identify opportunism, gain meaningful insights from their customers, map their journey, and involve them in designing services of real value*

• *Problem Solving By Design aimed to help companies identify opportunities for diversification, find how to generate creative ideas, and prototype and evaluate them*

• *Bite-size by design was intended to provide a very quick introduction to design thinking. These were scheduled for early evening and provided a snapshot of how the design process can assist in critically reframing issues to allow new thinking to take place.*

• *Block-of-cheese days. This format provided a drop-in service for companies wishing to receive on-to-one feedback on issues, which may have been uppermost at that particular time*

• *Insights report was a design audit process involving a company site-visit. Observations were made and individuals asked strategic questions after which a short report was provided based on the observations made by the design consultant*

• *Design master class programme was a series of public lectures given be eminent design practitioners with a track record of using design as a strategic tool for business growth. Each event was followed by a networking event to encourage collaboration between companies.*

3: Achievements & effectiveness of c4di

Discussion of initial aims & objectives

(a) To establish a project steering group, appoint a Project Director, Business Manager and specialist staff.
Just as the project was commencing a number of organisations who had committed to being on the Steering Group underwent re-organisations and in some cases mergers. This meant that our original membership of Scottish Enterprise Grampian, Glasgow School of Art, Aberdeen City Council, Learn Direct and Skills Development Scotland was reduced to Scottish Enterprise, Skills Development Scotland, Aberdeen City Council, Interface, and representatives from RGU's Commercialisation Department and Gray's School of Art. The steering group met on a quarterly basis and followed a structured agenda. Project aims, outputs and results were routinely reviewed at the meetings with discussions held on opportunities to maximise the project. Minutes were captured and circulated to all stakeholders to allow progress to be charted and to bring new and visiting members of the group up to speed quickly.

(b)To work closely in collaboration with Scottish Enterprise and their Account Managers.
Scottish Enterprise Grampian had been a key stakeholder in the bid as a principal feeder of leads and pipeline opportunities however as the project began they were undergoing significant reorganisation with management churn at the decision maker level. Despite existing contacts within the organisation the Account Management team proved difficult to engage with beyond the initial point of contact and the introduction to companies was very limited. A similar level of resistance was experienced with our local Enterprise Trust (ENET) although in this case it was felt to be more of a competitive resistance as some senior individuals were concerned that c4di could be stealing their clients.

We worked hard to overcome this and identified targets that ENET were struggling to meet themselves, requested a meeting with the CEO and demonstrated how we could assist. We maintained contact with the Scottish Enterprise Innovation team and were invited to take part as a partner in Winning through Innovation event in Grampian in March 2010. However that event was also launching Scottish Enterprise funded programmes and to some degree our market was spoiled as companies were being offered free support to attend programmes recommended by Account Managers to meet their objectives. At the end of c4di intervention, companies were then signposted to other sources of assistance and possible grant support from Scottish Enterprise, ENET and other agencies across Scotland. We helped to identify companies for the Scottish Enterprise pipeline and worked in conjunction with other economic development agencies to deliver a uniform approach.

(c) To organize events/workshops/seminars, produce papers for distribution directly to enterprises and to enterprise support/sectoral bodies.
The project aimed to provide thought leadership across the field of design-led innovation. This was achieved by creating a highly visual website with content explaining the approach and services offered by c4di. Press releases for events and articles in the press and business magazines were published on a regular basis on the project and a number

of academic papers were submitted to conferences and journals. The project ran a series of workshops, gave presentations as part of events run by other organisations such as Scottish Enterprise Winning through Innovation, Women into Business, and Scotland Food & Drink. A Design Master Class was also run in collaboration with the Design Council. In addition a series of introductory workshops entitled Bite-Size by Design were delivered to cross-sectoral groups of SMEs. A fuller description of workshops is outlined in Section 2.

(d) To establish and support a practitioners network
A database of companies offering design services was created. Companies would be invited to attend events such as the Design Master Class series, and using colour-coded badges to identify design practitioners from other business professionals, networking was successfully facilitated.

(e) With the help of Scottish Enterprise we will identify individual enterprises through their participation in workshops and via the practitioners' network, work with individual enterprises to develop good practice in design and innovation management and take new products to market through this; will carry out initial audit of current practices via one to one consultancy and use of audit/ benchmarking tools
As mentioned previously our market was somewhat spoiled by the flood of 'free training' being offered by one of our partners. In an effort to counter this and demonstrate the value of our own offering we developed an application process whereby companies had to apply for a place to qualify for support. This form asked for statistical information as well as aims and objectives and was used to structure each bespoke intervention. A nominal value was also placed on the time and support offered that was accepted by the client at no charge. The emphasis was on giving the company an understanding of their own business situation and giving them tools to identify opportunities and to bring about a shift in the business culture to make innovation more likely to occur and be successful. Gathering data proved somewhat tricky for the team as companies continued to show reluctance to reveal specific financial data.   The company was made aware of when the project would commence and end and key success criteria were agreed to ensure that all parties had a clear understanding of expectations.

(f) To develop a commercialisation strategy in collaboration with Scottish Enterprise offering a range of consultancy services in order to sustain the service beyond the period of the award and mainstream the service within a Centre for Design and Innovation. A full-time Business Manager will be appointed to assist with this process.
At policy level we worked with SE to help them develop their policy around design as an enabler for innovation and subsequently they have introduced some pilot progammes offering innovation workshops to groups of SMEs. The project has succeeded in demonstrating the need for design support particularly with SMEs but the business model had not proved to be viable without on-going government subsidy as SMEs are generally unwilling to pay for this service. The possibility of working will larger companies and organisations which would provide the underpinning costs of on-going support may be a viable way forward.

(g) Account Managers within Scottish Enterprise will identify SMEs who may benefit from involvement with the new Centre for Design Innovation. The SMEs will be invited to seminar/ workshop events.

As the programme offered by c4di was not a core offering against which Account Managers were tasked to refer, the team experienced a reluctance to engage.

(h) Take forward the findings of research with SMEs and with SEEKIT support add value through new work to transfer knowledge/expertise between science base and SMEs and between large and small companies via developing an Innovation and Design Management research/technology transfer network and a practitioners' forum.

The project ran a number of events, which included both large and small enterprises. In collaboration with Scottish Enterprise provide advice and consultancy services to 220 SMEs, supporting them in developing and taking to market new goods/services and embedding better practice through this experience. This objective was fully realized see Table 1.

Indicators & targets

Project outputs, results and impacts were prepared as part of the funding application. In hindsight it may have been better to backload the project profiles as it took approximately 5 months to recruit the full team necessary to deliver the project objectives. Furthermore since the grant was awarded the economic climate had changed significantly and Scotland was in the grip of a recession. Clarifying and articulating the c4di offering also took some time and the profile for target achievement should have reflected this. Despite this we delivered the majority of our targets during the project and in some cases exceeded some targets, which we had already increased during the course of the project.

Table 1 details the original project outputs, result and targets for the project.

TABLE1: PROJECT OUTPUTS, RESULTS & IMPACTS

PROJECT OUTPUTS	Performance Indicators				Total approved in grant offer letter	Total Achieved
	2009	2010	2011	2012		
No. of events held	3	4	4	-	11	29
No. of SMEs attending events.	60	80	80	-	220	343
No. of individuals/SMEs helped with advice/information (<1 day)	60	80	80	-	220	631
No. of SMEs assisted (1-5 days)	9	12	12	-	33	55
No. of SMEs assisted with High Level support (>5 days)	3	4	4	-	11	11
No. of SMEs undertaking innovation/RTD projects.	3	4	4	-	11	27
No. of new patents issued/IPR registrations made	-	-	-	-	5	2
No. of new licensing deals between SMEs and Science Base.	-	-	-	-	5	0
No. of new links between SMEs and Research Institutions.	6	8	8	-	22	86
No. of SMEs receiving support for energy savings and resource efficiency.	6	8	8	-	22	26
No. of renewable energy projects supported.	1	1	1	-	3	0
RESULTS						
Increased investment in External Knowledge/Innovation/RTD by SMEs (£)	0	100,000	500,000	-	600,000	688,300
No of products, processes or services significantly improved/new ones introduced	3	27	33	-	63	81
No.of SMEs with reduced costs per unit output	0	3	8	-	11	11
No. of new spin-outs/SMEs formed	n/a	n/a	n/a	-	0	0
SMART/KTP/Catalyst	0	1	5	-	6	2 Cat
R&D Grants	0	3	8	-	11	4
KTP Projects	0	1	5	-	6	0
New R&D initiatives	0	20	13	-	33	30
IMPACTS						
Increase in turnover in assisted business (£)	-	-	-	-	1,500,000	2,360,000
Total no. of gross new jobs.	0	1	32	-	33	34
Total no.of gross jobs safeguarded.	0	150	450	-	600	600

Case studies

In the following section we present a number of Case Studies, which provide examples of the ways in which c4di worked with companies across different sectors. During the course of the project c4di has communicated with over 300 SMEs. In some cases this would have been through a workshop event and in others a more intensive period of one-to-one advice. The examples describe the company, some of the issues they faced, and the impact of c4di's involvement.

Case Study 1 - Galloway Lodge Preserves

"I found working with c4di very useful. It's extremely beneficial to have another pair of eyes looking at your business. When you are so closely involved with the day to day running of your company it can be difficult to see things objectively. I now have a number of new ideas to implement which needn't be costly and which I anticipate will have a very positive impact on my business." Fiona Hesketh, Proprietor

The company

Galloway Lodge Preserves is a manufacturer of high –quality conserves and preserves selling under their own brand of Galloway Lodge Preserves and also as a private label manufacturer for a number of other select brands .The catalyst for this project meeting was a Scottish Enterprise "Meet the Expert" event for companies in the food sector held at Barony College, Dumfries. C4di were invited to meet with food companies individually on the day to provide advice and guidance on how design could be used as a tool to assist their business.

Issues identified

As many of these products are hand-made, the company was concerned about cost efficiencies relating to their current manufacturing, labeling, and packaging processes and the shipping of products.

Nature of c4di contact

Subsequently c4di spent two days with Galloway Lodge Preserves, observing the manufacture, labeling and packaging of its products. Evaluation tools developed byc4di were also employed to help analyse the core values of the company, which, in liaison with Fiona and in line with her plans for her business, assisted in the subsequent recommendations for the development of the brand. A c4di Insight Report provided more than a dozen design led recommendations covering process improvements, ideas for waste reduction, labour saving techniques and an improved and more consistent approach to the company's branding. At a strategic level, several options were also highlighted along with signposts to other support bodies that may be able to assist with advice and funding. A Knowledge Links for Business advisor is now working with the company, to project- manage and take the various recommendations forward. An application for funding has been submitted.

The impact

Since working with c4di, Galloway Lodge Preserves have introduced new products to their portfolio, most notably an onion marmalade, chilli jam and chilli and honey relish and hot tomato pickle, diversified their business with the acquisition of a coffee shop in Gatehouse of Fleet, and been featured at a number of high-profile trade exhibitions.

Galloway lodge preserves

Moto GF

Case Study 2 - MotoGF

The company
MotoGF's parent company had been supplying the oil & gas industry for over 10 years with Beta tools when they began to be inundated with requests from professional motorsports enthusiasts looking specifically for Beta tools and so took the decision to set up a dedicated service for these motorsport individuals and teams.

Issues identified
The company, with 26 staff, had identified a number of challenges in developing the market for MotoGF's products (particularly the Beta tools) against some very stiff competition. They wanted to research the buying behavior of young mechanics covering both their motivation and preferred methods of purchase especially in the area of branded tools for car/motorbike repair and maintenance.

Nature of c4di contact
C4di facilitated a 'problem solving by design' workshop involving student members of TAU racing team from the University of Aberdeen. A variety of user-centred design techniques were used to determine participants' interpretations of the core values of MotoGF and Beta tools, map customer journeys, and to facilitate a discussion on student use of social media. Additionally, a short ethnographic study of a father and son mechanic duo, was undertaken by c4di's principal designer, and some broad desk research into the use of social media in the world of motorsport.

A c4di Insights Report was created which recommended that MotoGF audit the company's existing products, services, branding and communications against core values; adopt a communications strategy which is part promotional and part informational; restructure the company website hierarchy making social media feed the most important part of the homepage; develop a mobile-based ordering and information system; and offer student mechanics discounted tool sets on an HP basis.

The impact
Since working with c4di the company have increased innovation investment by £30,000; have 13 new or improved products/services or processes; and have created 3 new jobs. They have also undergone a complete re-branding, and have transformed internal innovation and staff training proceedures.
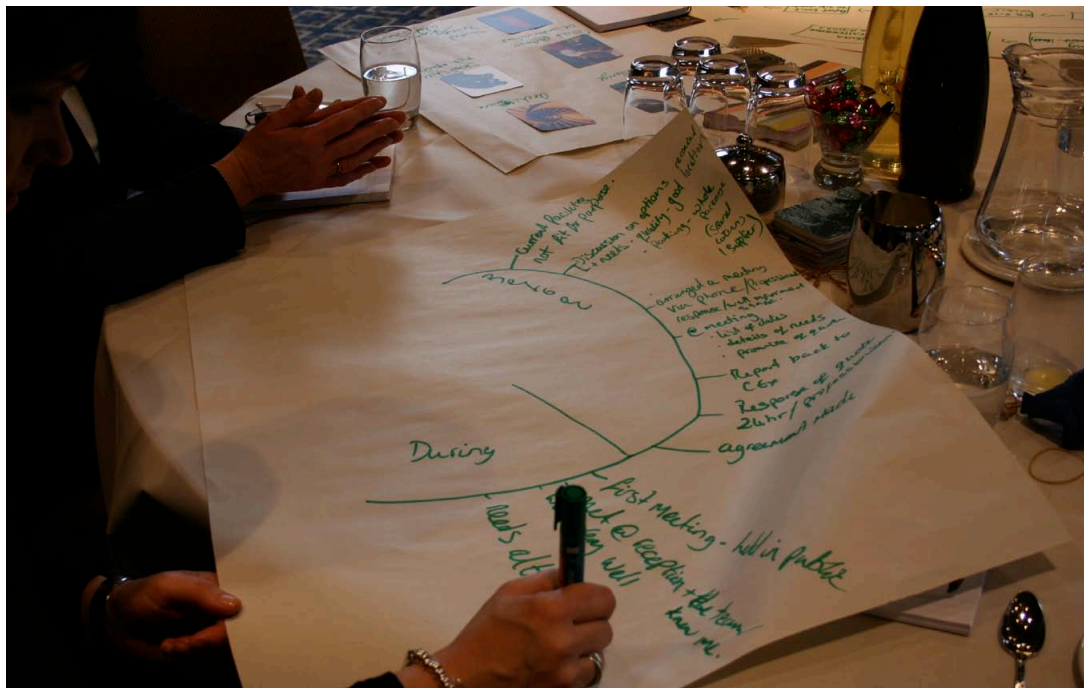
Easterbrook Hall workshop – mapping service journeys

Case Study 3 – Easterbrook Hall

"The project really helped us identify what was different and unique about the hall which has assisted us to develop a new product offering to the events market from outside the region. The support provided has been invaluable in helping us develop Easterbrook's approach to generating new business." Angela McIntyre – Venue Manager, Easterbrook Hall, Dumfries & Galloway

The company
Employing 80 staff, Easterbrook Hall and the Crichton Estate have developed a significant standing and reputation in the wedding market. The venue, which comprises a church, hotel with rooms of varying sizes, gardens and leisure facilities, has also been used for conferences. In the autumn of 2010 Easterbrook Hall met with the Knowledge Links for Business project.

Issues identified
The company aspired to develop the conference facility revenue stream and exploit the potential for business tourism in the region, however Dumfries & Galloway is not well-known as a potential conference venue in general and supporting facilities in the area for business tourism may be viewed by some as insufficient.

Nature of c4di contact
The Knowledge Links Team took the brief and made a number of introductions to expertise from Scotland's colleges and universities to help the Easterbrook team develop the product offering. A key introduction was to the Centre for Design & Innovation (c4di) based at Robert Gordon University in Aberdeen. Through their "insights" programme, c4di conducted an evaluation of the Easterbrook Hall brand and offering to identify key Unique Selling Points for the venue to attract new customers. A workshop was conducted with a number of existing clients to analyze the Easterbrook experience. In addition evaluation tools developed by c4di were also employed to help assess the core values of the venue which, in liaison with Angela and the team, assisted in the subsequent recommendations for the development of the brand offering to an external market.

Impact
Easterbrook Hall has safeguarded employment for all 80 employees whilst adding 1 new full time assistant sales manager and up to 6 seasonal staff. Company turnover has increased by £70,000 as a result of new/improved products, services and processes including new business packages, new wedding packages, a conference bureau partnership, partnering with a local radio station to run joint themed events, a charity product offering, and several new initiatives still in the pipeline. Efficiency savings have also been made as a result of waste and power reductions.

Case Study 4 - The Store

The company
The Store is a coffee shop and farm store owned by the Booth family, farmers in the area for four generations. At the heart of the Store's offering is the sale of beef and lamb, raised and butchered on site. The farm store also sells locally grown fruit and vegetables and a range of ready meals, cheeses and condiments. Products can be purchased online and a delivery service is also provided. A coffee shop sells drinks, home-bakes, soups and sand-wiches.

Issues identified
The company wished to determine whether there was consistency between The Store's brand, as visualized by the Booth family themselves, their employees and their branding agency.

Nature of c4di contact
C4di's Principal Designer facilitated an exercise using core values imagery to enable the company to articulate The Store's three main qualities or values in order to inform the development of the company's branding and communications material. A number of c4di recommendations were made relating to improvements in packaging design, graphics, signage, display, and public access.

Impact
Since working with c4di, The Store have run a series of user-centred events at their main store in Foveran, including Easter events for Children, specialist butchery skills workshops and Wagyu Beef Dinners, wedding catering, all adding value to their existing product range.

They have improved their online presence with Facebook and Twitter presence as well as making a number of improvements to online processes.

They have also expanded their staff team across the business, and recently won a Highly Commended in the Scottish Countryside Alliance Local Food Award at a Holyrood recep-tion and a Trend Life with Style Award for coffee shop and restaurant within one year of opening their new coffee shop and café.

BRITTAIN

OS MET

BUSINESS
THE RATIONAL
ORGANISATION
DELIVERS –
VALUE

YUAN GLOBAL CURRENCY

LIFE WILL BE AUTOMATED / PROCESS TECHNO DRIVEN → INTERNET/INTRANET ALL LINKED!

EU MARKET INTEGRATION & GOV WILL BE GLOBALLY 1

Virtual World University Virtual teachers

I.D. CARDS W. DNA + FINANCE DATA (MULTI-FUNCTIONAL)

LEISURE? SPORT = LUXURY. SPACE ISSUES EXPENSIVE GLOBALLY COMMUNITY ACTIVITIES

One Currency $ Global Dollar

SPACE TOURISM

ALL FOOD WILL BE IN THE FORM OF PERCY PIGS! THERE WILL STILL BE PERCY PIGS!

WORLD PEACE

CREATIVE SPACE

HOUSE - BOARD

SMALLER HOUSING DUE TO LARGER POPULATION

CALVIN-BALL !

COMMUNITY FARMS = SELF SUFFICIENT

UNIVERSAL LANGUAGE/ COMMERCE/ FISCAL POLICY

BIOTECH

HOME

Where is GOD in all this

iLens™

FAT BURNING

SKYNET GOES !!! LIVE ...

Free Technology & Free Communication Charges

Virtual offices the Norm & Open Public User Official data space

2020 WIND WAVE & NUCLEAR

NUCLEAR FUSION = FREE POWER & NO POLLUTION

NO CHOCOLATE EAT AS MUCH AS YOU CAN NOW!

206 EVERYONE WILL LIVE FOREVER

BIZ. SERVICE LED IN 'DEVELOPED WORLD' - MANUFACTURING IN 3RD WORLD. CROP IN CERTAIN AREAS.

ZZZZZ + keeping it!

MA-D

QUEEN MATE NO MORE

iSchool

[EDUCATION PLACES] ENVIRONMENTS

Free own injection Health correction every 10 years & all live to 100+

World standard to limit population is 1 kid per family with Tax Credits for zero kids

SELF-

HOME SCHOOLING VIA INTERNET & VIRTUAL AVATAR

SMALLER FAMILY MAKE-UP (IE. NO 3-10 KIDS + MUM/DAD

STANDARDISED [NHS] HEALTHCARE SERVICES

SME Inter business working is the Norm with shared Resources.

BUSINESS WILL BE GLOBAL

MINING ON THE MOON WE WILL HAVE TO!

Perfect FOOD

SELF-EMPLOYED

Allow Freelancer to MAX their chargeable...

Everyone is online to insure for health. Tax Credits if Not using Health Service

INSURANCE MARGIN

chips!

chips! DATA + Personality Testing

NO LOCAL PUBLIC SERVICES GLOBAL FREE MARKET

NO 9-5 WORK WHEN YOU WANT PLAY WHEN YOU WANT

Save Money!

VIRTUAL

TIME

START UPS

CRAZY KILLER INSECTS

Allow Freelancer to Max their Profit & optimise their tax

ON-LINE 24hr view of their Business Data

Share Holders & Stake Holders

Case Study 5 – Freelance World

"What an awesome couple of days we had with c4di. We went into it with our eyes open, not really knowing what to expect. We'd heard of design thinking, but had never seen it in practice. We'd also worked with lots of consultants, using "traditional' brainstorming techniques. The process that c4di followed blew us away. No linear lists or left-brain tasks - this was a very visual experience. Engage right brain! It made our heads hurt, but we got some real breakthroughs and an outcome that none of us could have foreseen. If you haven't used design thinking, you should. It will transform your business." Alasdair McGill, Managing Director, Freelance World

The company
Freelance World is one of the main contractor accountants in the UK, the recognised leader in the UK energy sector, and proactive, service-focused freelancer and small business accountants.

Issues identified
The company planned to re-position itself as a Total Business Support Service not just offering help to bookkeeping or accounting clients, but to also include in their offering, business advice and support. The company wanted to be identified as the leading online business support company and transform the business into a marketing and technical enterprise.

Nature of c4di contact
C4di facilitated two scoping workshops using the Business Model Canvas as a visual framework to describe the existing Freelance World business model and explored how incremental and radical innovations could be created. Student interns sourced from the Robert Gordon University used various prototypes of the business model to create hypotheses for subsequent project development.

Impact
A Robert Gordon University intern project (involving students with programming, design and a business skills) is currently working on process improvements/software prototyping; designing a new Creative Space website; redesigning the existing Freelance World website, and developing the company's social media strategy.
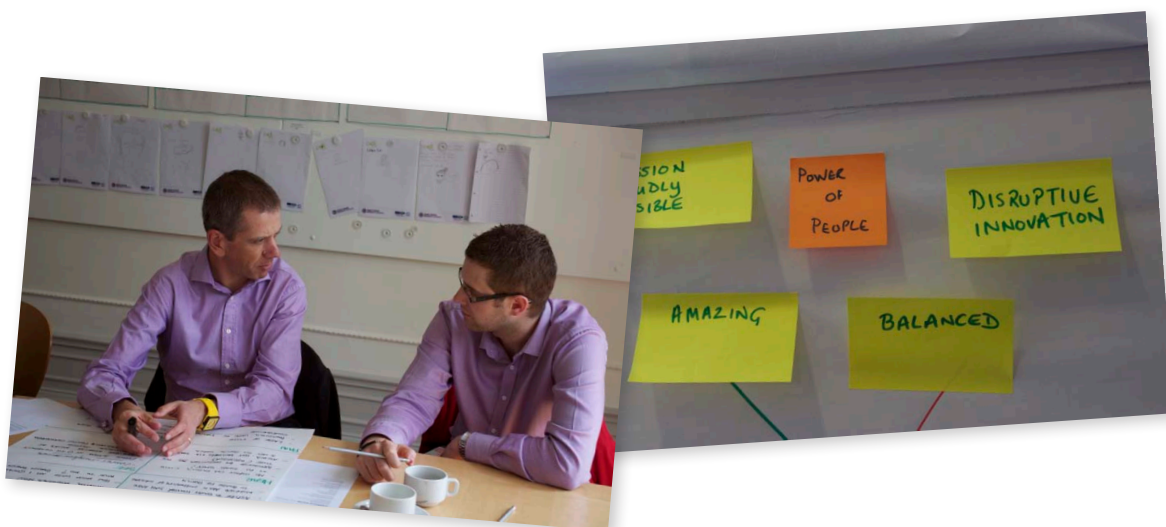
signature flavour

raspberry, mango & passion-fruit layer
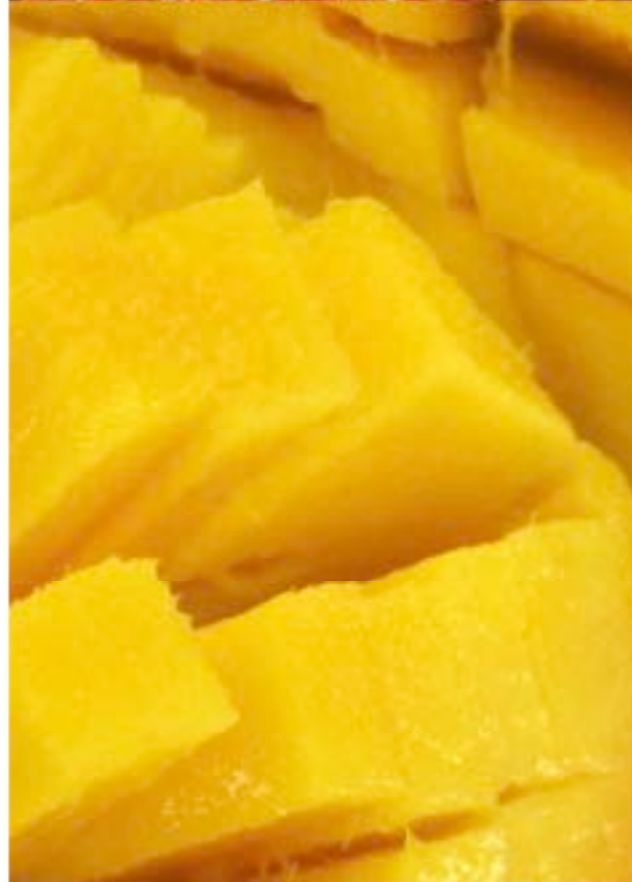
Case Study 6 - Cocoa Ooze

The company
Jamie Hutcheon established the expert chocolatiers, Cocoa Ooze, producers of handmade luxury chocolates, in 2008 at the age of just 17. The company works hard to reflect the delicate simplicity of quality ingredients and the inherited knowledge of family history in its products

Issues identified
The company had been given an opportunity to supply chocolate products to 17 outlets of a giant supermarket chain and needed to develop and formalize branding guidelines for the company and subsequently consider the requirements and implications of a sub-brand to be used in the supermarket's own range. Another issue identified was the current labour intensive methods used in the packaging.

Nature of c4di contact
Initial contact was made with Jamie at the Scottish Enterprise Winning Through Innovation event in March 2010. As a result of this meeting, c4di's Principal Designer and Project Manager made a site visit to Cocoa Oozes' premises which resulted in a design-led idea generation workshop which considered the company's core values, branding, packaging and printing, using specially designed c4di materials and techniques. C4di made a number of recommendations for the company to develop over a period of 18 months.

Impact
A new passion fruit, mango and raspberry layered chocolate was developed as a direct result of the c4di idea generation workshop, along with a new range of packaging which more fully represents the core values of Cocoa Ooze.

They have also recently opened a new shop and café in Peterculter, and launched a range of chocolate making workshops.

Projected increase in turnover: £25k in 2011 and £35k 2012/2103

They have plans to recruit trainee chocolatier. Future plans for expansion include opening premises in Edinburgh and Glasgow

Awards have included:
Grampian Food Forum innovation award (2011)
2010 Finalist in the Grampian Awards for Business Enterprise Emerging Entrepreneur of the Year Award
2011 Finalist, Scotland Food and Drink Excellence Awards (retail – confectionary and snacking)

Foyer workshop - ideation

Case Study 7 – Foyer Enterprise Ltd

"Developing a design brief can be daunting for the uninitiated. C4di engaged the Foyer creatively and with a real grasp of what we wanted to achieve that demonstrated an understanding of our commercial aims and social values. Their advice and support has been consistent and I would not hesitate to use them again." Leona McDermid, Commercial Director

The company
Foyer Enterprise Ltd incorporates the Foyer Restaurant & Gallery, with profits generated from both being used to support the Aberdeen Foyer, a local charitable organization working to prevent youth homelessness and unemployment.

Issues identified
Along with a proposed refurbishment of the premises, the company aimed to develop future business in a more profitable, sustainable way to ensure actual and potential resources were being optimized.

Nature of c4di contact
C4di facilitated two workshops with various stakeholders of the Foyer Restaurant & Gallery to brainstorm ideas for a proposed redevelopment of their business premises in Aberdeen. The outcome of this session was to develop a full design brief for internal implementation which included a customer experience narrative; recommendations pertaining to space; furniture, fittings & equipment; service design; marketing and business model innovations.

Impact
C4di's follow-up interview with Foyer Enterprise Ltd reported that the company have employed 4 new staff; dedicated 12-15 days of Director's time on development; have produced a new events package offering; have secured a substantial loan to implement refurbishment recommendations; and have generally seen a positive shift in the company culture.

Cross priority effectiveness

The Structural Funds Programme (2007-2013) was split across four priority areas, which are listed below. C4di was funded under Priority 1 but the nature of the project provided opportunities for the project to also address challenges identified in the other three priority areas

- *Priority 1- Research and Innovation.*

The aim of the Priority was to improve the competitiveness of the Lowlands and Uplands Scotland enterprise base through increased innovation and a fuller use of its RTD base. The funding for c4di was obtained under Priority 1, which aligned closely with the challenges outlined under this Priority, which were removing barriers to entrepreneurship, increasing rates of innovation and developing full exploitation of key sector technology developments. These challenges were addressed through the c4id workshop programme and one-to-one consultations and developing technology roadmaps for companies and providing referrals to technology providers where appropriate. Within the project examining how companies could enhance their innovation culture was given high priority including the publication of academic and non-academic articles (See Appendix 2)

- *Priority 2 – Enterprise Growth.*

The aim of the Priority was to improve enterprise formation and growth rates by enhancing the enterprise support environment, particularly with regards to access to finance, entrepreneurship, e-commerce and resource efficiency. Under priority 2 where appropriate companies were signposted to additional sources of funding including Knowledge Transfer Vouchers, KTP and SMART awards. When the team visited companies, opportunities for resource efficiencies were noted and reported back to the company in a follow-up report. In addition where appropriate companies were referred to the Scottish Manufacturing Advisory Service for more advice relating specifically to their manufacturing processes.

- *Priority 3 - Urban Regeneration.*

The aim of the Priority was to increase the contributions of the most disadvantaged urban communities to Lisbon goals by supporting their regeneration. The project contributed to Priority 3 by working with Social Enterprises who were using employees from disadvantaged groups.

- *Priority 4 - Rural Development.*

The aim of the Priority was to maximise the contribution of rural areas to achieving Lisbon goals with a view to developing sustainable economic growth. Under priority 4 the project worked with rural based businesses particularly food companies advising on how to improve their Internet presence, communicating their brand more effectively and advising on new ways of bringing products to market utilizing e-commerce and by co-operatives.

In addition to the four priority areas the Structural Funds included the following 'Cross-cutting Horizontal Themes":
- *equal opportunities*
- *environmental sustainability*
- *social inclusion*

The Robert Gordon University is an equal opportunities employer and c4di followed the University's guidelines for all its human resources requirements. Innovation advice was provided to companies where appropriate on how to reduce their carbon footprint by looking for operating efficiencies and how to make better used of web-based technologies in order to reduce logistics costs. At the outset of the project every effort was made to avoid excluding companies in disadvantaged areas and to include individuals from disadvantaged groups within customer focus groups.

4: Future developments

The c4di project aimed to look for sustainable sources of income either through the commercialization of its services or additional project funding from new sources. In October 2011, a market survey examining the viability of the project's service offerings was undertaken. The resulting survey was generally positive, however, it was considered that partnering with a larger firm would be necessary to ensure a commercially viable business. C4di continues to examine ways in which it can add value to innovation initiatives such as the SFC's current funding programme for establishing Innovation Centres in Scotland.

The need for finding ways of supporting innovation within companies in Scotland is of ongoing importance and is increasingly recognized by the Scottish Government as a priority across all sectors and the use of design as a key driver for innovation is widely acknowledged. The c4di brand is to continue through the licensing of its material.

5: Project impacts & beneficiaries

During the course of the project c4di worked with in excess of 300 companies across Scotland. In some cases this resulted in significant cultural shift within the company leading to a greater value being put on design as a way of improving the company's ability to bring about innovation (see case studies for examples). The full economic impact of the project is very difficult to assess within the timeframe of the project itself, as it can take some time for a company to instigate change and realize the results in terms of improvements in revenue.

C4di had a significant impact in raising the value of design thinking as an approach that can be used to bring about substantial improvements in the way companies do business. C4di worked with a number of business support organizations to bring about policy developments that included funding from Scottish Enterprise for future design-led innovation workshops.

The project also provided thought leadership in this field by contributing to academic and non-academic publications (see references).

The project helped to support the delivery of an international academic conference on design entitled 'Design Connexity, hosted by The Robert Gordon University, and chaired by Malins. The themes of the conference included design thinking and service design amongst others, which helped to inform the c4di project and disseminate the research related to the project.

The project hosted a series of Design Master Class Lectures funded by the UK Design Council, aimed at providing businesses with examples of design-led innovations. These events were public lectures given by prominent designers followed by networking events to provide SMEs with the opportunity to meet with companies from our professional design practitioner's forum. These included professional design companies providing services to businesses in the region. The lectures were videoed and made available online as an open resource. Figure 3, Design Master Class presented by Wayne Hemingway of Hemingway Design.

Figure 3 – Wayne Hemingway presents Design Master Class Public Lecture

Organisations such as the Technology Strategy Board, Scottish Enterprise, and NESTA are actively supporting and promoting design-led innovation initiatives and support for business development. The work of c4di contributed to this development by providing examples, case studies and resources. The use of service design in particular has become a widespread tool to support public engagement with service innovation throughout the public sector. Major outsourcing companies are adopting this methodology when seeking to find efficiencies and new service innovations across the public sector.

Key recommendations

• In order to achieve efficiencies and service quality improvement in businesses, expert facilitation is required. Facilitators using a design thinking approach can provide essential identification and reframing of problems, which is very difficult to do within the organization due to the inherent difficulty of shifting a perspective.

• C4di worked with a range of companies from early, to well-established companies. Although their issues varied they all benefited from the facilitation process, which focused on improving the innovation culture within the company rather than specific product developments.

• The use of visual methods and lo-fidelity prototyping provided the most effective approach for working with groups, and using a play or game metaphor improved user engagement and helped to increase creativity as a result.

• Any future design-led innovation type service has to be integrated into the wider innovation landscape in order to be effective. Companies seeking support from funding bodies would greatly benefit from working initially with design innovation groups in order to scope projects and develop innovative solutions.

References

Cox, G., *The Cox Review of Creativity in Business: building on the UK's strengths*, HM Treasury 2005. http://www.hm-treasury.gov.uk/d/coxreview-chap8creatinggreater.pdf

The UK Design Industry, Skills Development Plan: *High Level Skills for Higher Value,* 2007, Design Council and Creative & Cultural Skills 2007.www.ukdesignskills.com

The Design Council, *The Designing Demand Review*, 2008 http://www.designcouncil.org.uk/documents/documents/publications/designing_demand_review_design_council.pdf

2008 MacDonald, S. International DMI Education Conference, Design Thinking: New Challenges for Designers, Managers and Organizations, 14 – 15 April 2008, ESSEC Business School, Cergy-Pointoise, France. In Conference Proceedings: *Design Thinking and Design Innovation Scotland.*

2009 *Design Connexity Eighth International Conference of the European Academy of Design* (April Aberdeen). Proceedings from this conference were published and available at http://ead09.rgu.ac.uk/.

Hassi, E., & Laasko, M., *'Conceptions of design thinking in the management discourse'* in: EAD 09 The Endless End Conference Proceedings, Porto, Portugal, May 4th-7th 2011. http://endlessend.up.pt/site/?page_id=7

2010 Malins, J. & Liapis A., 'IT-Based Tools to Support New Product Design: A Case Study of a Design Consultancy Firm', 2010, *Information Technology & Product Development – Annals of Information Systems, Vol 5, Part 1 Chapter 4.*

2010 Malins, J. & Grant, G., *DESIRE '10: Creativity and Innovation in Design' Conference,* Arhus School of Architecture, Denmark – 16th-17th August. In conference proceedings: 'Designing Creativity Tools to Support Business Innovation', Proceedings available at http://www.virksom.dk/DESIRE10_Proceedings.zip

2011 Malins, J., *EAD 09 'The Endless End',* The 9th International European Academy of Design Conference, Porto, Portugal 4th-7th May, Conference Proceedings, 'Innovation by Design: Using Design Thinking to Support SMEs'. http://www.ead.lancs.ac.uk/conf/EAD_09.html

2011 Malins, J., 'Innovation by Design: A Programme to Support SMEs', in: Swedish Design Research Journal No 2.11, pp25-32, SVID, Stockholm, Sweden.

2011 Malins, J., Gulari, M., Boru, A. E & PDE 13th International Conference, *Design Education for Creativity and Business Innovation,* London 8th-9th September. In conference proceedings: ' Towards an Evolutionary Understanding on the Success of Participatory Design'.

2011 Malins, J, and Murray, A., E & PDE, 13th International Conference, *Design Education for Creativity and Business Innovation,* London 8th-9th September. In conference proceedings: 'Projectspace: Linking Design Education with Business'.

ROBERT GORDON
UNIVERSITY·ABERDEEN

IDEAS Research Institute

EUROPE & SCOTLAND
European Regional Development Fund
Investing in your Future

The Scottish
Government