Collective responsibility for Continuous Improvement

SLEEK Pilot Status Report

Name: Donna Cullen
Role: SLEEK Programme Leader
Email: Donna.Cullen@strath.ac.uk
Telephone: 01415484175

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SECTION A: Pilot Status

Programme Initiation & Objectives

The SLEEK (Strathclyde's Lean Six Sigma Efficiencies in Education Kit) Programme Pilot was initiated in April 2011 in direct response to an action from the University's Information Strategy Committee (ISC), to establish a methodological approach to Business Process Improvement (BPI) across the institution. For full details of the Programme see the SLEEK SharePoint Site[1].
Led by Information Services (IS), in partnership with the Department of Mechanical Engineering (DMEM), the SLEEK Programme Pilot has now successfully achieved its objectives and satisfied its initial remit. Therefore this report outlines a recommendation for completion of the pilot, makes suggested arrangements for handover of all programme products, services and support and includes an evaluation of programme activity, with a view to communicating lessons learned and establishing a platform from which future activities can be launched.

The recommendation for completion of pilot and transfer of associated activities is based upon the following:

- ✓ **The successful achievement of pilot objectives in line with the ISC's original remit**
  - BPI Objectives
    - Objective 1 - Establish Methodology and notation
    - Objective 2 - Provide Training
    - Objective 3 - Provide a SharePoint Site
- ✓ **The remit for SLEEK/BPI together with future resources now being transferred from IS to Human Resources (HR)**
  - Current resource for SLEEK from existing IS staff complement
    - 1.0 FTE Programme Manager (Donna Cullen)
    - Senior Management Champion (Catherine McMillan)
    - Line Management (Emma Graham, Development & Innovation)
    - Technical Support (Development & Innovation)
    - Admin support (Business Systems Admin)
- ✓ **The requirement for movement from pilot to sustainable strategic solution to ensure:**
  - genuine embedding of lessons learned
  - establishment of dedicated continuous improvement service across the institution
- ✓ **The requirement for re-assessment of all activity in line with partnership agreement with external company Unipart**
- ✓ **The requirement for decision on future arrangements for the related academic research programme** with DMEM.
  - Research into all aspects of the successful application of Lean Six Sigma (LSS) in HE led by Professor Jiju Antony

[1] https://moss.strath.ac.uk/sleek/

Handover of Products and Suggestions for sustainability

As the SLEEK Programme Pilot draws to a close there are a number of areas, some with possible resource implications that now require decisions or further consideration. This "Handover of products" from IS to HR it is hoped will help inform next steps and ensure all related activities are appropriately completed or considered for continuation where appropriate.

SLEEK Community

The SLEEK programme has provided training for 62 staff across the university to date. 55 of those staff completed a two day "Yellow Belt" training course and successfully passed a Yellow Belt exam, with the other 7 completing a 5 day "Green Belt" training course and associated exam. 42 process improvement projects were initiated as a result of the training, with 16 projects complete to date (Jan 13), 12 on track to complete by the end of March 13 and a further 14 projects scheduled to complete by the end of the pilot phase (likely April 2013). The total number of existing trained staff has reduced from 62 to 52 since the beginning of the pilot phase (8 staff have left the University and 2 are on maternity leave). Some staff chose to work on joint or group projects and 2 staff from RKES upon completion of a yellow belt project have now progressed to a green belt project.

A total of 12 staff declined the opportunity of involvement in a process improvement project, with all stipulating that other work pressures and priorities precluded them from participating further in the pilot at that stage. A further 12 staff remain on a waiting list for training after expressing an interest in the programme.

After completing the training, participating in group events and workshops and applying SLEEK tools and techniques through project work and beyond; this SLEEK "Community" now has considerable experience in process improvement and in the tools and techniques of LSS. All staff involved have shown considerable enthusiasm for process improvement and have continued to apply the SLEEK methods and approaches in their day to day roles. Many have requested further support and training and all remain enthusiastic about the longer term vision for continuous improvement here at Strathclyde.

Sustainability

With continued support this community of staff could significantly contribute to the achievement of institutional wide continuous process improvement. However, without support and communication there is a risk of not utilising their new skills, de-motivating and downgrading their efforts and creating confusion over the wider vision for process improvement going forward.

Yellow Belt trained staff have been provided with a strong foundation in process improvement theory and Green Belt staff are arguably very well placed to take on significant roles in any process improvement efforts. It is strongly advised therefore that the embedded process improvement programme going forward takes advantage of the positive experience and enthusiasm of the SLEEK Community of staff and builds on this to create a "critical mass" of process thinking staff.

Internal communication of the completion of the pilot programme as a natural progression towards a more embedded solution and an opportunity to apply lessons learned, while celebrating what has

already been achieved, would help ensure continued buy-in and support and provide an ideal launch pad for the sustainable solution currently being investigated in conjunction with HR and Unipart.

SLEEK Projects

Yellow Belt Project Support (two tier accreditation)
Over 30 staff still require support to achieve full "Yellow Belt" accreditation. The project support model in place provides for on-line feedback, one-on-one sessions, group workshops and practical support on the use of individual tools and techniques (and the supporting software tools etc.) This support is currently provided by Donna Cullen (Information Services) with some limited support from Professor Anthony (DMEM). In order for these remaining staff to achieve SLEEK LSS Yellow Belt accreditation and to be considered LSS "Practitioners" - it is recommended this support remains in place until March 2013.
For those staff unable to complete projects by end of Feb 2013 a standard accreditation is currently being considered that would recognise the successful completion of the training and exam only. As responsibility for final accreditation and certification remains with DMEM – Donna Cullen and Professor Jiju Antony will ensure this distinction is appropriately made and staff are rewarded accordingly upon project completion.
Yellow Belt projects typically generate a £2,000-£2500 efficiency saving and each of the 30 remaining projects provides not only a saving but also the opportunity to make lasting and visible process improvements that contribute to the wider, longer term effort of documenting, understanding, and making our processes more transparent so that they can be continuously monitored, improved and aligned with institutional strategies.

Green Belt Support (accreditation costs and arrangements)
Green Belt accreditation and project support is significantly different from the Yellow Belt and requires more time to be spent not only supporting the staff undertaking these projects, but also in "re-writing" the criteria for accreditation to that which is more suitable for an HE environment. Traditionally LSS Green Belt projects have been carried out in manufacturing and engineering environments and a tailored approach is required to ensure staff in HE can satisfy the industry standard criteria for accreditation, while making an appropriate and significant saving within the institution.
Green Belt projects should each generate in excess of £20,000 in efficiency savings and as such supporting the 6 staff currently working towards completion at this level is extremely important.

The skills and expertise these staff will gain from completion of the SLEEK Green Belt should also prove invaluable to future institutional process improvement endeavours, while at the same time boosting the knowledge base and attributes of the teams in which they currently operate.

Process Improvement Review Periods
The very nature of continuous improvement programmes predisposes the requirement for a "review period" whereby improved processes are re-assessed to ensure that the full potential has in fact been achieved and any further opportunities for improvement are explored. The constantly changing nature of the University's landscape, indeed the changing nature of any innovative and progressive institution, gives rise to the requirement for continued review of processes, including those improved during the SLEEK pilot. Those who have completed projects have been advised of a date to review their process - without a dedicated team in place to ensure this review takes place and provide further support and monitoring then this review period could be an opportunity missed and could give rise to the wider risk of process improvement activity once again becoming fragmented, opaque and directionless.

Sustainability

The recommendation is made that Yellow Belt Project support should continue in the previously agreed way until the Yellow Belt deadline of end of Feb 2013 – with some activity expected to run into March 2013. This will ensure staff are appropriately supported, process savings are made and results are appropriately documented and shared. Beyond this point no new Yellow Belt projects should be initiated unless this is in line with the new HR led plan.

A final Yellow Belt meeting has not yet been scheduled and will be held after the deadline for project completion, again giving opportunity for communication of the anticipated new set up.

It is requested that decisions now be made regarding the continued support of Green Belt projects to completion, the associated cost of accreditation and indeed consideration given to the future role of staff emerging with significant expertise in process improvement. At present there is an accreditation cost of £200 per person for Green Belts paid to DMEM to cover external examiner costs (though this cost could be reduced if all green belts were accredited at the same time) and with no budget allocated to SLEEK an appropriate source of funding requires to be identified.
The next Green Belt group meeting is scheduled to take place in early Feb 2013, giving good opportunity to update staff involved on next steps.

Process Improvement Training

One of the main objectives of the SLEEK Programme was to train staff in the tools and techniques of process improvement and give them sufficient foundation from which to begin analysing their own processes and tackling improvement opportunities in their immediate area of practice. Building on DMEM's very successful existing Yellow Belt in LSS commercial course, the SLEEK training course was led by Donna Cullen and Professor Jiju Antony, as a tailored HE version targeted solely at Strathclyde staff. Staff response to the training was overwhelming and quite a "buzz" developed across Professional Services and the HaSS and Science Faculties in particular. It was decided to increase the normal class size of 10-15 to 20+ to ensure demand was met. Two separate courses were run during the pilot, with a third course unfortunately cancelled due to the ramifications of the James Weir Fire.

The SLEEK Yellow Belt course followed a two day taught course with an exam at the end of day two and a process improvement project (originally with a target of 3 months for completion after the training date). Follow up workshops were held looking at specific tools in more detail and supporting staff in moving their projects through the agreed phases.

SLEEK trained staff are now proficient in a number of aspects of the LSS methodology and during the SLEEK Programme Pilot the following process improvement tools and techniques were readily adopted by staff and proved most useful in achieving results:

- The **DMAIC** (Define, Measure, Analyse, Improve, Control) is the backbone of the methodology and charts the phases of a given process improvement project.
- **Process mapping/value stream mapping**
  Process maps were very useful to help staff visualise processes and communicate with others using a common notation. Value stream maps allowed everyone to understand and agree on how value is produced in the eyes of customers and where waste occurs within

processes - thus allowing the identification of root causes of failure and error. Agreeing and displaying maps also ensured all staff involved understood the "end-to-end" process instead of just their own stage.

- **Cause and effect analysis**
  This is a very powerful tool which allows a team to identify and explore the potential causes related to a problem to discover its root causes. Cause and effect analysis is generally used in conjunction with brainstorming. The potential causes may fall under any of the following categories: manpower; machines; methods; materials; mother -nature or environment; and measurements.
- **7 Wastes (+ 1 – Latent Skills)**
  This tool is used to help identify wasteful activities or steps within a process. This helps with the separation of value and non-value added steps. Wastes fall into the falling categories; Transportation, Inventory, Motion, Waiting, Over-Processing, Over-Production, Defects and Latent Skills (the latter being typical of public service organisations)
- **Kano Model**
  The Kano model of "Customer Satisfaction" helps to split customer needs into basic, expected and delighted categories. Directing activity towards the achievement of these category levels helps to separate out basic service provision from that of the achievement of "excellence" or "excitement" among customers about your service or products. It is also worthy of note that service considered "excellent" now may become a "basic" requirement in 5 years' time as expectations increase, technologies improve and competitors emerge.
- **Visual management**
  Visual management is a powerful tool to understand what is physically going on in a process and to identify what is under control and what is not. Visual management helps with:
  - ✓ understanding and indicating work priorities;
  - ✓ showing what standards of work should be;
  - ✓ identifying the flow of work and what is being done;
  - ✓ communicating to everyone what performance measures are in place.
- **Pareto analysis**
  Pareto analysis is used to separate out the vital few causes from the trivial many. Often 80 per cent of the problems are due to 20 per cent of the causes or factors (the 80/20 rule). By graphically separating the various aspects of a problem, a team can make an evidence based decision upon where to direct its improvement efforts.
- **Project charter**
  The Project charter provides an overview of the project and serves as an agreement between management and the improvement team regarding the expected project outcome. A project charter consists of several parts, all vital to identifying project expectations and gaining approvals and commitments from project champion (and or sponsor) in support of the goals of the project. This tool is generally used in the "define phase" of the DMAIC within the SLEEK methodology.
- **Supplier-input-process-output-customer (SIPOC)**
  The SIPOC is primarily used to document a process at high level and visually show the process from supplier's inputs to the products or services received by customers. The key purpose of a SIPOC diagram is to identify:
  - ✓ the key outputs and customers of those outputs

- ✓ the process boundaries and key activities
- ✓ suppliers and the key inputs to your processes
- ✓ all the CTQ requirements for the inputs, processes and outputs

- **Rapid improvement workshops (RIW)**
  The term RIW is synonymous with rapid improvement event and Kaizen Blitz. The workshops are focused on local processes (usually departmental) with a view to tackling some of the obvious problems or issues in processes within the timeframe of the workshop (generally three to five days). The advantages of the workshops are:
  - ✓ Participants are engaged in the change process.
  - ✓ Decisions can be made rapidly given the representative stakeholders are present.
  - ✓ Ability to develop a cross-functional team of managers and employees working together to tackle a problem.
  - ✓ Focus is on the practical, implementable solutions.

Sustainability

Although the SLEEK project successfully trained over 60 staff the requirement for further training and indeed initial training for others still exists. A "Skills Gap" still needs to be filled across most areas of the University, if staff are to be appropriately armed with the correct tools, techniques and expertise to become genuine "process thinkers" and able to support any continued institutional effort towards significant change in this area.

12 staff names still remain on a "Waiting List" having registered their interest in future training courses and many heads of departments or line managers have requested "team" or "group" training be made available. The nature of the tiered structure of this type of accreditation naturally lends itself to staff wishing to progress - from yellow belt- to green - to black -in turn creating demand for further training and support.

It was always the intention that the SLEEK Programme training would eventually "branch away" from the DMEM commercial course and for Professor Antony to remain involved in a more supervisory and mentoring capacity. Further it remains important that staff receive a consistent level of training going forward that ensures they have access to appropriate materials and support that is aligned with institutional thinking and with longer term sustainability plans. The true benefit of the tools and techniques rolled out during the training will only be realised if they become embedded as part of a recognised and consistent approach.

It is recommended therefore that no further Strathclyde staff are registered or accepted onto Yellow and Green Belt LSS courses in the short term, until decisions are made on appropriate training and support for the new infrastructure being considered. Given the transfer of responsibility for process improvement, the recommendation that future training plans remain solely at the discretion of HR is made.

Department/Faculty / Project support and collaboration

During the programme pilot SLEEK also supported a number of department and faculty activities and some corporate level projects. For example SLEEK ran a series of workshops with the Student Records team, helping them to document existing processes and to set new process improvement

targets for the re-focussed project. A series of meetings were held with the TIC team and a process improvement workshop to aid the drafting of operating policies for all stakeholders was planned – this has since been put on hold pending the outcome of resource discussions etc.

Donna Cullen (IS) and Gerard Graham (HR) worked closely with Professor Antony (DMEM) and Catherine McMillan (IS) to develop a strategy for the SLEEK Programme Pilot. Input from HR was crucial to success and the collaboration between IS & HR pivotal to pushing the process improvement agenda across the institution. It is anticipated that this strong relationship and shared understanding will aid the smooth transfer of activities from IS to HR.

The Estates directorate have also been strong champions of SLEEK and a directorate prioritisation revealed a number of areas that SLEEK could support in the achievement of operational excellence. As such Jim McConnell, Director of Estates, attended the SLEEK Yellow Belt training along with his assistant directors and all are currently engaged in SLEEK projects.

SLEEK was also recently invited to speak at the University's "Developer's Forum" and as a result has begun to support IS's Applications Support & Development Team in documenting and prioritising processes, with a view to kicking off local process improvement activities, while giving staff involved the opportunity to get up to speed on SLEEK tools and techniques. "Creation of new User Accounts" has been identified as a key process for application of the SLEEK approach and continuing this work would directly benefit student and academic stakeholders.

SLEEK has also had a number of parallel discussions with the Finance department, whose activities around the procurement of the new finance system and the associated Unipart work in support of this effort, has resulted a number of synergies and possible opportunities for collaboration in shaping the institution's wider vision for process improvement. Four staff within finance have been trained to Yellow Belt level, with projects currently on hold, pending wider discussions.

SLEEK has supported the HaSS Faculty through meetings and workshops during and after the merger looking at processes around "Speeding up the assessment marking & feedback process & reducing duplication in the recording of marks". Lorna Dougall, HaSS Faculty manager and SLEEK Green Belt, is leading this effort with significant improvements expected to be reported in the first half of 2013.

Further, SLEEK is working closely with staff in the Science Faculty to implement efficiencies around "Standardising Examination Procedures for Disabled Students with 25% Additional Time". The Disability Service have also been involved and are extremely keen to implement lessons learned.

Sustainability

These collaborative activities were seen as a particularly fruitful part of the SLEEK Programme Pilot as they provided opportunities for cross-disciplinary working and for embedding the new methodology within the more general operations of the University. A "sea change" was noted that prompted a number of institutional projects to begin to re-consider their general approach and think in terms of processes instead of systems or outcomes. Managers have remarked that SLEEK has completely changed the way they are approaching day to day tasks. The demand for process improvement support is clear and it is hoped that the team put in place to facilitate BPI going

forward will also be in a position to support day to day operational teams across the University in this way.

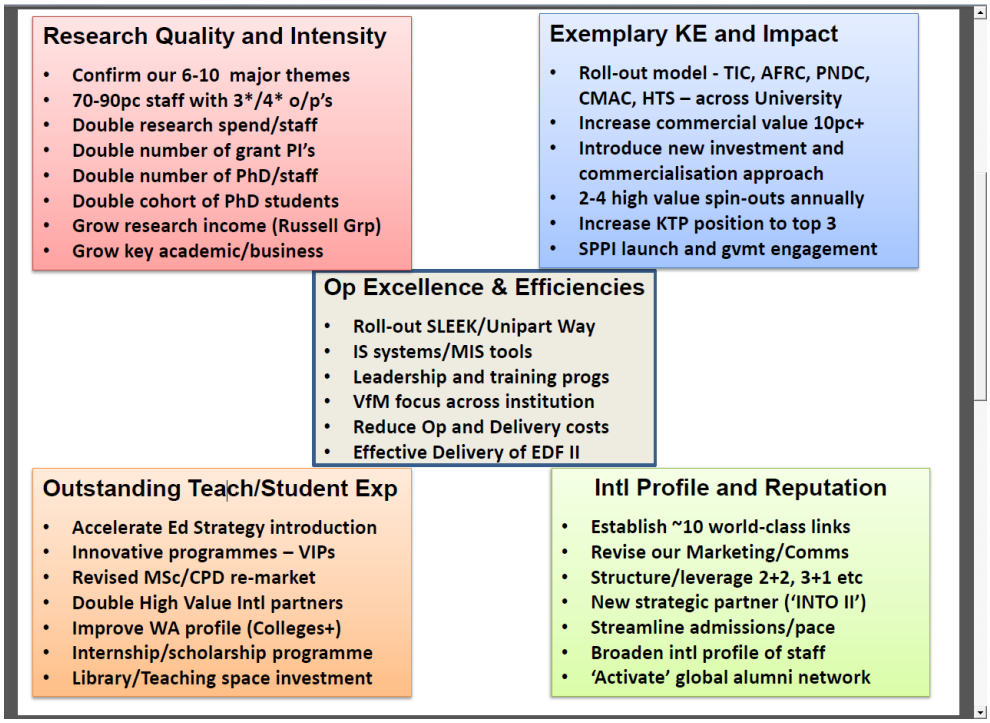
Evidence shows that SLEEK has informed many departmental/ faculty and project strategies and plans, and given the relatively short period of the programme pilot the readiness of staff at all levels to incorporate and embrace the SLEEK methodology is a significant outcome and lesson learned. SLEEK currently forms part of IS strategy and as such any handover of activity to HR should take account of this re-focus. Further a decision is required on future activities with TIC and Estates in particular.

Institutional Strategy, Marketing & Communications

From the outset the SLEEK Programme Pilot was closely aligned with wider institutional strategies. From its initial ISC remit the programme gained momentum quickly and secured the backing of a number of senior staff and key process owners across the institution. There was widespread recognition that operational processes needed to improve and efficiencies and effectiveness could better be achieved through dedicated effort and collective responsibility for change. SLEEK's championing of a "tailored" version of LSS (that also encourages elements of Systems Thinking) appealed to many and the success of the methodology in Engineering, Manufacturing and latterly public sector organisations such as the NHS, gave a strong argument from which to build a "Burning Platform" (See Section B) for widespread continuous improvement. The programme began to report directly into the Chief Operating Officer, Hugh Hall, who ensured the Executive Team and professional services directors were briefed periodically on progress. The Senior Management Team, who were also in discussions with external company Unipart, then began to shape a vision for process improvement across the institution that could capitalise on the great enthusiasm and fantastic staff-led process improvements emerging from SLEEK, while ensuring a sustainable platform and infrastructure was developed that would allow Strathclyde to make significant progress in key process areas quickly.

In an update to the Strategic Plan (2011-2015) the Principal, Sir Jim McDonald, demonstrated the institution's commitment to achieving operational excellence and efficiencies and effectiveness through process improvement, and a commitment to a sustainable solution through partnership working between SLEEK and Unipart as seen outlined in Figure 1.1.

Figure 1.1: Update to Strategic Plan



Process Prioritisation Exercises

The Programme Pilot also initiated a series of process prioritisation exercises, with buy-in to carry out these activities, secured at the highest level. All Deans of Faculty were visited by Hugh Hall and Donna Cullen to ascertain pressing process problems and professional services directors were canvassed for opinion through group meetings, workshops and an on-line survey (See Section B for details) Figure **1.2** shows the Prioritisation Matrix used in Directorate level exercises and **Figure 1.3** the process priorities identified through senior management consultation during the Programme Pilot.

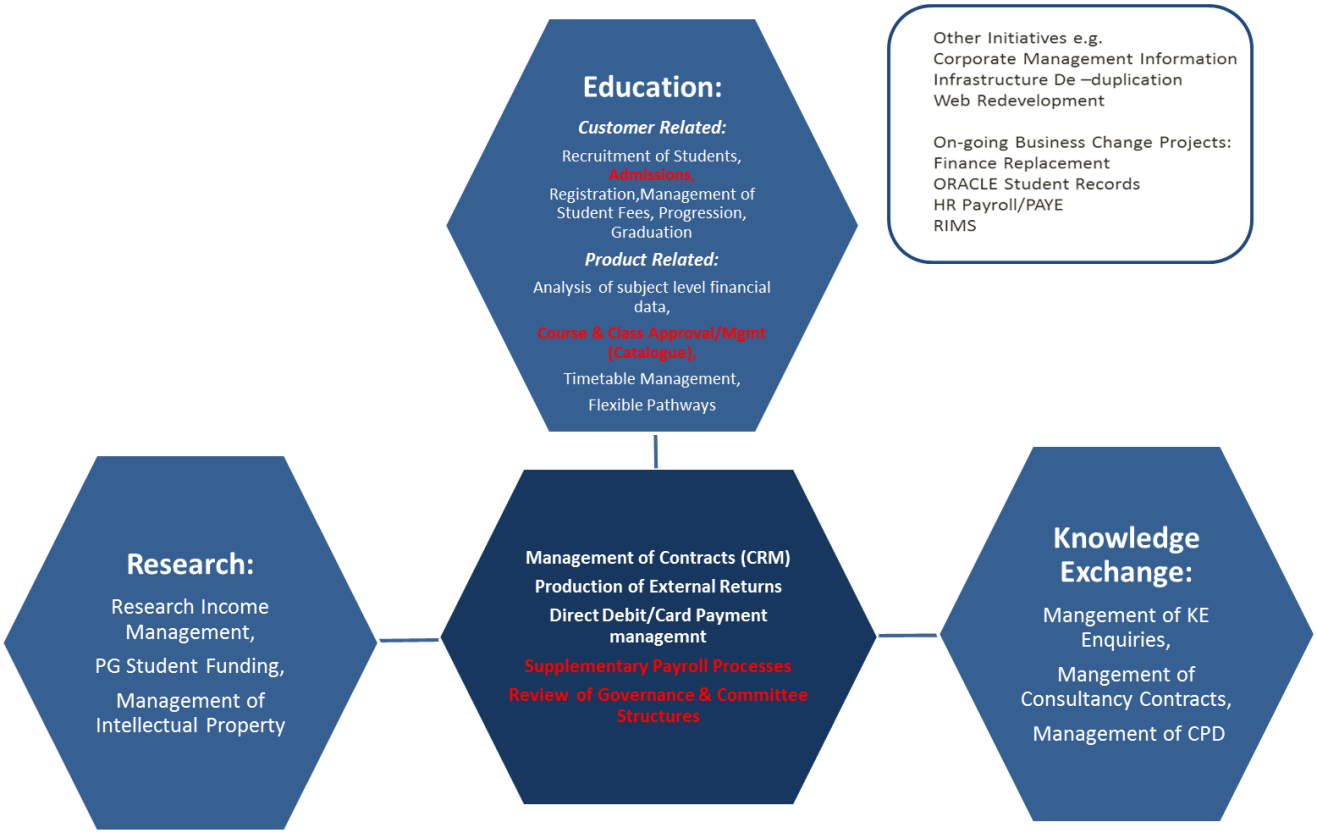
Figure 1.2 SLEEK Project Selection Criteria Matrix

Scoring Criteria

Decision Criteria

	0-2	3-4	5-7	8-10
Direct links to Strategic Goals	Indirect Alignment	Some Direct Alignment	Strong Alignment	Very Strong and Direct Alignment
Customer Satisfaction Impact	Customer may notice	Customer will appreciate	Major Customer Concern	Customer demands Improvement
Cash Releasing	0-30k	30-50k	50-100k	100k+
Notional Cash	0-15k	15-25k	25-50k	50k+
Return on Investment	2+ years	1-2 years	1 year	6 months
Time Releasing	Up to 0.2 FTE	0.2-0.5 FTE	0.5-1.0 FTE	1.0+ FTE
Time to resolve problem	+180 days	91-180 days	31-90 days	30 days
Resource Availability	None	Low	Moderate Amounts	Committed Amounts
Data Availability	Does Not Exist	Attribute data available	Large Database Available	Strong Variable Data
Measurable	Complicated and Expensive measurement	Moderate Complexity and Cost	Low Complexity and Moderate Cost	Easy Measurement at Low Cost

Figure 1.3 Corporate Priorities for BPI as identified by the SLEEK Programme



Sustainability

The SLEEK Programme Pilot has championed process improvement across the institution and become associated with this objective. As the pilot comes to a close this advocacy role should now be transferred, together with the responsibility for achievement of institutional process improvement strategies and associated reporting e.g. SLEEK currently reports into the Principal's monthly business report. A Communication Strategy to communicate the results of the pilot and associated process improvement case studies had been discussed with Marketing and Communications. This has now been placed on hold pending anticipated plans. A decision is now required on the communication of results and lessons learned to mark the end of the programme pilot.

Within the timeframe of the SLEEK Programme Pilot it was impossible to carry out an all-encompassing "Process Prioritisation" exercise and as such the requirement for this activity still remains. The information gathered through such an exercise would also prove a very useful starting point for future activities and should provide an insight into the general consensus on where process improvement activity should be targeted going forward.

Materials and SharePoint

The SLEEK Programme SharePoint site[2] stores all SLEEK materials and associated process documentation (Process Flows, SIPOCs etc.) Workflows have been created to support staff with

[2] https://moss.strath.ac.uk/sleek

process improvement projects, allowing them to submit process documentation for on-line feedback. A Process Improvements Register for management reporting is also available here, with scope for developing a number of different views for sharing information with different stakeholder groups.

SLEEK Case studies will also be displayed here making this space the single best resource for accessing the outputs and findings from the SLEEK Programme Pilot. Opportunity exists to continue to use this space to share best practice and process improvement information and the site has been designed with flexibility in mind.

Sustainability
Donna Cullen and the Development and Innovation team currently support, maintain and populate this site, with some copyright implications concerning DMEM's training materials. A decision is required on the continuation of this space and its artefacts and indeed its purpose within the context of the wider programme should now be considered.

External Collaboration

During the SLEEK Programme Pilot a number of connections were made with external bodies, most notably NHS Scotland, and other HEIs. Strathclyde called for the set- up of a "Process Improvement Network" across HEI's in Scotland and as part of an external Leadership Foundation bid canvassed support for a joined up approach to process improvement across the sector. Resulting from these initial conversations Caledonian University, Edinburgh Napier University, Aberdeen University, University of Edinburgh and St. Andrews University have all expressed an interest in some group activities towards this effort. Some joint workshops, papers and conference submissions for the LSS in HE Conference, being hosted by Strathclyde in June 2013, are also being muted.

Professor Jim Mather, visiting professor to DMEM and former Minister of Enterprise for Scotland[3], has also been a strong SLEEK champion and has acted as an advocate of the programme helping to establish connections internally with DMEM and SIOM and externally with the Scottish Parliament, NHS Scotland, Quality Scotland, GAEL Ltd.[4] , Vanguard Consultancy and many more. His advice and insight led to the "Systems Thinking"[5] dimension of the SLEEK tailored methodology (See Section C) and maintaining this connection would continue to ensure process improvement efforts at Strathclyde remain in line with other sector wide considerations.

Sustainability
In recent weeks the SLEEK team has taken a deliberate "back seat" with communications with external bodies. A decision is now required on progression of such communications.

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[3] http://www.scotland.gov.uk/About/14944/Scottish-Cabinet/jimmathermsp

[4] http://www.gaelquality.com/about-gael

[5] http://www.systemsthinking.co.uk/1.asp

Meetings are scheduled with Aberdeen University for late February 2013 and a group meeting with all interested parties is being organised for early March 2013. Caledonian University have now taken on the organisation of the first group meeting at our request.

Research

All research aspects of the SLEEK Programme Pilot and the tailoring of LSS methodology for HE has been led by Professor Jiju Antony, Director of the Centre for Research in Six Sigma and Process Excellence (CRISSPE), within DMEM[6]. Professor Antony believes that there are unique opportunities for leading research coming out of the Programme and as such has invested a lot of time in supporting and decoding the impact applying this type of methodology could have on an HEI such as Strathclyde. SLEEK draws on the success of LSS and Systems Thinking in manufacturing, engineering and public sector organisations but, through SLEEK, is being adapted and tailored to meet the very unique circumstances of the Higher Education environment. The blend of tools and techniques incorporated within SLEEK, Professor Anthony believes, are entirely transferrable and could provide a collaborative framework for benchmarking across Higher Education Institutions (HEIs) In Scotland.
Professor Antony is keen to publish the findings from the SLEEK Programme Pilot and to continue to be involved in supporting process improvement here at Strathclyde. His research findings could lead to a number of celebrated articles and research associated activities e.g. the first article on process improvement here at Strathclyde has already been published; "Lean Six Sigma for higher education institutions (HEIs): Challenges, barriers, success factors, tools/techniques", in the International Journal of Productivity and Performance Management[7] and the first International LSS in Higher Education conference is currently being advertised for June 2013 – this conference is being advertised as "sponsored by SLEEK" and SLEEK Programme Manager Donna Cullen has been invited to Co-Chair the conference with Professor Antony.
As part of DMEM, Professor Antony also works with the Strathclyde Institute for Operations Management (SIOM)[8] and during the SLEEK Programme Pilot a number of discussions took place as to a possible role for SLEEK within wider plans for a SIOM "Operational Excellence Hub" -operating as part of TIC. These discussions are on-going with a view to considering joint activities in the future.

Sustainability

SLEEK has been supporting this research dimension here at Strathclyde. Donna Cullen has provided support to Professor Antony throughout the pilot e.g. tailoring the LSS methodology for HE, developing process examples and case studies, shared supervision of two MSc students working on related projects, Yellow and Green Belt training/ project support & accreditation and with SLEEK sponsoring the up and coming International Conference. Consideration should now be given as to the likely continuation of this research dimension as part of wider operational concerns and to the appropriate level of continued engagement of the staff involved. The research dimension is

[6] http://www.strath.ac.uk/siom/research/centres/#d.en.79390

[7] http://www.emeraldinsight.com/journals.htm?issn=1741-0401&volume=61&issue=8&articleid=17062689&show=html

[8] http://www.strath.ac.uk/siom

arguably a longer term concern and as such it is recommended that internal activities in line with immediate operational objectives take priority.

Evaluation of Pilot Programme

Summary of achievements against objectives

Successful delivery against initial ISC objectives has been achieved as detailed below:

Objective 1 – Establish a methodology

The first objective outlined to Programme Manager Donna Cullen, was the establishment of an appropriate methodology and notation for taking process improvement forward across Strathclyde. Lean Six Sigma was identified as this methodology and this was accepted at ISC and by Senior Management as being fit for purpose. There was a recognition however that implementing LSS wholesale within Strathclyde would not achieve the desired results and a tailored approach was therefore established that saw the blending of tools and techniques within lean and six sigma with systems thinking – SLEEK was established as a new Strathclyde "tailored" methodology for process improvement and a framework to communicate the methodology and develop the appropriate infrastructure for its application was developed. More information on Programme Pilot Stage Boundaries and the practical roll out of the methodology is available on the SharePoint site[9]. The methodology brought new tools and techniques that in turn established a consistent and recognisable notation. Most notably (as described earlier); Project Charter, DMAIC, SIPOC, Process Flows, 7 Wastes, CTQ's and Pareto analysis. The creation of SLEEK therefore saw the fulfilment of Objective 1.

Objective 2 – Provide Training

The SLEEK Programme pilot incorporated formal staff training in the tools and techniques of process improvement and LSS. This programme was developed in line with DMEM's already established and highly successful commercial course, with new HE relevant materials, examples and process flows. The SLEEK Programme also introduced a new dimension to the typical Yellow Belt in LSS accredited training, that of a Yellow Belt process improvement project, to be completed by the trainees after the training. Introducing the SLEEK process improvement projects was a novel approach to get staff comfortable with the tools and techniques while generating support and enthusiasm for the wider approach. It also served as a demonstration of the possible returns in investment of applying this methodology to process problems. To date the SLEEK Programme Pilot has seen over 60 people trained in the methodology with over 40 projects initiated. Associated workshops and rapid improvement exercises are still currently being carried out to support staff engaged in process improvement projects and case studies and worked examples are being developed to help inform future activities. The demand for training on the methodology and on process improvement tools and techniques was and remains significant – so much so that demand for training has now exceeded supply and it is clear that a dedicated and sustainable training programme is now required going forward. A SLEEK training programme was developed and piloted with great success and lessons learned are available to inform next steps thus fulfilling the second objective of the programme.

[9] https://moss.strath.ac.uk/sleek

Objective 3 – Provide a SharePoint space

The SLEEK SharePoint site[10] provides a space to store, all programme documentation, encourage collaboration and report on process improvement across the institution. Lessons learned and case studies will be posted here as a final deliverable of the Programme pilot. This fulfils the third objective as laid out by ISC.

Programme Stage Boundaries

For any organization, the first step in a Lean Six Sigma deployment is deciding to use the methodology. Once the leadership of an organization believes they can benefit from using Lean Six Sigma, there are a number of key stages and steps that should then be followed to achieve success[11] The SLEEK Programme Pilot followed 9 key Steps/Stages, which are mostly applicable to all lean six sigma initiatives, but with some new facets specifically added to suit the HE environment and steps tailored to account for the more unique aspects of the academic environment. Research into successful deployments across a number of industries gives credibility to the "steps" outlined in Figure 1.1 below. Please see the SharePoint site for the full SLEEK Programme background and for an analysis of the extent to which each step was achieved within the lifetime of the SLEEK pilot.

Figure 1.4 SLEEK Programme Pilot Stage Boundaries

[10] https://moss.strath.ac.uk/sleek
[11] http://www.isixsigma.com/implementation/success-factors/8-steps-successful-lean-six-sigma-implementation/

Summary of Improvements

During the course of the SLEEK pilot a number of improvements were achieved, some directly linked to solving process problems and others with a wider connection to staff morale, personal development and institutional strategies.

Return on Investment

The LSS methodology suggests the Return on Investment ratio for a yellow belt project is approx. 1:5 and for a green belt 1:10. Therefore, upon completion the SLEEK Programme Pilot could achieve time and cost savings equating to around £210,000 at a conservative estimate (based on 35 yellow belt projects expected to achieve at least £2000 each and 7 green belt projects charged with savings of at least £20,000 each) The industry rate for green belt training is nearly £2000 per person with Strathclyde receiving a significant discount – therefore the projected 1:10 saving is based upon this figure (i.e. 1:10 on £2000 = £20,000) – actually making the projected return on investment for green belt projects even higher at Strathclyde (approx. 1:15)

Projects to date have already saved over £60,284. The initial investment in training of 55 staff at £400 per Yellow Belt and 7 staff at £1300 per Green Belt (paid by department heads to DMEM) brings the total training cost to £31,100. The cost of the training during the Programme Pilot therefore has already been more than covered by project savings. **A conservative estimate of the final total saved, based on all remaining projects being supported to completion (minus training costs), is therefore £178,900 -** even allowing for the 10 staff who have left the institution and the other 12 staff unable to partake in projects.

These figures do not take account of staff time while engaged in project activity, however considering all projects were aligned with existing process problems that needed to be addressed, the time speculated to resolve would arguably need to have been allocated regardless – and the argument is made that without the tools and techniques and support of the SLEEK programme then more time would in fact have been wasted and process problems remained unsolved. The skills of the staff gained are also transferable so this initial investment will continue to bring benefits going forward.

Institutional Level Improvements

At an institutional level the following successes were noted in connection with SLEEK activity;

- ✓ Transparency of processes
- ✓ Sharing of knowledge and understanding
- ✓ Consistency in approach
- ✓ De-duplication
- ✓ Removal of waste
- ✓ Cost efficiencies
- ✓ Time saving efficiencies
- ✓ Improved morale
- ✓ Staff development through application of the methodology, tools and techniques

- ✓ Staff enthusiasm
- ✓ Collective effort towards "One Strathclyde"
- ✓ Cross-disciplinary working

Process Level Improvements

At an individual process level the results were more tangible and quantifiable and further improvements are expected as project results are received in February and March 2013. **Figure 1.5** shows a summary of some of the results achieved at January 2013, detailing the efficiencies made from old to new improvement process and documenting the measures most critical to quality (CTQ's) for "customers" of the process.

See the SLEEK site for full case studies.[12]

[12] https://moss.strath.ac.uk/sleek/casestudies

Figure 1.5 SLEEK Process Improvement Projects Summary

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
Develop better IS provision of data for reporting from the PURE database • Process Lead - Jennifer Ross (IS) • Main Process Customer - RKES	Develop a process to query the data in the PURE live database which is efficient, user friendly, up to date, flexible and satisfies the requirements for RKES requests for data held within PURE. ***Efficiencies*** **£1,985 savings in Staff Time** • "New Table" Process time cut from 3 days to 24 hours • "CLOB data" time cut from 2 days to 0 days • IT Department time removed completely • Little to no re-work in the new process ***CTQ's*** • Data now available within working hours • RKES now having direct access to live and up to date data within the system • Easy to use with agreed user interface now in place • Speed of retrieval is now to agreed targets.
Rationalising Scanning Service processes to achieve time and quality efficiencies • Process Lead – Eileen Ulas (Scanning Service) • Main Process Customer – Students and Staff	Design and implement improvements to the current Scanning Service to ensure delivery of required documents to students timeously while making efficiency savings ***Efficiencies:*** **£10,353 (Year 1)** **£14995 (Year 2)** • Involvement of 4 departments reduced to 1 • 28 process steps reduced to 18 • Variation of turnaround time from receipt of request to scan- reduced from 0.3-15 days to a consistent 4 days for CLA and 10 days for books (and improving) • Work re-allocated to staff on more appropriate grades preventing "Latent Skills" waste • Real "Cost" of scanning service now quantifiable ***CTQ's*** • Customer "Service Level Agreements" now in place • Clear and consistent process delivering results in agreed timeframes

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
	• Quality and security of scans checked and assured.
Speeding up and improving processing credit/debit card payments in the Alumni Telethon process • Process Lead – Holly Salvona (Alumni & Development) • Main Process Customer – University Donors	Identify and reduce the true cost (both financial and staff time) of processing debit/credit card donations in a non-electronic format during telethon campaigns. ***Efficiencies*** **£576.00 (for every telethon) - with increased donations the saving would also increase incrementally.** • Turnaround time for one donation reduced from 19 min to 8 min - 50% reduction! • Processing cost reduced from 5.78 pence to 1.78 pence per donation • Processing variation reduced from 5-18 days to a consistent 24 hours • Overall Gift Income has increased (without extra donations) due to faster turnaround time and reduction in errors typical in the old process • 3 departments involved reduced to 1 • Savings in paper and printing costs • Opportunities to transfer lessons are high • Risk of lost donations reduced to zero. ***CTQ's*** • Increased donor satisfaction • Donor details secure and error free • Donation card rejections resolved within 7 days – previously income would simply have been lost. • Donor experience consistent and satisfactory removing risk of non-repeating donations
Reducing the number of cheques raised in Finance • Process Lead – Tracey Bennett (Finance) • Main Process Customer- Recipients of cheques	Identify the cause of cheque payments within Accounts Payable and investigate ways to reduce while improving the payment process and reducing cycle time for payment to customers ***Efficiencies*** **Exact figures to be confirmed in coming months** – anticipated results: • Number of cheques reduced from 14% (8000 per year) to 6% (3500 per year). Expected to reduce further to target of 3% (agreed tolerance for exception payments) • Reduction in Staff time and costs associated with processing/posting ***CTQ's*** • Prompt payment of invoices

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
	• Better experience for recipients of payments • Reduction in errors in the process.
Improving the Software Management and Purchasing processes • Process Lead – Evelyn Trearty (IS) • Main Process Customer – Purchasers of Software within Information Services	The Software Board wish to make efficiency savings in the current process for purchasing software within the University. This project will pilot a new approach within IS to provide proof of concept and feed into a wider "Green Belt" project that will review software asset management across the institution – this will be led by Donna Cullen. ***Efficiencies:*** **£2,190 savings annually (Just in IS Sales)** • 12 "error prone" to 9 "error proofed" steps • Variation in purchase and processing reduced from "months" to 5 days • **£910** was spent last year on software available to download under site licences for free from Pegasus. • Reduced processing time and costs for purchase of software by **£400 per annum** by displaying Civica catalogue within pECOS. • Inclusion of the Civica catalogue within pECOS allows for comparisons on software purchases - **£180 wasted last year by choosing more expensive supplier of same goods in error** • **Waste of £300** in staff over-processing time identified • **Waste of £400** on unnecessary "media" purchasing identified and highlighted • The knowledge gained through this project could be transferred to the wider remit of streamlining software acquisition/purchasing practices across the entire University. • The lessons learned have already helped to inform the software asset management policy (SAM) which has in turn supported the redesign of the Software Board. • Process is now being looked at as part of wider "Green Belt" review of software asset management ***CTQ's*** • Obtain software within 5 days from request being raised • Purchase at lowest cost • Provide user with appropriate download/installation instructions. • Provide user with access to software info. and pricing reducing opportunity of more expensive/ unnecessary product being purchased in error.

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
Streamlining administration processes around IS annual leave • Process Lead – April Woods (IS) • Main Process Customers – IS Staff	The integration of 3 separate service departments to form IS has resulted in a variety of administrative processes and procedures being used to request and approve annual leave. Requirement to introduce one process, streamline requests, remove duplication and speed up approval. ***Efficiencies*** **£5122.62 Savings** • Turnaround from request to approval reduced from 2 weeks to 1 hour 5 min on average (with a variation of 1 minute to 23 hours) • All requests for AL now received and processed within 24 hours • 5 Staff at 1 hour 48 min each week to process reduced to 1 member of staff at 1 hour 30 min per week • 10 paper based methods reduced to one consistent "12 step" on-line process • Paper to on-line - saving in printing and internal mail costs • No duplication between paper and system (line managers also previously kept own records) • Reduction in opportunity for error to nearly zero • Greater accuracy from staff when requesting leave ***CTQ's*** • Consistent clear process for all staff has been achieved and implemented • Staff and managers able to understand process and responsibilities within process in line with HR policy • Staff and managers able to see record of requests throughout the year to ensure annual leave expended within annual leave year in line with HR policy. • Ability to review days remaining in order that carry forward of greater than 5 days can be minimised in line with HR policy • Ability to compare requests from staff to ensure operational cover
Reviewing the Governance Structures of the ISC Committee • Process Lead : Nicola Smith • Main Process Customer -ISC Project Sponsors & Managers	**Approx. £22,000 savings** ***Efficiencies*** • 11 boards reduced to 3 (including closure of software board at significant saving) • 19 members reduced to 6 (saving in staff time and associated cost) • 50% reduction in the number of meetings held each year • Meeting times reduced from routinely 2 ½ hours to a targeted 1 ½ hours

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
	• Previously no timeline for decisions – now project decision turnaround time is 6-8 weeks for major projects and 3 weeks for tactical projects • Governance has moved from "red" to "green" on the IS Operational Plan • Previously no recognised support infrastructure in place – now supported by PAT (Information Strategy Project and Training Office) • Re-work and duplication wastes have been removed – both staff time and committee materials (printing and storage of documents) • Previously no formal methodology or Quality Assurance –now there is a recognised ISC Governance process and infrastructure in place • Customers are readily consulted and report they are happy with the new structure and process. • An IS portal is being rolled out in Feb 2013 to provide a standardised project board site for the management of all associated paperwork and the display of management information. Workflows have been customised to facilitate collaboration on risks and issues with the ability to "escalate" where appropriate. • Multiple source to single source data
Improving data gathering, storage and feedback to the RCUK ROS. • Process Lead – Scott Kilgariff (RKES) • Main Process Customer - RCUK Grant Holders and funders	Create and refine a new process to minimise data entry effort and inaccuracies in research outputs metadata entered into RCUK system ***Efficiencies*** **£3,632 (annually recurring)** • The financial saving of £3,632 relates to the initial task of uploading for the first time all of the publications associated with RCUK grants (estimated at 1701) • Processing time of 30 min per annum per grant at a rate of £40/ hour now completely removed • Replacing current process with a centrally managed upload system will **save approx. £8k per annum**. (based on 200 grants requiring to be updated) • Two separate processes for grant holders reduced to one • Removal of duplication of data between the RCUK - Research Outcomes (ROS) system and the centralised Research Information Management system - PURE • Opportunity for manual data entry error is removed as the new process transfers records electronically

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
	from PURE, a system which already has data checking built-in. • Associated reduction in both UoS and RCUK time spent correcting errors and updating data. • Additional content types such as Impact, Follow-On Funding and Knowledge Exchange records will follow in future years. Continuing to review this process in line with this will ensure time/cost savings in future years. • The new process also reduces the number of defect records being sent to RCUK and will therefore reduce costs for that customer ***CTQ's*** • Accurate research outcomes metadata (RCUK & Strathclyde RCUK Grant Holders), and associated planning • Minimal data entry for (Strathclyde RCUK Grant Holders)

Standardisation of RKES Managed Funding Calls
• Process Lead : Emer McDougall (RKES)
• Main Process Customers:
	Review, standardise and implement a process for funding calls managed within RKES. Ensure other potential call managers in RKES understand the process and why revisions have been implemented
	Efficiencies
	£2,000 (per unplanned call avoided)
	Opportunity cost reduced by £2000 - if the number of unplanned funding calls is reduced by only one call.
	Prevention of potential unseen costs.
	• Projects start on time
	• Allocation of funding used is increased
	• Removal of staff time associated with unplanned calls:
	  ○ 4-5 days of admin
	  ○ 0.5 x 8 of senior academics (some at Vice Dean / Senior Officer level)
	• Standardisation of the process and inclusion of mandatory process route
	• Inclusion of HoD approval to ensure all direct costs for new staff are covered, plus indirect costs, their implications and workload implications are considered upfront. Minimising the impact on a HoD's resource management and increasing the chance of projects starting on time.
	CTQ's
	• Reduced the number of process queries from the same academics (increase consistency of processes)
	• Time (cost) to complete process does not exceed the benefit (funds)
	• Reduced number of unplanned, internally funded research projects in the department

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
	• Reduced unplanned / unexpected costs to departments from successful funding applications.
Streamlining of Exam Board Decision Code Processing • Process Lead: Margaret McNaughton (IS) & Elaine Beattie (Previously SEES) • Main Process Customer: Students	Inaccurate recording of exam board decision codes can cause significant problems for both individual students and the reputation of the institution as a whole. Removing the opportunity for error and in the longer term reducing the overall number of exam codes available within the system will remove this risk. **£4253 Savings** ***Efficiencies*** • 2 departments involved reduced to 1 for input of exam board decisions • Removal of non-value added steps • Removal of SEES staff time – no longer attend board meetings • Removed opportunity for error as over-processing removed ***CTQ's*** Intention to achieve the following in line with wider student records improvements • 100% accuracy for decisions being released within 3 days of the date of the meeting of the examination board prior to them being released. • 95% accuracy for decisions on initial input. • Overall reduction in the number codes – estimated to be 90 down to approx. 20 codes.
Improve PGR student registration timescales in relation to fees and stipend payments. • Process Lead: Julie Sobocinski (CIS in Science faculty) • Main process Customer: Students, RKES & Finance	Reduce the turnaround time of the registration process, in terms of delays with the payment of fees and/or stipends and reduce delays with payments to the student from already allocated funds. e.g. Studentships/scholarships. Streamline the process for the benefit of departments/faculty/finance and student records, overall saving staff time and improving the student experience. **£7,031.13 (annually) – based on estimated average time spent dealing with delays, by 5 members of staff across 4 departments, for 1000 students.** This type of project is very typical to HE and a good example of a project that does not fit neatly into an LSS "Data-Driven" project. Without previous data measures in place (as is typical in a number of areas across the institution)

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
	it is difficult to quantify exact savings so a survey of students who experienced problems was carried out and calculations were based on a sample set of 1000 students. ***Efficiencies*** • Overall turnaround time for registration through to payments of fees has been reduced. Estimates suggest that for 1000 students previously **416.66 hours across 4 departments was being spent** dealing with issues and delays. This time has now been greatly reduced by utilising existing Science system "Spider" to improve PGR funding data management across CIS. • 13 "error prone steps" reduced to 9 "error proofed" steps. • The system now provides **single source data,** easily accessed online and provides a single point of reference. • Data is now visible and accessible to all approved users e.g. RKES, Faculty & Finance • Removal of duplication of data across departments and associated opportunity for error • Removal of requirement to manually enter budget account codes and associated opportunity for error ***CTQ's*** • RKES can now view student detail online speeding up award of studentships • RKES can now use this as a definitive record of all student funding across CIS (and ultimately if rolled out the whole institution) • Finance can view data and export more easily to action payments to students quicker • Process problem resolved within CIS without need for investment in new system (although some modification to existing set up would be required for institutional roll out) • RKES are now taking this project forward and reviewing the wider process with an opportunity for this to be rolled out across the institution at even greater saving
Automate reporting to training providers from University online booking system • Process Lead : Rehman Mohammed (IS) • Main Process Customer: Training providers	Each of the training providers who use the University's online booking system has a series of diverse reporting requirements. Eliminating the manual process by migrating the database to SQL Server will achieve efficiency savings ***Efficiencies*** **£2138 (annually)** • The £2,138.40 per annum savings relate to savings on reports which are currently run. • Removal in opportunity for error or duplication of data

Process Improvement (Staff/Depts.)	Summary, Efficiencies, CTQ's
	• The range of reports which can be generated will now increase at least two-fold following the automation of the reporting process meaning that future potential savings and efficiencies could rise to **between £4k and £5k per annum** • Time released of staff who had to run manual reports ***CTQ'S*** • Reports available to training providers on a 'live' basis rather than 'historical' reports which are updated on a weekly or monthly basis. • 100% accuracy of data to training providers now provided
Streamlining Overseas PG applications • **Process Lead** – Bronagh Dallat • **Main process Customer** - Overseas applicants to postgraduate study in the Faculty of Science, University of Strathclyde **(Results target April 2013)**	Applications from PG overseas applicants are not being dealt with in an acceptable time frame. This project is looking at the causes of delay in making decisions on PG applications from overseas applicants and will seek to implement a plan to improve the speed of decision-making with a view to improving intakes in 2012/13. **Current performance** Decisions are with the Selector for 21.36 days, with an overall range of 184 days and a standard deviation of 25.78 days. ***CTQ's*** • All decisions to be returned within 21 days • Failure to make an offer within (number of days to be agreed) is a defect
Speeding up the assessment marking & feedback process & reducing duplication in recording of marks • **Process Lead** : Lorna Dougall (Green Belt) Cathy Smith (Yellow belt), Gwen McArthur (Green Belt) - HaSS Faculty • **Main Process Customer:** Students and Academic Staff **(Results target April 2013)**	One of the largest paper handling and error prone tasks is receipt of assignments for marking and return of assignments, with feedback, to students. The number and variety of assignments means different processes are in operation. There are a number of areas where we can easily identify errors but there may also be hidden, as yet unknown. Vision is to streamline these processes to have one system across the Faculty, become close to error free and speed up the return of marks to students. **Target is to align with Psychology benchmark of 21 Days and 5 hours turnaround time from receipt to return with feedback**

SECTION B: Lessons Learned & Critical Success Factors

Although LSS has been widely adopted by a number of manufacturing and service organisations, its applications in HE creates significant challenges. The following are some of the fundamental challenges faced by the SLEEK Programme Pilot, that could prove useful lessons learned for those charged with taking forward business process improvement initiatives and advocating the use of LSS tools and techniques in the HE environment;

Lessons Learned

- **Quantifying process improvement savings is extremely difficult** without a recognised framework within HE to point to. Efficiencies and effectiveness are not as easily measured in less "transactional" areas of the institution. A measure for excellent student experience for example is far more difficult to quantify into tangible process improvement targets, than say setting goals within finance to reduce the number of cheques issued or within admissions to process a student registration within a particular timeframe.
- **Terminologies** taken from manufacturing and engineering industries are not readily accepted in the HE sector and many people are uncomfortable using some of the more data-driven and statistical tools and techniques.
- **Not taking time to gather data and find the root cause of process failure** can have disastrous consequences and foster a "fire-fighting" mentality.
- **Taking the right measurements** is a significant challenge for HEIs. Appropriate data is not necessarily readily available or indeed easily accessible from the system infrastructure currently in place. Application of statistical method is not easily achieved in some University environments and a skills gap exists that creates both a conceptual and practical barrier for the roll-out of a data-driven methodology, such as that advocated by SLEEK.
- The difficulties in quantifying and documenting improvements and the lack of a framework to support staff in this task has also resulted in some **staff feeling hesitant** about advertising achievements **and they often "under-sell" the savings made** as they feel unsure of their calculations or lack confidence in the data source on which their findings are based.
- In HE **staff often try to improve processes in isolation**. This approach can actually sub-optimise the overall performance of the end-to-end process (or system) as without sound understanding of the impact of adjusting or improving a sub-process within a top-level process, this can in fact create different, in some cases even greater problems. This was noted by the yellow belt project participants who felt it was difficult to make smaller improvements within a wider more complex process. Scope Creep was a problem and encouraging incremental improvement towards a wider effort was challenging.
- **Process improvement should consider the whole "system"** if it is to be genuinely effective across any organisation. The devolved nature of some HEIs (Including Strathclyde) creates challenges for establishing ownership of key processes and ensuring all stakeholders are active participants in improvement activities.
- Lack of **process thinking and process ownership** among staff prevents new approaches from becoming genuinely embedded and sometimes derails efforts to improve processes that are reliant on action from other areas within the institution that do not perhaps immediately see the benefit or have time to get involved. Process thinking is not prevalent in many HEIs and establishing processes therefore requires a change of mindset.
- The strategy of achieving **"leanness" is not clear to some senior managers** (Mathaisel and Comm, 2000). This is primarily due to the lack of awareness of the benefits of Lean out-with the manufacturing and engineering industries, but can also be a result of **communication**

failure during periods of process improvement activity –if successful applications of process improvement techniques are not appropriately advertised the benefits are not immediately apparent.

- It is absolutely crucial to have **uncompromising management commitment** and buy-in from the outset of any process improvement initiative. Without management support and commitment the effort of staff will ultimately be futile. A lack of commitment and support from the senior executive makes it difficult to foster a genuine culture of continuous improvement.
- Process improvement or Lean initiatives should not be viewed as a quick-fix. Without **long-term commitment** the approach risks being labeled as another passing management fad. Womack and Jones (2005) caution that if "Lean is seen as a means of quickly cutting costs to meet budget deficits, organisations will fail to achieve the real benefits".
- Lack of **visionary leadership** has been widely reported as a fundamental barrier in the successful introduction and deployment of process improvement/ LSS initiative in organisations irrespective of the size and nature of the industry (Antony and Snee, 2010): Leaders need to
    - set a clear vision for establishing the desired culture;
    - communicate the vision to all employees at various levels to gain organisational commitment
    - empower employees and give them a sense of ownership.
- The existing culture of the higher education sector is a significant challenge to the introduction of LSS. In order for staff to feel they are part of the organisation and openly talk about their improvement suggestions, there needs to be a **culture of openness, trust and acceptance**.
- Lack of **understanding of the different types of customers in HE** is also a perceived problem. The challenge is to understand the true voice of different customers and develop strategies to meet customers' requirements that are suitable to this sector.
- The devolved nature of many HEIs can result in a lack of communication that leads to the development of "silos" across various departments or faculties. It is absolutely critical to have **effective communication at all levels** that makes employees aware of the need for the process improvement journey and what their role is in achieving the vision set by the senior management team.
- Lack of **resources (time, budget, etc.)** is an immense challenge in many public sector organisations including HEIs. If employees do not have sufficient time to execute continuous improvement projects that result in improved process performance or increased customer satisfaction, opportunities to achieve operational excellence are lost.
- Establishing a **strong link between continuous improvement projects and the strategic objectives of the HEI** is also a significant factor. It is important to select process improvement projects which are directly aligned with strategic goals of the organisation through a "prioritisation" of all activities.

Critical Success Factors

Figure 1.6 below outlines what the SLEEK programme has revealed as the critical success factors for embedding methodologies like SLEEK, or indeed any continuous improvement initiative within a HE environment.

Figure 1.6 SLEEK Critical Success Factors

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Uncompromising top management support and commitment

Without senior management on board from the outset of a process improvement journey, the chances of success are ultimately compromised. Many successful initiatives of this nature point to the requirement for the senior management team to attend at least a half-day or one day broad overview of LSS strategy and methodology, ensuring buy-in and commitment for the outset of the implementation. Process improvement champions should be identified across the institution responsible for identifying, prioritising and overseeing process improvement projects. Securing senior management support and commitment, also relies upon selecting projects which are tied to strategic goals of the institution. A failure to secure genuine commitment can often be seen by lack of attendance at process improvement meetings and events, partial engagement in the whole change process and a visible reluctance to implement the ideas put forward by staff members after the completion of improvement projects. Staff members need adequate time to complete process improvement projects. Further, appropriate training and a committed facilitator with good technical knowledge on the topic must be in place if there are any problems encountered by staff members during the project execution phase.

Project selection and prioritisation

Process improvement project selection is not only the most essential but also the most challenging aspect experienced during a LSS initiative (Pande et al., 2001). Project selection methodology enables organisations to compare large volumes of proposed projects, and forecast which project will give the best return (Harry et al., 2010). Moreover selection of the right projects will create confidence in staff and foster tangible results that give credibility to the initiative going forward. This in turn should promote further investment into the initiative (Kumar et al., 2009). The following

[13] As published in Lean Six Sigma for higher education institutions (HEIs): Challenges, barriers, success factors, tools/techniques

tips may be useful for selecting process improvement projects in the context of the HE sector: Projects must be aligned with critical business and customer issues. This may be referred to as the voice of the business and the voice of the customer.

1. Projects must be feasible to execute from a resource and data standpoint.
2. Project objectives must be clear to everyone involved in the project.
3. Completion of projects should be feasible within four to six months.
4. Select those projects which have the ability to show measurable improvements in the delivery of quality associated with education, operational costs and timeliness parameters.

Continuous improvement culture

Evidence from successful process improvement initiatives demonstrates that changing the way work is organised has a more profound and lasting impact on organisational culture than simply educating employees in problem-solving methods. The power of LSS to create a culture of continuous improvement lies in the combination of changing the way work gets done by changing processes, plus educating people in new ways of understanding processes and solving problems. Nothing affects the culture of an organisation more than the outlook and behaviour of its leaders. In HEIs, the organisational culture should be focused on the way we take care of our customers (i.e. students, parents, local companies, faculties, alumni, etc.) and how we provide "excellence" in all areas of our business.

Effective communication at all levels vertically and horizontally

One of the problems identified during the SLEEK Programme Pilot is that without a shared understanding of the purpose of a continuous improvement journey, breakdowns in communication and mixed messages can begin to dilute the effort. Poor communication has been cited as an implementation failure for continuous improvement initiatives across a number of public sector organisations and it is important to guard against this within Strathclyde. Only through effective communication, will employees genuinely engage and collectively to solve process problems. Through effective communication, organisations can establish a common language for change and improvement. This is critical for the University if it is to achieve its ambitious objective of Operational Excellence.

Strategic and visionary leadership

Dewhurst et al. (1999) state that leaders have the responsibility to create a challenging vision for the future and motivate their employees towards its accomplishment. Mission and vision give direction to an organisation, and provide a road map, that can lead to better performance. Leadership should enable employees at all levels to shift from their current culture to a new culture and leadership of process improvement will only succeed if it is recognised and supported wholeheartedly by the senior managers of the business (Douglas and Conger, 2007). Leaders should provide the direction, communicate the purpose, value and progress of the new direction and finally recognise and reinforce successful improvements. The following are useful indicators for measuring leadership commitment within a process improvement initiative:

- commitment of both financial and personnel resources;
- a clear strategic deployment plan showing the tangible objectives and goals of the initiative;
- development and roll-out of a communication plan (i.e. need for the initiative, the benefits of implementation, roles and responsibilities those involved)
- clear direction and guidance on deployment
- reward and recognition for employees

Developing resources and skills to facilitate implementation

One of the most important requirements is to build human capital by providing education and training to employees. The employees should be equipped with project management, process improvement and change management tools and techniques. Staff members should be given adequate time to select and execute a process improvement project which results in improved customer satisfaction, improved employee morale and enhanced customer experience. Learning from practical application can have the most powerful impact upon employee motivation and support for change.

Developing organisational readiness

It is important to first understand the preparedness of a HEI to implement continuous improvement initiatives such as LSS. If a HEI is ready to embark on an LSS journey, then a customised roadmap can be proposed to guide the organisation through the implementation and deployment process. Continuous improvement maturity models provide a roadmap for many organisations to assess their weaknesses and highlight the issues that need urgent attention (Bessant et al., 2001; Dale and Smith, 1997). A good understanding of the characteristics underpinning different stages of maturity models could help Strathclyde to evaluate its own positioning and readiness for a process improvement journey.

Tools and techniques of LSS for HE

Dale et al. (2007) define a tool as a device that has a clearly defined application, often narrow in focus and often, but not always, used on its own. On the other hand, a technique is something with much wider application than a tool. A technique usually requires more skills, training and conceptual thought to be used effectively. A technique can even be viewed as a collection of tools (Dale et al., 2007). Many organisations use some kind of systematic approach when deciding which tool or technique to apply in given situations, when to apply tools or techniques and how to apply them. This yields significant benefits in the long run. The selection of process improvement tools and techniques depends on the needs of the organisation. See Section A for details on tools most readily adopted within SLEEK.

SECTION C: Next Steps

With the SLEEK Programme Pilot coming to a close, there is now a requirement to discuss next steps and agree the practicalities of product handover and suitable timeframes for transfer of activity. It is hoped that individual staff projects will be completed by April 2013 with case studies made available on the SLEEK site[14] thereafter, pending agreement of resourcing required.

Consideration should be given to the following to facilitate a smooth handover and to allow key staff from both Directorates to feed into future plans:

- Arrangement of a handover meeting between Information Services & Human Resources, with Hugh Hall and David Coyle in attendance where practical, to formally recognise the transfer of responsibility for the BPI agenda.
  Discussion Points:
  - Institutional communications to help advertise the end of the pilot and the launch of the next phase. This communication could also provide opportunities to;
    - Recognise staff efforts to date

[14] https://moss.strath.ac.uk/sleek

        - Recognise IS contribution to date
        - Provide an update to the Leadership Group and Executive Team
    - Participation/responsibility for the development of a plan for the roll out of SLEEK as an embedded programme of work in partnership with Unipart (Emphasis upon collective responsibility for continuous improvement and efficiencies & effectiveness across all operational activities).
    - Participation/responsibility for the development of a plan for Directorate & Faculty Prioritisations
    - Decision on research and external collaborations. Including role of Donna Cullen as "Co-Chair" of the LSS in HE Conference being hosted by Strathclyde in June 2013
    - Participation/responsibility for a plan for Embedded Organisational Change e.g. 5 year plan to develop world class processes.

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