

## **Leaning into Sustainability at University of Alberta Libraries**

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## ***Abstract***

Purpose - The purpose of this paper is to present a case study that considers the links between cost avoidance, lean design and sustainability in relation to two different library projects at University of Alberta Libraries (UAL) - the design of the Research & Collections Resource Facility and the development of new fee-based library services at UAL's John W. Scott Health Sciences Library.

Design/methodology/approach - This case study describes the analysis of each project's workflows in relation to lean design in order to enhance processes and service delivery.

Findings - Findings to date in both of these ongoing projects suggest that consideration of the lean philosophy has already led to process and service improvements. With regard to the new building design project, revised task design is already resulting in significant savings in staff time and work space. And the staffing model for fee-based specialized services has already been redesigned in alignment with lean principles.

Research limitations/implications - While this paper does discuss and define lean design, it does not provide a comprehensive summary of research in this area.

Originality/value - This paper highlights the value of lean design as a framework for designing, developing and reviewing academic library buildings, services, processes and workflows to ensure they are sustainable.

## ***Keywords***

Academic libraries  
Lean design  
Sustainability  
Library buildings  
Fee-based library services  
Bibliometrics

## ***Article Classification***

Case Study

## ***Introduction***

Academic libraries are in the midst of great transition and innovation. Exciting opportunities exist to design new buildings, leverage collections through digitization, and develop new services such as measuring research impact. In such periods of transformation, it is critical to have clarity of vision in order to be responsive, rather than just reactive, to the changing environment. Librarians should draw from philosophies developed outside their field in order to inform their work.

This paper considers the value of drawing from one of the best-known business philosophies: lean design. In particular, new opportunities come with new costs, and reviewing how best to implement them within the context of lean design can provide insights into how best to utilize resources.

The University of Alberta (UAlberta) is certainly not the first university to use lean design principles in a library setting. Furthermore, lean design has been applied to a variety of public services in other contexts. The authors believe, however, that lean design in a library setting has much to offer a postsecondary system that increasingly emphasizes the value of sustainability. As Alan Mossman & Tariq Abdelhamid of The Lean Construction Institute – an independent not for profit, registered charity in the UK – have stated, “You can be lean without being explicitly green, but it is difficult to be as green as is possible without lean and systems thinking and without a client that wants a sustainable product (2016).” Like many universities, the UAlberta has named sustainability as a key principle for developing its future institutional strategy (UAlberta, 2016a).

In this paper, we therefore consider the links between cost avoidance, lean design, and sustainability in two very different library projects at the UAlberta.

## ***UAlberta/UAL Context***

UAlberta in Edmonton is one of Canada’s top teaching and research universities, with an international reputation for excellence across the humanities, sciences, creative arts, business, engineering, and health sciences. Home to 39,000 students - 31,000 undergraduate and 7,500 graduate - and 15,000 faculty and staff, the university has an annual budget of \$1.8 billion and attracts more than \$480 million in sponsored research revenue. UAlberta offers close to 400 rigorous undergraduate, graduate, and professional programs in 18 faculties on five campuses—including one rural and one francophone campus.

UAlberta has recently issued the first draft of an Institutional Strategic Plan which identifies “sustain” as one of five verbs that will guide the university’s strategic thinking over the next decade (the others verbs are Build, Experience, Excel and Engage). The text of its draft plan explains:

To achieve our strategic goals, the University of Alberta will attract and steward the resources we need to excel and deliver our core teaching and research mission at the high standard expected by all Albertans. We will continue to build our capacities for securing new sources of operating, capital, research, and philanthropic funding. We will continue to model and advance teaching and learning in the area of environmental sustainability on our campuses and in our work. We must sustain our people by promoting health, wellness, and safety as a defining feature of the University of Alberta's learning and working experience, and by maintaining and enhancing the university's essential teaching, learning, and research infrastructure. Continuous improvement and cross-unit engagement and co-operation will define our approach to governance and administration to ensure that our systems, policies, and procedures facilitate the achievement of our shared goals (UAlberta, 2016a).

This UAlberta focus on sustainability meshes well with the Chief Librarian's longstanding promotion of three criteria for all projects undertaken by UAL, i.e. that they are open, sustainable and responsive to the needs of our communities. UAL is Canada's second largest research library system, with a print and electronic collection exceeding 4.7 million titles and over 8.7 million volumes. It is comprised of ten libraries, spanning three campuses, housing physical collections in all disciplines of study at the university, including Health Sciences and Law. UAL's Bruce Peel Special Collections & Archives has strengths in Canadiana, Anglo-American literature, Amer-Indian history and culture, European history, print culture, and private presses.

In addition to housing core print collections across disciplines, UAL offers a wide range of electronic collections, user services, spaces, and technology to meet the diverse needs of the UAlberta community. We have 5,336 seats in the library system, occupying about 10,000 square metres of our total 46,688 square metre footprint; 4.8 million visits were counted by our electronic gate counters in 2013/14. Last year, library staff responded to over 118,000 research questions and taught over 500 classes to more than 18,000 students, faculty, staff, and community members. UAL is a national leader in the areas of research data management, scholarly communication, and digital preservation, with resource-sharing and development partners.

As mentioned above, one of UAL's key operating principles is sustainability. We consider this principle as we develop all library projects, large or small. We make efforts to assess our impact on the environment but we also consider sustainability as an important principle when managing and allocating the Libraries' financial and human resources. Our focus on sustainability has inspired us to consider not only how we might apply lean design to the development of new processes and workflows, but also to existing ones to ensure they are sustainable, that they improve service to our users, and that they help us achieve our library vision and mission.

### ***What is Lean Design?***

Lean manufacturing is a well-known management philosophy and business system made famous by Toyota, and no attempt will be made here to summarise the voluminous literature with which it is associated. Lean design, a subset of lean manufacturing, focuses on applying

lean concepts to the design phase of a system (Wikipedia, 2015). The core principle of lean design is to design operations in order to maximise customer value while minimising waste. Value is defined from the customer's perspective. Traditional design tends to focus on economies of scale, maximum utilization of materials and equipment, and efficiency. Lean design focuses on product flow, high visibility and continuous improvement. Significantly, traditional design will often seek to benefit from largescale operations whereas lean design may achieve balanced workflow by focussing on small batch work [1].

It must be said that library work typically involves both large scale and small scale operations. For example, large scale operations at a library's high-density storage facility such as the one described below includes the storage and retrieval of millions of items in one space. Libraries seek economies of scale from collocating physical collections in controlled environments and from the transfer and storage of pallet loads of materials from other locations. However, from the customer's perspective, a library's orientation is mostly concerned with the efficient delivery of a relatively small number of highly specific and individualised services to a large, diverse, and widely distributed customer base. The delivery of collection material is again a good case in point: library users want access to particular editions of a small number of particular books and are highly unlikely to tolerate substitutes. Libraries in general have long ago moved from the earlier concept of a "warehouse of knowledge" towards a more user-focussed assessment of their societal value. The principles of lean design therefore appear to form a better basis than traditional methods for achieving library efficiency. It is a philosophy that seeks to meet the opportunities and challenges presented by a simple concept: *let the customer pull the product*. This aligns well with the philosophy of responsiveness articulated earlier for UAL projects.

## ***Project 1: Research & Collection Resource Facility (RCRF)***



*Fig. 1.* Aerial photograph showing proposed RCRF building and site (outlined in red). University of Alberta. RCRF Design Development Report submission – January 11, 2016. Stuart Olson/HFKS Architects, Inc.

UAlberta is currently in the process of building a new high-density storage library facility on the university's South Campus, a campus predominantly devoted to agricultural research and sports and recreational facilities (UAlberta, 2016c). The facility will house the bulk of the Libraries' physical collections, including large quantities of archival material, maps and microforms. An estimated 3.1 million volumes currently housed in a rented off-site storage space will be moved into this building after construction is completed in summer 2017. Additionally, the facility will have space to house up to 1 million more items drawn from UAL's other campus libraries, plus expansion space for approx. 1 million future acquisitions. Materials housed at the RCRF will be circulated by truck deliveries to all campus library locations plus locations for each of the 17 members of a consortium of academic and special libraries in and around Edmonton called NEOS. Furthermore, students, researchers and visiting scholars will be able to make an appointment to use an on-site reading room to view archival material and other material stored at RCRF that is too fragile or bulky to transport in a truck. The facility will also accommodate collection-based library projects, especially digitisation projects. The new RCRF will therefore provide an appropriate, functional, and welcoming space for staff, students, and visitors for academic and research purposes. It will improve the proximity of the facility to our main campus and other campus libraries and provide appropriate space for processing, storing, and digitizing materials in the collection.

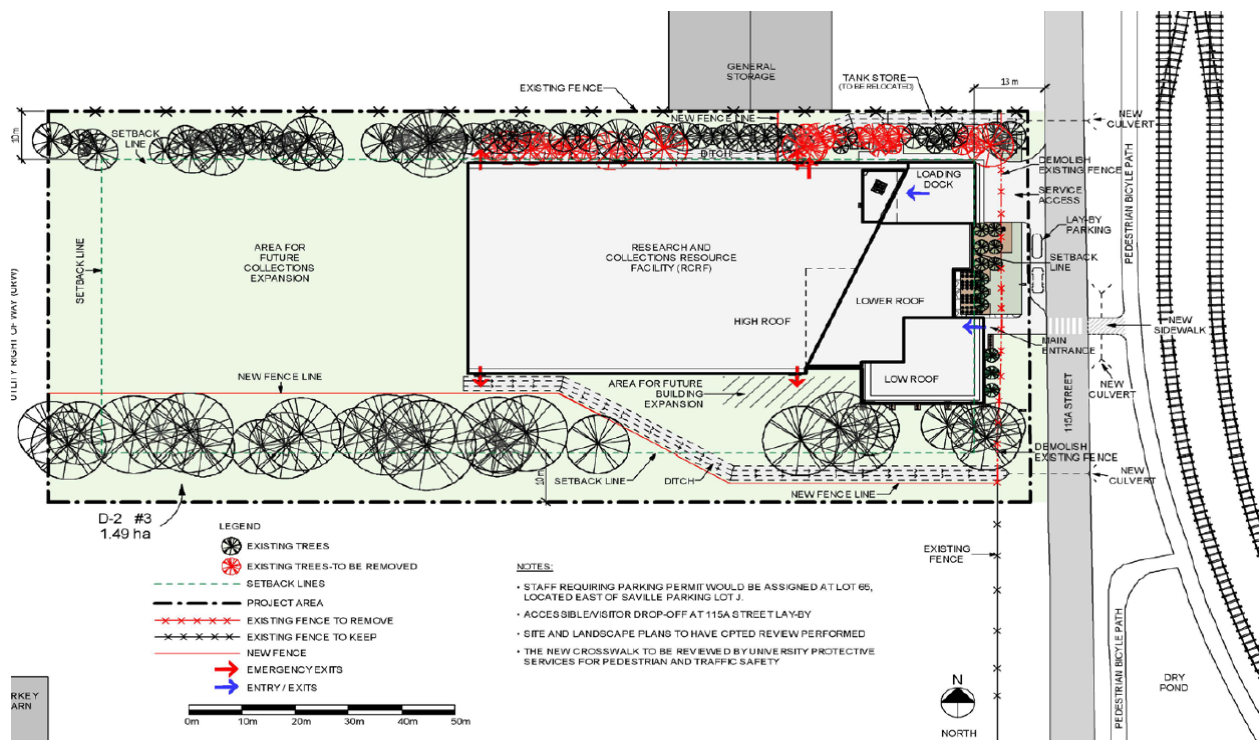


Fig. 2. Site layout plan. University of Alberta. RCRF Design Development Report submission – January 11, 2016. Stuart Olson/HFKS Architects, Inc.

It is not possible to give a full account here of the process leading from university approval of the project in principle (November 2014) to arrangements for financing to selection of consultants Stuart Olson Construction Ltd and architects HFKS Architects Inc (July 2015). The project then followed an aggressive timetable even for a modified Design-Build project which included extensive community consultation and culminated in a major milestone when the university endorsed a Design Development Report on January 28, 2016. Throughout this process the Chief Librarian was one of the university's representatives, and worked with a Library Project Team which met weekly Fall 2015 to prepare documentation and recommendations, both as client and future tenant of the RCRF.



*Fig. 3.* Proposed east elevation. University of Alberta. RCRF Design development Report submission - January 11, 2016. Stuart Olson/HFKS Architects, Inc.

In addition to creating an environmentally sustainable building, a key component of this process has been applying lean principles to service delivery to, from, and within this facility which will be a hub for collections moving between campus libraries, and between the libraries across the province with whom UAL has key partnerships. Ensuring the design of the building, its services, and supporting processes and workflows are efficient and sustainable has been a critical element of this project.

In Fall 2015 the Libraries hired a consultant from a local organization called the Mosaic Family of Companies that specializes in providing lean design consultant services. The consultant, Michel Handfield, has worked on a regular basis since October 2015 at the libraries' current high-density storage facility, the Book And Record Depository (BARD), to analyse its workflows and implement improvements in process and space design prior to completion of the RCRF project. Michel has demonstrated how lean principles improve task design. As he stated in his original proposal via email (M Handfield 2015, personal communication, 3 September):

Our understanding is that you have been asked to provide a process design to the architects of your new facility. This is a rare opportunity to build your facility around the process and it would be nice to have a process that is optimized to produce the results your customers are looking for. ... Whether it is speed, accuracy, or volume; the process or system needs to be tuned to produce exactly what the customer wants when the customer wants it. Using Lean Manufacturing techniques we can work with you and your team in the planning, design, and implementation of



Lean process that will improve your level of service while reducing the overall cost of operations.

It is striking to those of us engaged in the project to read statements in UAlberta's draft Institutional Strategic Plan that, without explicitly mentioning lean design, draw from its key principles such as continuous improvement and customer focus:

We promote a culture of continuous improvement in administration and governance, and ensure that our resources are used and sustained effectively to ensure the long-term vibrancy of our institution. We do this to the benefit of Campus Alberta as a whole: we share critical research infrastructure, provide systems and services to smaller institutions, facilitate student mobility, and build partnerships across the province to ensure that all Albertans have access to their provincial university and the benefits we offer (UAlberta, 2016).

Michel also developed a 4-hour introductory session on the lean philosophy for the Chief Librarian, Associate University Librarian, Head of Access Services, and other staff who worked primarily at the library's current high density storage. His work is ongoing and it is too early to provide accurate data. However, revised task design is already resulting in significant savings in staff time and work space and we are confident that customers will experience a substantially improved service even before the move from BARD to the RCRF in 2017.

### ***Project 2: Specialized Library Services Pilot***

UAL currently provides a wide range of services to meet the research needs of its faculty through its very strong liaison librarian model. At UAL over 35 librarians have liaison role assignments to unique departments and faculties across three campuses. This role currently encompasses a range of activities, including course- or program-integrated library instruction, in depth research consultations, and collaborative research projects.

UAL's John W. Scott Health Sciences Library's (Scott Library) has 5 full-time librarians who are liaisons to the following faculties: Medicine and Dentistry, Nursing, Pharmacy and Pharmaceutical Sciences, Rehabilitation Medicine, and the School of Public Health. In addition, three sessional librarians are cross appointed with the Libraries and other institutes. Scott Library had an additional contract with the University of Alberta's Faculty of Nursing from 2008-2015 to provide embedded research librarian support that went above and beyond the service provided by their liaison librarian. This sessional librarian had an 80/20 split between the Faculty and the Libraries. Over the course of that seven year period, a wide range of core and specialized services were offered to a range of researchers in a highly integrated way within Faculty offices. This contract ended in August 2015 due to budget constraints. However, a fee for service model was requested to support the ongoing needs of individual researchers.

This request prompted significant reflection on fee-based service models in academic libraries, that began to appear over fifty years ago and often focused on copying, research and instruction, as noted by Brooks (2010). They were often designed to serve the needs of external users wanting specific services, such as ILL (Ward and Camille 2002), or subject

specific reference assistance, for example in business (Ernest, 1993). And while some fee-based services have come and gone, others persist, such as University of Minnesota Libraries' InfoNOW service (2016). The Scott Library developed a new fee-based service model in the summer of 2015 that articulated core, free services; specialized, fee-based services; and a fee schedule. A sessional librarian was hired for a two years term to provide capacity for delivery, and the pilot launched in September 2015.

This project supports the continued delivery of core library services by subject librarians to the Faculty at no cost while offering specialized services on a priority, fee-for- service basis. It provides Scott Library, and the Libraries as a whole, an opportunity to meet existing and new, in-depth, priority research needs of faculty; test a team- and fee-based approach to service; and assess its sustainability and scalability for the future.

The following free and fee-based library research support services were articulated for the pilot.

#### Fee-based Services

- Librarian systematic review support with/without co-authorship as a priority
- Publishing support including providing customized reports on appropriate journals in which to publish, background information about journals (i.e. Journal Impact Factors), finding appropriate open access journals
- Customized mediated literature searches
- Preliminary screening of references for systematic reviews
- Current awareness services
- Research impact analysis: citation based impact for individuals or departments; tracking publications, pulling research metrics such as the impact factor or h-index, analysing scholarly output, preparing reports

#### Core Services

- Librarian systematic review searching Instruction where librarian advises on searching methodology, sources, and strategies; users do the searching
- Librarian systematic review collaboration with co-authorship as capacity permits
- Basic and extended reference to educate users on resources, search strategies, etc
- Information literacy education to UAlberta faculty, staff and students
- Collections management
- Support and information for accreditation processes
- Promotion of library to user communities
- Research data management

A key part of this pilot is assessing the model's sustainability and viability as an ongoing service from financial, human resources, and service perspectives. The review of this project in relation to lean design principles outlined by Womack & Jones (1996) provides a useful framework for reviewing its first year. These five principles include: defining value for each product/service; making value flow to the customer; eliminating all unnecessary steps in each value stream; knowing that the customer pulls all services; and pursuing perfection continuously.

## *Defining Value*

With regard to defining value, the Faculty of Nursing expressed interest in a fee-based model based on their perceived value of the service provided and on the expertise of their embedded librarian. The dean and individual faculty members reinforced the value of specialized services through conversations in summer 2015, when a new service model was being explored.

Systematic review searching provides them with required support for grant-funded research. For example, their embedded librarian had been written into a range of Canadian Institute for Health Research grant applications, a number of which were awarded. In addition to consulting and completing systematic reviews to support research, a search of Scopus and Web of Science in April 2016 confirmed that between 2011-2016 their embedded librarian co-authored seven articles with Faculty of Nursing researchers. Current awareness services provide a large, health research unit with a mechanism for weekly updates to nationally and internationally distributed research team members regarding new publications and resources related to the field. The subject expertise of their embedded librarian was emphasized as critical to her success in this role. Research impact reports on the scholarly output of Faculty of Nursing research teams benchmarks them against comparable teams at other institutions nationally and across the world.

The value of systematic review support extends to all of the health sciences disciplines. Demand is significant. Over the past year, Scott librarians conducted more than 340 systematic review searches, as well as providing more than 700 additional research consultations. The Scott Library also had the highest number of consultations in 2014/2015 among the fifteen Association of Faculties of Medicine of Canada libraries who submit statistics to AFMC. While various strategies are actively being used to manage this demand (Campbell and Dorgan, 2015), all librarians continue to support systematic reviews through instruction and consultations, while some conduct systematic and scoping reviews or meta-analyses with or without co-authorship on research publications. For example, a Web of Science and Scopus search confirmed that since 2008 the liaison for the Faculty of Pharmacy and Pharmaceutical Sciences co-authored nine publications.

Beyond the Faculty of Nursing, the value of the library's role in supporting research impact analysis work on campus was also identified through various requests over the past two years in relation to the work of UAlberta Presidential Visiting Committees (PVCs). These committees, serve as advisory bodies for the President, Provost and senior academic administrators and assess, advise and offer perspectives regarding each faculty's academic programming, research and creative activities (UAlberta, 2016b). One of their specific objectives is to benchmark performance measures related to research productivity and impact, and the Libraries were invited to contribute as a key partner in assisting with this work, reinforcing the role librarians can play in delivering relevant metrics to faculty, researchers and administrators (Roemer and Borchardt, 2015).

## *Making Value Flow*

Through the first year of this pilot project, as well as the PVC work completed to date, the flow of value has been refined. The below image captures the workflow related to one of the specialized services, research impact analysis.

A critically important part of the workflow is meeting with faculty to determine the parameters and scope of the requested project. A research impact report may be requested for an individual faculty member, a research team, a department or a Faculty. Depending on which of these options are requested, comparable benchmarks are identified. The number of UAlberta researchers, as well as benchmarks and time period to be reviewed, help to determine the scope of the project.

The next decision points relate to the metrics and resources that will be used to undertake the research. A range of metrics have been discussed as potential measures in UAL projects to date including h-index, number of articles published, number or percentage of articles published in high impact journals, times cited, and number of cites per publication. At this time the librarian also determines which resources to use to search for relevant information based on best coverage of the research discipline. UAL librarians have primarily used Scopus and Web of Science to complete research metrics work. A critical part of this work is acknowledging up front any database limitations. For example, in departments or faculties where there is a significant focus on interdisciplinary research, some databases will have excellent coverage in one discipline with much less well-represented coverage in others. In addition, some databases primarily track citations based upon citing journal articles, with very little coverage representing citations found in books. In presenting reports, this information is highlighted to ensure faculty understand what the number represents, but also what may be missing.

Once all of these parameters are identified, the librarian assesses the time required to complete the research. Once the terms for the work are accepted, searching selected databases for research data is then completed, with data downloaded, collated, and cleaned to disambiguate any name differentials. The final clean data set is then used to produce the final report.

The time required to complete this work is directly related to the project parameters. The last three research impact projects that UAL completed were for individual Faculties and took between six and thirteen hours. Each report presented the productivity and impact of the Faculty as a whole, which varied from fifty to one hundred researchers. Each Faculty benchmarked against ten Canadian comparators, with two including an international comparator. The publication date searched ranged from one to five years and the tools used were Scopus and Web of Science. All three projects reported on three metrics: h-index, number of articles published and number of cites. Two projects also looked at journal impact factor and author affiliations as a measure of collaboration.

## *Reducing Waste*

In an assessment of how we make value flow through the research impact analysis service, the most common wastes are related to defects, waiting and extra processing.

Before work can begin, a complete and correct list of the researchers whose work will be searched must be identified. The UAlberta Strategic Analysis Office is a key partner in finalizing this list, ensuring that researcher data is complete and up to date. The task of identifying researchers at benchmark institutions is more challenging, most often using web scraping of institutional web sites which may or may not be accurate and up to date. As a result, this process can result in defects in the final dataset and report.

Once all researchers have been identified, the librarian expert performs searches in the relevant database(s) and processes the data - through analysis, aggregation and extraction. Some extra work in processing data is often required, particularly in relation to name disambiguation and de-duplication. This problem occurs when multiple authors share a common name or when multiple name variations for a given author appear in citation records. The waste associated with this process can be markedly improved by researchers' use of ORCID author identifiers (Akers *et al.*, 2016).

Waiting is also a waste that is inevitably a part of our current approach to research impact analysis. While the librarians currently providing this specialized service are expert in the work, they are balancing such requests with core service requirements, and other fee-based service requests. The timelines for these requests often need to be negotiated with faculty based on current priorities. There is currently no single individual whose work is dedicated to providing this service, which does present an element of waiting on behalf of faculty members for the work cycle to be completed. Waiting is also an issue in the provision of systematic review searching on a fee basis for the same reasons.

### *Pulling from the Customer*

As we consider the lean principle of pull from the customer, it becomes clear that providing specialized services for a fee ensures that Scott Library is only delivering what our users are willing to pay for. While many of our core library services are responsive to historical expectations of service and the expressed needs of our users (i.e. requests for library instruction sessions, one-to-one research consultations), others are designed to anticipate needs and grow over time (i.e. research metrics). In addition to the specialized services we are providing as part of this pilot, we already have feedback from some researchers in the Faculty of Nursing that they have additional demands that are not being met. For example, providing a broader range of communications support is highly desirable, but are not generally the purview of the library. UAL can avoid waste by ensuring that it provides core and specialized services that rely specifically on the expertise of librarians, rather than that which can be better provided by expert communication professionals.

## *Seeking Perfections*

Scott Library continues to seek perfections in the delivery of specialized services. It is already engaged in a continuous improvement process to expand the team who supports fee-based services associated with this pilot. In the previous model, the embedded librarian provided all aspects of all services. In this new model, she is part of a broader, team-based approach to service delivery. While there is a single point of contact for fee-based service requests, Faculty of Nursing work is now distributed among a three-person team consisting of the sessional librarian, the Faculty of Nursing liaison and a Public Services Assistant (PSA). The work involved in providing specialized services continues to be analysed to assess who is best skilled and positioned to do the work. In depth research metrics support is led by the sessional librarian, with the liaison librarian taking on this new role as the pilot develops. Systematic review searching is managed by both librarians. Searching for content for current awareness services resides with librarians, while collation, presentation, and distribution of content has been transferred to the highly skilled PSA.

## **Conclusion**

An analysis of this pilot from a lean design perspective has been a useful exercise as we near the end of our first year and consider what changes may be required to continue to provide excellent and sustainable service. The findings of this review will inform the work of UAL's new Research Metrics Working Group, which will investigate, define and propose a service, or set of services, that we can offer more broadly to the UAlberta user community.

## **Notes**

1. The authors are grateful to Michel Handfield, consultant from the Mosaic Family of Companies and a Lean Six Sigma Black Belt, for his permission to borrow concepts from an introductory presentation to library staff on lean design.

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