



## Small TLEF Innovation Project – Proposal Form

**All proposals must be submitted by 3:00 pm on November 14, 2019**

- Before proceeding, please read all TLEF criteria and application instructions at: <http://tlef.ubc.ca>
- Applications should be written in language that is understandable to a non-specialist.
- The online application system is plain text. You will not be able to add tables, graphs, or charts in your proposal.

### Project Title (200 characters max.)

Do not use all-caps.

Establishing a Cloud-based Learning Resource for Business Analytics

### Principal Applicant

For administrative purposes, there must be one Principal Applicant who should be a full-time UBC faculty or staff member. A UBC student may also apply as a Principal Applicant provided there is at least one co-applicant who is a full-time UBC-V faculty member who will act as a co-principal signatory.

Principal Applicant's name:

Harish Krishnan

Principal Applicant's title(s) (e.g. Assistant Professor, Instructor, Professor of Teaching, etc.):

Professor, Operations & Logistics, MBAN Academic Director

Principal Applicant's primary (UBC) email address:

Principal Applicant's role:

- |   |                                |
|---|--------------------------------|
| <input checked="" type="checkbox"/> Faculty | <input type="checkbox"/> Staff |
| <input type="checkbox"/> Student            | <input type="checkbox"/> Other |

Principal Applicant's Faculty, College, or administrative unit:

- |  |   |
|--|---|
| <input type="checkbox"/> Faculty of Applied Science      | <input type="checkbox"/> Faculty of Pharmaceutical Sciences   |
| <input type="checkbox"/> Faculty of Arts                 | <input checked="" type="checkbox"/> Sauder School of Business |
| <input type="checkbox"/> Faculty of Dentistry            | <input type="checkbox"/> Faculty of Science                   |
| <input type="checkbox"/> Faculty of Education            | <input type="checkbox"/> UBC Health                           |
| <input type="checkbox"/> First Nations House of Learning | <input type="checkbox"/> UBC Library                          |
| <input type="checkbox"/> Faculty of Forestry             | <input type="checkbox"/> Vantage College                      |
| <input type="checkbox"/> Faculty of Graduate Studies     | <input type="checkbox"/> VP Academic                          |
| <input type="checkbox"/> Faculty of Land & Food Systems  | <input type="checkbox"/> VP Students                          |
| <input type="checkbox"/> Allard School of Law            | <input type="checkbox"/> Other                                |
| <input type="checkbox"/> Faculty of Medicine             | <input type="text" value="(Please specify)"/>                 |



Principal Applicant's Department, School, or unit:

**Co-Applicants & Project Team Members**

Please indicate all other co-applicants' names as well as their corresponding titles, affiliations, and UBC email addresses, separated by commas (e.g. Jane Doe, Associate Professor, History, Faculty of Arts, jane.doe@ubc.ca). If your proposal is successful, this list will be published on the UBC website (emails will be removed).

**Department Head Approval**

The Department Head/Unit Head, Director, or equivalent of the Principal Applicant, has been consulted on the nature of the project, is aware of potential resource commitments, and has agreed to support the project. If there are resource commitments from the departments of any co-applicants, their Department Heads should also be aware of, and in support of the project.

Yes       No

**Project Summary (150 words max.)**

Describe your project in a manner that is accessible to a non-specialist. Please specify what you hope to change or see as an impact resulting from this project. If your proposal is successful, this summary will be published on the UBC website.

UBC Sauder's Master of Business Analytics (MBAN) program provides students with analytical skills within a broader business context. Our graduates are required to apply advanced analytical tools and methods to address management challenges in today's business world. With this project, our goal is to create open Business Analytics Learning Resources to enhance students' data analysis and meta-skills. The Business Analytics Learning Resource will provide various hands-on experiences and experimentation activities grounded in 'real-life' data and business problems through open source and cloud-based tools (e.g. Interactive Computing Environment, Jupyter notebooks). MBAN students will be involved in the creation of the learning resources, curating materials and 20 learning activities/problems. These resources will benefit not only our MBAN students (including alumni and prospective students), but also other students at Sauder (e.g. MBA, BCOM, MM). We believe the development of the learning resources will contribute to the enhancement of business analytics skills and competencies.



**Students Reached by the Project**

Please fill in the following table with all known courses and sections that will be reached by your project and in which academic year (e.g. HIST 101, 002, 2018/2019, Sep).

Course Code	Section	Academic Year	Term (Sep/Jan/May)
BAIT 507	BA1	2020/2021	Sept
BAIT 508	BA1	2020/2021	Sept
BAMS 506	BA1	2020/2021	Sept
BAMS 508	BA1	2020/2021	Sept
BABS 507	BA1	2020/2021	Sept
BABS 508	BA1	2020/2021	Jan
BAIT 509	BA1	2020/2021	Jan
BAMA 517	BA1	2020/2021	Jan
BABS 502	BA1	2020/2021	Jan
BAMA 516	BA1	2020/2021	Jan
BAMA 511	BA1	2020/2021	May
BAMS 521	BA1	2020/2021	May
COMM 337	001, 002, 003	2020/2021	Sept & Jan
BA 515	001, 002, MM1	2020/2021	Sept

If your project does not pertain to a specific course(s), briefly describe the overall student reach in the academic year(s).

The above list outlines the main courses that would benefit from the business analytics materials; moreover, this project would benefit students' overall experience in the MBAN program (including the undergraduate Python and analytics course and new MBA course) as it would develop linkages between courses and strengthen the students' technical skills. It would also have an impact on future cohorts of MBAN students and program alumni who would be able to benefit from the learning resources and add to them.

How many students overall do you estimate will be reached by this project annually? (Please provide a number)

380

**Project Objectives (500 words max.)**

Clearly state the project's rationale, overall objectives, and expected impacts/changes with particular reference to how it meets TLEF criteria.

The 12-month UBC Master of Business Analytics (MBAN) program teaches students the full analytics spectrum including data management, data analytics, and decision analytics within a broader business context. The MBAN program offers 23 required courses. There is substantial variability among students in terms of their backgrounds (e.g., computer science, business, etc.). Currently each MBAN course is run independently, however we see a need for greater collaboration of resources between courses where similar content and skills are taught.

Students have provided feedback that they desire more experiential learning opportunities dealing with real datasets and real-world problems. This feedback is in line with one of our program goals, Sauder's core principle (transformative student experience, Goal 3) and



university-wide goals (transformative learning), which is to expand experiential learning where possible as we see the value this brings to student learning and preparation for their careers.

The main objective of this project is to develop open learning resources which will enhance students' business analytics knowledge and to be able to effectively apply these skills (which we call "meta-skills"). A stack of learning resources will include curated materials for business analytics (e.g., references to learn programming languages and other skills) and 20 learning activities/problems that apply business analytics concepts and tools to solve real business problems.

Open resources for data science are plentiful. However, it is hard for students to efficiently find appropriate resources for specific questions. We therefore see value in curating materials that are appropriate for business analytics students and professionals. Furthermore, open resources that are specifically designed for business analytics are scarce (e.g. applying open source tools like Python for optimization and simulation).

To help students engage with curated materials more effectively and to develop their skills more quickly and deeply, we intend to develop learning resources that will be made accessible using open source and cloud-based tools (e.g. Jupyter notebooks). These resources will also allow students to enhance their meta-skills (including technical skills such as being able to deploy the results of their analyses) that are in high demand in the industry.

Faculty would be able to use the resources to strengthen their teaching by providing a space for students to develop their technical and meta-skills alongside the assignments in their courses. It is anticipated that as a result of the shared learning resources development, students will develop their skills in a deeper and more organic way. In addition, the resources will help both faculty and students recognize linkages in the curriculum, which will serve to strengthen student learning.

Furthermore, the learning resources would help to foster a stronger community within the MBAN program as it would benefit program alumni and prospective students. This project would be of sustainable benefit because each year the open learning resources would be enhanced for each future group and continued to be used by program alumni and prospective students. In a broader sense, this proposal would support the development of a university ecosystem and consortium of similar tools and repositories.

**Project Focus Areas**

*Please select all the areas that apply to your project.*

- Resource development (e.g. learning materials, media)
- Infrastructure development (e.g. learning technology tools, learning spaces)
- Pedagogies for student learning and/or engagement (e.g. active learning)
- Innovative assessments (e.g. student peer-assessment)
- Teaching roles and training (e.g. teaching

- practice development, TA roles, learning communities)
- Curriculum (e.g. program development/implementation)
- Student experience outside the classroom (e.g. wellbeing, social inclusion)
- Experiential and work-integrated learning (e.g. co-op, community service learning)



- Indigenous-focused curricula and ways of knowing
- Diversity and inclusion in teaching and learning contexts

- Open educational resources
- Other

*(Please specify)*

**Project Work Plan, Timeline & Milestones (1000 words max.)**

*Provide a clear work plan for how you will achieve the stated objectives of the project. Please include major milestones to indicate when you will initiate project development, when you will implement the project with students, and when you will evaluate whether your project intended impact has been achieved.*

**Pre-TLEF activities (prior to April, 2020)**

Sept-Nov, 2019

**Needs analysis:** We derived the objectives from our initial needs assessment based upon the analysis of past students’ project report in COMM 337 (2018 W1) and direct inputs from MBAN graduates.

- **Pilot project:** To test the feasibility of how cloud services can be integrated into the MBAN program, we conducted a pilot project in COMM 337 (2018 W1). Positive comments from the COMM 337 students lie in three aspects: learning cloud computing, exploring data streaming, and gaining practical business analytics skills that are highly employable skills. Following the successful completion of the COMM 337 pilot, we now look to bring the success to the MBAN program as a whole by using cloud-based knowledge as a learning tool to enhance student’s practical and meta-skills.

One student in COMM 337 put it this way: “Learning Linux and Cloud Computing can help us better fit into a future career regarding business analytics. By collecting large real-time data, we can use them for further analysis to get knowledge of the current trends and thus generating some business insights. In addition, it allows us to work with teammates on the same project to achieve higher efficiency.”

**TLEF-funded activities (April, 2020-March, 2021)**

- **Project launching (April, 2020):** Each course instructor uses different tools/cloud computing for data analytics within MBAN program, so we will review all the MBAN courses syllabi and contact individual course instructors to better understand the content of their courses and listen to their needs for improvement for continuity of instruction in the program. This activity is very useful for us to articulate our project design and development, and collect potential materials that are needed in the MBAN curriculum.
- **Recruitment and training of project participants (April, 2020):** The PA and program manager will select 4 qualified MBAN students who have strong technical skills including Python, R, SQL, etc. and have experience with cloud-based tools such as Github, Bitbucket, Amazon AWK, Microsoft Azure, etc., as team members, and work with 1-2 faculty members as experienced mentors.
- **Learning resources development (April-Aug, 2020):** A stack of learning resources has two main components; one is to develop curated materials on business analytics; the other is to develop 20 learning activities/problems that require real life data collection and analysis by



applying programming tools like Python and by utilizing online cloud-based tools. We plan to hire 2 MBAN students as part of their required internship part-time from April 20-May 30, 2020 and 2 full-timers from June 1-Aug 28, 2020 so this is a student-led project. The students will consult with the Canaccord Learning Commons (CLC)/David Lam Library staff and CTLT staff for the creation of materials with Creative Commons licenses. For this project, weekly work-in-progress meetings will be held to make sure things are on track and two or three milestone meetings/presentations will be made to project applicants to report the progress at each stage and receive constructive feedback. From **April to May**, project members are expected to develop a unanimous, accurate understanding of how these learning resources ought to be structured, set up actionable work plans and finish early-stage work such as resource selection (Github, Azure Devos, or Amazon S3) and fundamental structure construction; from **May to July**, the curated materials will be finalized and the body of the learning activities will be completed by applying programming tools like Python and by utilizing online cloud-based tools; from **July to August**, the stack of learning resources will be provided through the interactive collaborative computing environment (Jupyter notebooks/Syzygy) thoroughly and scientifically tested and trialed by interested parties including but not limited to course instructors, MBAN students and invited alumni. A final, complete and fully functional version of the learning resources will be delivered in production upon the end of August.

- **Project implementation (Sept-March, 2021):** One MBAN student who created the learning resources in the summer will stay working on the project in a TA capacity during the first year of implementation. This project will be implemented for the MBAN Class of 2021 including COMM 337 and BA 515, and MBAN alumni will use, contribute to, and benefit from the learning resources. New content will be added to the stack of the learning resources at the request of course instructors to create an interactive teaching experience in the classroom. The optimization of structure and improvement on reducing reaction time of the system will be conducted during this period as well.
- **Evaluation - Data collection and compilation (Feb-March, 2021):** We anticipate measuring data both quantitatively and qualitatively. We will consult with CTLT on evaluation planning (e.g., creating survey questions, methods for data collection) to provide evidence of achievement of our objectives. We will also consult with the research analyst in Learning Services for data analysis.

#### **Post-TLEF activities (April - Aug, 2021)**

**Continuous improvement / Continuous development** - We will revise and restructure the content for the MBAN Class of 2022 based on the continuous efforts on development.

**Result dissemination** - We will share the project outcomes with other faculty members within UBC Sauder and beyond (e.g., Learning Analytics, Visual Analytics - LAVA group, Pacific Institute for the Mathematical Sciences - PIMS) through various channels (Food for Thought luncheon forum, CTLT's TLEF showcase across UBC, CTLT's Spring or Summer Institute, and other relevant events).

**Prospect:** The learning resources may be used as a blueprint to create cloud-based storage services for other courses at UBC Sauder, other departments in UBC or even a big, united project for the whole of UBC, should it prove its reliability and benefits.



**Project Outputs, Products or Deliverables (500 words max.)**

List or describe the project's intended tangible outputs, products, or deliverables. What will the project do or create as a result of the implementation of its work plan?

The goal of this project is to create Open Business Analytics Learning Resources that could be used to enhance the learning of future MBAN students, alumni, and prospective students by Sept 2020. The MBAN students will have completed 9 months of academic coursework so will be well-suited to the below deliverables, in both content and infrastructure analysis and execution.

The creation of these learning resources will:

- engage MBAN students in the development of business analytics materials that will foster their learning in the program.
- create an opportunity for students to develop practical and meta-skills.
- provide a resource that could be used by our MBAN faculty for the purpose of teaching meta-skills to our MBAN students.
- provide an opportunity for sustainable development through adding newly reviewed data analytics materials.
- provide a platform for knowledge translation and knowledge transfer to the workplace.
- provide an opportunity for connection between MBAN students, faculty, program alumni, and prospective students.

**Anticipated Deliverables during this Timeframe:**

1. Determine topics and tools to include for the development of the learning resources through the consultations with the MBAN course instructors.
2. Share recommendations and inputs from faculty about topics so it is complementary and enhances the MBAN curriculum.
3. Begin to build a framework for the content to be included including curated materials, suitable datasets, and practice problems. We will refer to the existing UBC projects with Jupyter and Syzygy.
  - <https://ubc-dsci.github.io/introduction-to-datascience/>
  - <http://www.math.ubc.ca/~pwalls/math-python/>
  - <https://lectures.quantecon.org/jl/>
  - [https://clouds.eos.ubc.ca/~phil/courses/parallel\\_python/](https://clouds.eos.ubc.ca/~phil/courses/parallel_python/)
4. Complete the development of the learning resources.
5. Use Jupyter notebook and Syzygy to hold the stack of the learning resources.
6. Complete beta testing.
7. Implement the project for the MBAN Class of 2021, COMM 337, and BA 515.

These resources will be targeted for our MBAN students (including our program alumni and prospective students) but will be openly licensed so that it can be reused by other instructors at UBC Sauder, UBC, and beyond.

**Project Impact (500 words max.)**

Referring to the project's objectives and expected outputs, what are the direct and short-term as well as sustainable benefits to students or instructors you expect to achieve? What changes or impacts do you hope to see as a result of this project? Explain how these will contribute toward the enhancement of teaching and learning.

The direct benefit of this project would be that MBAN, COMM 337, and BA 515 students would strengthen their practical and meta-skills through the experience of using and contributing to





the business analytics resources. Their knowledge of open source and cloud-based software would be enhanced through the experiential nature of developing their methods and skills while simultaneously contributing to these resources. Through experiential learning, students would master valuable competencies while creating a lasting resource for other students to benefit from. It is anticipated that students who utilize the learning resources will be more prepared for more technical jobs in industry (eg. data scientist roles) which would help to widen students' career possibilities.

Faculty would directly benefit by having the resources to provide practice problems and datasets in addition to the assignments required for their course. The learning resources would also by its nature help to create connections between different courses and faculty members. One example given by a student interviewed is that, "for example, for a project in BAMA 516- Customer Relationship Management, we could refer to the repository to extract a method learned in BABS 508- Descriptive and Predictive Business Analytics."

The sustainable benefit would be that the stack of the learning resources would be a living creation that would continue to be developed over the years and used by future MBAN cohorts as well as alumni and prospective students. It is anticipated that this will strengthen MBAN and Vancouver business community connections further. The learning resources would also be contributing to the university ecosystem and consortium of similar tools and repositories that could potentially be shared by other faculties and programs at UBC for an even wider benefit.

#### **Evaluation Plan (500 words max.)**

*Describe how you will find out if the project resulted in the intended impact(s). What evaluation strategy will be used? What data will you collect to evaluate the project's impact(s), and how will you collect these data? Outline any key indicators that will be used to determine the project's success/performance.*

We aim to foster student learning competencies and technical and meta-skills through shared business analytics materials and an interactive computing environment. Our success will be measured through a number of different criteria in alignment with the project goals and benefits above.

1. Improved technical and meta-skills and competencies: The data-enabled teaching resources with Jupyter notebooks will be developed. To measure the impact of this project from students' perspective, we will conduct surveys (pre and post surveys) to confirm end users' competency before and after using the learning resources. We will survey student learning experiences with the learning materials. All the interactions between the users and content of the learning resources will be captured as data that feeds into learning analytics in Tableau. We will measure how many times each component/resource is accessed across courses.
2. We will seek qualitative data on student satisfaction with the learning resources and measure the practical benefits the materials have on users' employment opportunities.
3. The business analytics resources will be openly available to ensure that it is freely accessible and available for all students and instructors at UBC Sauder, UBC, and beyond. We will compare the relative popularity of the different contents/resources and this data will be used as metrics to better understand student needs and areas for improvement.





4. These open learning resources will allow students to connect with knowledge and other learners such as our program alumni and prospective students. Newly added resources by users in the field could provide us with a further opportunity to critically assess our MBAN curriculum. We will collect data on how many users access our learning resources and how the number of users increases in the next 2-3 years.

**Student Involvement (250 words max.)**

*Describe how students were consulted and involved in preparing and reviewing this proposal, and how they will be involved in the implementation of the project.*

This project will be student-led.

- 1. Needs analysis (consultation with MBAN graduates): Four MBAN students who recently completed the program were consulted in this proposal and their insights are included throughout the application. One of them became a co-applicant and helped prepare this proposal. We also reviewed 50 students project reports on the use of cloud services piloted in COMM 337 (2018 W1).
- 2. Learning resource development: Four MBAN students will create the open resources as their required summer internship. The students will consult with the Canaccord Learning Commons (CLC)/David Lam Library staff for the creation of OER and identification and curation of existing resources (developing search strategies in selecting resources, inclusion/exclusion criteria, approval processes, permissions, etc.). The students will also consult with CTLT staff in the creation of the materials with Creative Commons licenses. The PA and students will also collaborate with the Pacific Institute of Mathematical Sciences (PIMS) and other groups on campus to learn about the effective use of Jupyter notebooks. One GRA will be expected to provide administration, student recruitment, and preparation for reports.
- 3. Implementation: One MBAN student who created the resources in the summer would continue working on the project in a TA capacity during the first year of implementation.
- 5. Evaluation and dissemination: One GRA will be hired to assist with data collection and analysis. The GRA will consult with CTLT on evaluation planning (e.g., creating survey questions, methods for data collection) to provide evidence of achievement of our objectives. The GRA will also consult with the research analyst in Learning Services for data analysis.

**Special Classroom or Facilities Requirements (150 words max.)**

*Does the implementation of your project require any special classroom/facilities or scheduling support (e.g. video-conferencing, lecture capture, flexible classroom space, etc.)?*

**Project Budget**

*If this proposal is successful, do you anticipate that your project will seek second- and/or third-year funding from the TLEF?*

- No, only one year is anticipated
- Yes, two years are anticipated
- Yes, three years are anticipated



Title of previously funded TLEF project (if different from title of this proposal):

**Funding Requested from the TLEF**

Indicate the funding being requested. If this is a returning project, please also provide the historical funding for the project in its first and second year(s), if applicable, as indicated:

Example	Year	Funding Requested
Year 1 – Historical funding:		
Year 2 – This year’s funding:		
Year 3 – Anticipated funding:		
<b>Total Project Budget</b>		<b>\$0</b>

**Total Project Budget**

The total budget of a Small TLEF Innovation project cannot exceed \$50,000.

**Other Funding**

Indicate any funding from other sources outside of TLEF being applied to this project:

If applicable, please list any other existing TLEF-funded projects currently held by the Principal Applicant:

**Small TLEF Innovation Project Budget**

Please use and upload the Excel template provided in .xls format:

<https://tlef2.sites.olt.ubc.ca/files/2019/05/2020-TLEF-SP-Budget-Template.xls>

Information on funding criteria and cost estimates for TLEF proposals as well as the budget template can be found on the TLEF website, under Application > Process.

In preparing your budget, please refer to the rates published on the TLEF website for costs of services and salaries relating to staff and students at UBC: <http://tlef.ubc.ca/application-process/>

For reference purposes only - complete application online