Paper 00191

For the Consideration of the Digital Campus Sub Committee

Business Case Executive Summary			
Title and Project Code:	Student Learning Footprint Data Mart		
Project Definition:	This project will deliver a new data mart, situated within the institutional data warehouse, integrating data from a number of University systems that contribute to and characterises the student learning footprint. This data mart will provide the institutional infrastructure to support the robust and sustainable implementation of learning analytics to support our delivery of a distinctive and outstanding student experience.		
Project Duration:	**Start Date**	**End Date**	**Duration**
	01/10/2018	29/02/2020	17 Months
Estimated FEC of Project: (including VAT)	**Core Funding Contribution**	**Department Funding Contribution**	**New Funding Required**
	2018/19 = £22,575 2019/20 = £18,299 2020/21 = - Total = £40,874	2018/19 = £3,587 2019/20 = £3,328 2020/21 = - Total = £6,914	2018/19 = £28,286 2019/20 = £28,993 2020/21 = - Total = £57,278
Estimated On-going Annual Resource Requirements Following Project Completion:	New service delivery resources		n/a
	Resources for enquiries and training		n/a
	Annual licensing costs		n/a
	Development resources for software upgrades		n/a
	Resources for infrastructure maintenance		n/a
	Recommended system replacement timeframe		n/a

Guidance for Digital Campus Sub Committee Members							
Case Type:	Strategic		Tactical	X	Software		Other	
Intended Outcome:	To approve the project						
	To approve funding from the ISC budget						X
	To approve to go to ISC for consideration						
	Project approved. For noting and comment.						

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Student Learning Footprint Data Mart

A. Strategic Context

1. This project will deliver a new data mart, situated within the institutional data warehouse, integrating micro level data from a number of University systems that contribute to and characterise the student learning footprint. This data mart will provide the robust and sustainable institutional infrastructure to support the implementation of learning analytics to support our delivery of a distinctive and outstanding student experience.

2. Learning analytics has been defined as the legal and ethical collection, measurement, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimising the learning environments[1]. The list of potential data sources is extensive and growing as learning design becomes more closely integrated in the VLE, and as IT systems develop and institutional data expands, this will correspond with an increase in technical and computing capacity and infrastructure.

3. Creation of this data mart will not only provide the institutional infrastructure to support the implementation of learning analytics, it has the potential to also provide additional data for other strategic projects such as the Learner Experience Framework[2] and to complement business intelligence within SUnBIRD and its increasing development, adoption and use across the institution. It is the intention of this project to harness this data to inform our strategic education enhancement and development activities, supporting an evidence based approach to the delivery of an outstanding student experience throughout the institution.

4. Learning analytics has the capacity to be an important enabler in a number of key strategic priority areas for the institution. As part of the learning analytics piloting process, learning analytics was mapped to key internal strategic documents which identified opportunities for enhancement. These were subsequently ratified by the Learning Analytics Board and Learning Enhancement Committee.

5. Key Performance Indictor (KPI) 3 in the Strategic Plan requires a focus on improvement of National Student Survey (NSS) scores. Critical to this improvement is assessment and feedback, which requires targeted measures to address. Similarly, assessment and feedback is a critical influencing factor in the Teaching Excellent Framework (TEF) scoring system for HEIs. Accompanying this, the University has engaged in Graduate & Degree Apprenticeships with a projected significant increase in students studying online, which will bring new challenges in terms of engagement and retention. A number of learning analytics proposals, with a focus on meeting the assessment and feedback challenge, and supporting both our on-campus and online students, were endorsed by the Learning Analytics Board and the Learning Enhancement Committee in December 2017. In order for these proposals to be delivered, an institutional data mart is required in order to deliver a system in which there is a demand and focus for use in an educational and business context.

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[1] Agreed by the Learning Analytics Steering Group, 21st April 2016.

[2] The Learner Experience Framework (LEF), an Education Strategy Committee project, is a mechanism to baseline and reflect upon activities in support of our distinctive approach to delivering an Outstanding Student Experience, through our external partnerships with industry, business and the voluntary and public sectors, locally, nationally and internationally. The framework, alongside our strategic education projects, should enable us to reflect on how we influence and respond to our institutional KPIs, as well as develop a deeper and broader awareness of our distinctiveness, strengths and development areas in our strategic priorities for education.

6. With the appropriate institutional infrastructure, learning analytics has the potential to support delivery of the University Strategic Plan in the following areas:
    a. Outstanding student experience: compiling, analysing and visualising data which can be used to identify an outstanding and distinctive student experience, ensuring appropriate information is reviewed and presented in a format appropriate to a range of stakeholder requirements, informing delivery of KPIs 2,3 and 4
        i. Compiling, analysing and visualising data which can be used to inform and influence change in each individual student's experience in areas measured by the NSS and other student surveys, such as teaching and learning, assessment and feedback, course design, student support, course organisation and management, and learning resources[3]
        ii. Providing data which can be used to develop, and review benchmarks, and measure success for the Learner Experience Framework at Programme level, providing evidence to inform the educational strategic aims of the University
        iii. Using actionable intelligence and timely effective interventions, informed by current behaviour and predictive analysis, as a catalyst to provide distinctive high-quality support to students
        iv. Improving student retention by identifying disengaged students and implementing an effective intervention process
        v. Providing course teams with timely and actionable information to mitigate issues specifically to address the poorer retention rates experienced by distance learning programmes[4] as the University strives to increase its provision of online undergraduate and postgraduate taught courses, by proactively using "interventions [that] can increase student retention by appreciable proportions of the maximum possible increase"[5]
        vi. work-based learning courses, which have "differences in engagement defined by the part-time and distance learning nature of WBL"[6] to a full time student
        vii. Providing validated and robust data to students to allow them to examine their own engagement, with guidance, to motivate them to modify their own learning behaviour
        viii. Providing data to staff to assess the success of assessment and feedback strategies, and informing improvements to that strategy
        ix. Capturing empirical learning and teaching data which, in combination with subjective module evaluation data, can be used to measure the impact of innovative learning, teaching and support techniques.
    b. Operational excellence:
        i. Supporting efficient and effective techniques for staff to evaluate teaching practice and student progress initiate an effective intervention strategy
        ii. Enabling the exchange of successful pedagogical approaches to course design by evaluating the success of a class
        iii. Informing institutional decision making and investment in staff development, facilitating the development of courses and sessions to be identified and delivered at an Institutional level and informing institution led review and annual monitoring processes.

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[3] Areas measured in National Student Survey
[4] Simpson, O. (2013). Student retention in distance education: are we failing our students? Open Learning, 28 (2), 105-119.
[5] Simpson, O. (2004). The impact on retention of interventions to support distance learning students. Open Learning, 19 (1), 79-95.
[6] Costley, C., Shukla, N. and Inceoglu, I. (2011). Work-based learners' engagement with the university: An exploratory study. Higher Education Academy. York: Author.

B. Anticipated Benefits

7. Learning analytics can act as an enabler in many institutional priorities such as assessment and feedback, supporting students and retention in online courses, and has the potential to overcome the challenge of delivering personalised feedback for large class sizes.

8. By creating a student learning footprint data mart, multiple data sources, capturing engagement at the individual student level will have been brought together that will be used to analyse and model student behaviour and engagement in their classes and with the institution. It will also provide an additional data stream to enable further cross-institutional business intelligence analysis, for use in SUnBIRD, and support the data requirement for the Learner Experience Framework project. It has the potential of underpinning any other future data-driven institutional projects.

9. By implementing this data mart, and the subsequent development required on the reporting system and staff development activities, improved efficiency for academic staff for accessing and interpreting the data provided is achieved.

10. By developing this data mart, it becomes possible to compile, analyse and visualise data that can be presented in a format appropriate to a range of stakeholders, will increase the opportunities to provide targeted support and intervention where appropriate and support evidence-informed practice, to foster strategic and formalised interventions with students.

11. By developing this data mart, it will allow for the GDPR compliant and retention of student data (historical data) which is necessary for the development of predictive analysis and modelling of student behaviour.

C. Project Objectives

12. Development of a data mart will facilitate the delivery of a system which supports evidence-informed decision making by key stakeholders, in all areas of the institution; from supporting high-level business decisions, to providing personalised support for individual students.

13. Development of new dimensional model specific to business needs for learning analytics data mart.

14. Development of source system extracts in coordination with data custodians and developers to be utilised via Extract Transform and Load (ETL) for the data warehouse dimensional model.

15. Development of ETL packages with Oracle Data Integrator (ODI) from identified source systems to potential data mart dimensions and fact tables.

16. Learning analytics has the potential and power to enhance the learning experience by providing information from students, about students, to help students once they have entered their chosen course. A repository consisting of multiple sources of institutional data is critical to the successful implementation of the learning analytics strategy, endorsed by key learning and teaching strategic committees.

D. Scope – Included

17. Business Event Analysis and Modelling will be carried out to assist with the business requirements gathering specifically for the development of a dimensional model for the data mart.
18. Delivery of a data mart to support various institutional activities and projects, such as learning analytics, the Learner Experience Framework and SUnBIRD.
19. Delivery of Oracle Data Integrator ETL software that will continually populate the data model as identified.
20. Accessibility to data mart via SQL Developer only for further analysis.
21. Recruitment of Grade 7 Developer

E. Scope – Excluded

22. Although the data mart will be designed and future-proofed as much as possible with learning analytics, the Learner Experience Framework and SUnBIRD in mind the actual projects that will use this data mart are specifically out of scope for this project. No Business Intelligence dashboards or reporting will be part of this development.
23. Current dashboards utilise operational live data in Myplace. The development of a range of approved learning analytics tools, including predictive modelling (LEC – date), is out of scope of this project however, their successful development and implementation is dependent on the delivery of the Student Learning Footprint Data Mart. It is planned that specific learning analytics business cases, leveraging this new infrastructure, will be submitted to DCSC upon delivery of the data mart.

F. Proposed Project Delivery Approach

24. The PMO Handbook for Project Managers will be used to manage delivery of the project. In addition, the project will be a standing item and report regularly to the Learning Analytics Board, chaired by Project Sponsor, Brian Green (Deputy Associate Principal Learning & Teaching). An update from the Learning Analytics Board is also a standing item at Learning Enhancement Committee. Project outputs and recommendations will be presented for the consideration of the Learning Analytics Board and the Learning Enhancement Committee.

25. The project will be delivered in a phased approach to minimise impact on business as usual.

26. The data mart will be created in-house, and located within the existing institutional data warehouse.

27. A small core project team made up of Education Enhancement and Enterprise Data Warehouse team, in collaboration/consultation with key stakeholders where required, will develop the data mart, and will necessitate recruitment of one new Developer.

28. The project will be led by Education Enhancement and will report to the ISC Programme Board. The project will also supply regular updates to the Learning Analytics Board, the Learning Enhancement Committee (and onward to Education Strategy Committee).

G. Project Delivery Structure

29. Project Board:
   a. Project Sponsor: Brian Green,
   b. Project Manager: Michael Aherne, Myplace Development Team
   c. Senior Customers: Education Enhancement & Strategy & Policy
   d. Senior Suppliers: Information Services Business Systems
   e. ISC Governance: Evelyn Trearty, PMO representative

30. Project Team:
   a. Project Sponsor: Brian Green, Deputy Associate Principal Learning & Teaching
   b. Project Manager: Michael Aherne, Senior Applications Analyst/Developer
   c. Senior Supplier: Robert Anderson, Enterprise Data Warehouse Manager
   d. Business Expert: Ainsley Hainey, Learning Technologist
   e. Senior Customer: Scott Walker, Deputy Head Education Enhancement
   f. Tester: Nidhi Rohatgi
   g. Developer: TBA (New Post)

31. Key Stakeholders:
   a. Students
   b. Departmental and School Teaching and Administrative Staff
   c. Programme Directors/Leads
   d. Learning Analytics Board
   e. Learning Enhancement Committee
   f. Library
   g. ISD
   h. Strategy & Policy

H. Project Delivery Plan

32. Dependencies:
   a. Key stakeholders are available for consultation/input as required

33. Assumptions:
   a. Grade 7 developer successfully recruited on schedule.
   b. Project team remains assigned to project throughout.

34. Delivery Stages:

	10/18	11/18	12/18	01/19	02/19	03/19	04/19	05/19	06/19	07/19	08/19	09/19	10/19	11/19	12/19	01/20	02/20
Initiation & Requirement Analysis		▣	▣														
Recruitment	▣																
Development of Data Model			▣	▣	▣												
Source System Extract(s) Development					▣	▣											
Development of ODI ETL						▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	
Close Down															▣	▣	▣

35. Initiation Stage key milestones described
    a. Undertake Business Event Analysis and Initial Modelling.
    b. Identification of available data as per requirements.
    c. Undertake Data Protection Impact Assessment.

36. Recruitment key milestones described:
    a. Write job specification and advertise post.
    b. Form recruitment panel.
    c. Shortlist candidates.
    d. Interviews.

37. Development of Data Module key milestones described:
    a. Development User Requirements into fully form dimensional model.
    b. Develop dimensional model documentation.
    c. Develop ODI ETL Specification.

38. Source System Extract(s) Development key milestones described:
    a. Analysis of required data extracts.
    b. Specification of required data extracts.
    c. Development of extracts from required source systems

39. Development of ODI ETL key milestones described:
    a. Development of ODI ETL software for each dimension and fact.
    b. Testing of ODI ETL software for each dimension and fact.
    c. System Testing of ODT ETL software for each dimension and fact.

40. Close down project.
    a. Plan handover to business as usual.
    b. Close down project.

I. Key Risks to the Success of the Project:

Risk description	Effect if the risk is realised	Prob-ability	Impact	Risk rating
1. Delay in recruiting developer	Re-baseline delivery	2	4	M
2. Failure to recruit developer	Re-baseline delivery, divert resources to this project by re-baselining other existing projects/commitments etc.	1	5	M
3. Project team not available as planned	Delays	2	3	M
4. Lack of stakeholder engagement	System not fit for purpose	1	3	L

J. Resource Requirements

41. Estates Space Requirements:
    a. There is one additional space requirements for this project. This will be accommodated within existing requirements in the Enterprise Data Warehouse Team on Level 5, Curran Building.
    b. Estates costs for the project are calculated on a monthly basis against the estimated staffing profile and are based on the FTE rates found in section K, Project Budget.
    c. See Appendix B for financial source figures.

42. Estimated Staffing Profile
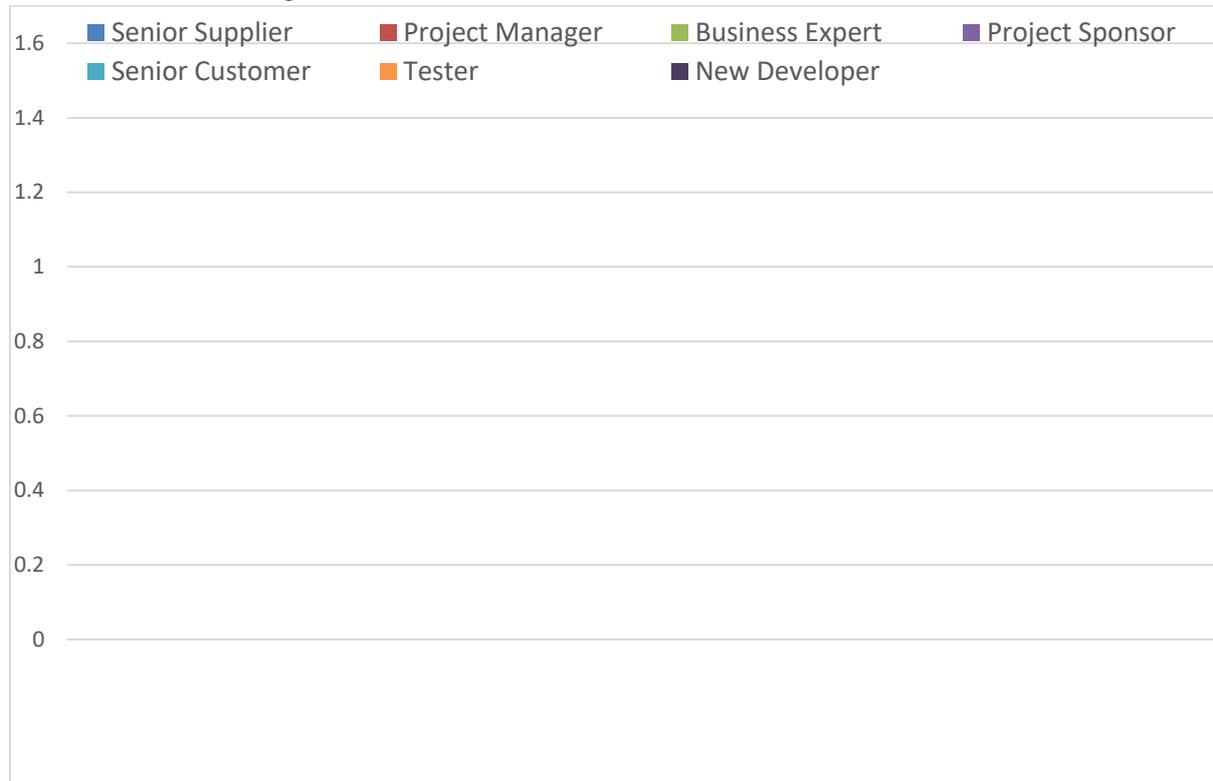
K. Project Budget

Summary Project Costs by Budget Year									
Budget Year	2018/19		2019/20		2020/21		Sub-Total		
Core Funding	£	22,575	£	18,299	£	-	£	40,874	
Department Funding	£	3,587	£	3,328	£	-	£	6,914	
New Funding Required	£	28,286	£	28,993	£	-	£	57,278	
					Estimated FEC		£	105,066	

Summary Project Costs by Spending Category			
Item	Core Funding	Department Funding	New Funding Required
Internal Staff Hours	£ 40,874		£ 57,278
External Suppliers			
Hardware			
Software			
Materials and Equipment			
Training*			
Estates and Indirect Costs		£ 6,914	
Project Running Costs			
Sub-Totals	**£ 40,874**	**£ 6,914**	**£ 57,278**

*Excludes internal Trainer costs because they are captured in "Internal Staff Hours"

L. Delivery Options

43. Do Nothing (impact if the project is not approved):
    a. Learning analytics has the potential to be a key enabler to a number of the University's strategic education priority areas. Failure to undertake the development of the data mart will result in an inability to fully implement and maximise the potential that learning analytics can bring to support the student experience and operational excellence.

44. Delay (impact if the start date is delayed):
    a. If the start date is delayed, then work will proceed, however this will also cause a delay in the implementation of learning analytics to support strategies in priority areas of education and student experience.

45. Other Solutions Considered:
    a. It is not possible to deliver using existing resources as the Enterprise Data Warehouse team do not have sufficient capacity to deliver the data mart to the timetable required. This business case envisages that both the Senior Developers and Enterprise Data Warehouse Manager will be committed to the project for its duration (at 0.39) and will be able to begin the initial development during the recruitment phase, ensuring that the immediate requirements are met. However, the scope and complexity of the development requires the additional resource of an additional 1.0 FTE developer to ensure timely delivery.

Appendix A: Detailed Budget Breakdown

	Internal Staff Project Costs				
Item	**Grade**	**FTE**	**Months**	**Core Funding**	**New Funding Required**
Project Sponsor	Senior Staff	0.025	16	£3,515.40	
Project Manager	8	0.05	17	£4,994.33	
Project Admin					
Business Analyst/s					
Business Specialists	7	0.3	6	£8,603.48	
Developer/s	7	1	12		£57,278
Senior Developer/s	8	0.24	17	£19,090.39	
Infrastructure	9	0.025	16	£2,764.23	
Trainer/s* **Make sure this is not double-counted under training breakdown**					
Communications					
Backfill **(subtract from core funding)**				-£	
Key Stakeholder consultation time				£1,906.32	
Sub-Totals				**£40,874**	**£57,278**

External Suppliers, including External Training Costs		
Supplier Type (and name if known)	**Nature of work to be completed**	**Estimated Costs (incl. VAT)**
	Total	

Hardware, Software, Materials and Equipment (including internal training materials)		
Item	**Description**	**Estimated Costs (incl. VAT)**
	Total	

Appendix B: Source Figures for Financial Calculations

46. Estates and Indirect Rates have been produced in conjunction with Finance:
    a. They are updated in July of each year as part of the annual budgeting process.
    b. Indirect costs are primarily based on the annual professional services per capita rates. These are calculated on an agreed basis which allocates out costs based on the users of each of the services.
    c. Estates costs are based on a shared office accommodation space of 7m^2 per person, as per the University's Space Management Policy, and the 2018/19 per capita rate for general office space (type 1).
    d. Key stakeholders are not included in the calculations for Indirect and Estates costs.

47. The following Estates and Indirect Rates were calculated based on the 2018/19 budget:
    a. Estates – generic – £2,024 per FTE
    b. Indirect costs – £2,413 per FTE

48. Representative Staffing Costs:

Grade	2018 Hourly Rate	2018 Daily Rate	FTE 2018	FTE 2019	FTE 2020
3	£16.15	£121.11	£26,644	£27,310	£27,992
4	£18.71	£140.30	£30,866	£31,637	£32,428
5	£22.49	£168.65	£37,103	£38,030	£38,981
6	£27.77	£208.29	£45,823	£46,968	£48,142
7	£34.29	£257.14	£56,571	£57,985	£59,435
8	£42.30	£317.23	£69,790	£71,534	£73,322
9	£49.72	£372.86	£82,030	£84,080	£86,182
10	£55.17	£413.75	£91,025	£93,300	£95,633
Senior Staff	£63.22	£474.19	£104,321	£106,929	£109,601

49. These **representative** salary costs have been calculated in the following way:
    a. Grades 3 to 10 are based on the USS Salary Scales and Costs table at 1st April 2018 spreadsheet produced by Finance.
    b. Costs for senior posts are based on representative figures provided by Finance.
    c. An inflation rate of 2.5% has been used to calculate salary costs from 1st April 2019 and 1st April 2020.
    d. Units for calculations are based on:
        i.   1 day = 7.5 hours / 1 year = 220 days
        ii. 1 week = 37.5 hours / 1 year = 44 weeks
        iii. 1 year = 1650 hours