All text and images in this guide relating to the products, platforms and services listed are taken directly from the submissions of the vendors that chose to respond to the Request for Information (RFI) that was issued publicly and internationally through the Irish government’s eTenders platform (Reference number: HEAnet_DESSI_LearningAnalytics18). The National Forum for the Enhancement of Teaching and Learning in Higher Education’s role in the publication of this guide is merely to collate the responses and make them available. The National Forum is not affiliated with any of the vendors and has made no changes, edits or omissions to the vendor submissions that were received through the public RFI process. The contents of this guide were submitted verbatim by the vendors listed and do not necessarily reflect the views, ethos or mission of the National Forum.

Further information on how the submissions were invited and gathered is available in the section entitled *How this Guide was Compiled*
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INTRODUCTION

Data is becoming increasingly recognised as an invaluable resource across the international higher education. While much of the data currently held by Higher Education Institutions (HEIs) is collected incidentally, such as the metadata behind Virtual Learning Environments (VLEs), we know that it can serve institutions and their students as an invaluable, and frequently underused, source of key insights. Although it may be considered a fledgling area, Learning Analytics research has shown that learner data can be used as an evidence base for proactively identifying students at risk of underperforming, for recommending services and courses of action that can enhance students’ learning experience and for targeting support resources to students with the greatest need. It can enable HEIs to make informed decisions and take actions with a higher likelihood of success, while empowering them to iteratively and dynamically enhance the quality of the student experience.

In order to maximise the value of this resource, HEIs must take a strategic, whole-of-institution approach that focuses on growing a culture that embraces data as a fundamental evidence base for driving decisions and actions at every level. They must recognise that the ultimate goal is not to have an analytics capability per se, but to maximise the value of that capability as a tool for driving and supporting student success, in conjunction with effective, enabling student success policies and practices.

The National Forum has been working over the past two years to provide supports for institutions as they look to develop their capacity in this area. Working directly with key stakeholders and experts from across the sector, we have generated a substantial number of guides and case studies designed to assist institutions and staff who teach in maximising the value of the data available to them. These resources, which cover many key areas such as policy development, data quality, data question development, ethics, GDPR, communications, consultation and effective interventions, are available through ORLA, the National Forum’s open-access Online Resource for Learning Analytics.

We have also compiled two recognised professional development programmes aimed, respectively, at staff who teach and those interested in driving institutional data strategies. Both of these courses, developed as part of the National Forum’s Professional Development Framework, will be available from January 2019.

Of course, the ability to turn that raw data into real-time, actionable information is also an important aspect of an effective data-enabled approach to student success. To this end, I am delighted to welcome you to this guide that gives an overview of many of the analytics platforms that are currently on the market. This guide, the first of its kind, introduces each platform across a number of key areas such as features, cost, support and technical infrastructure, all in the words of the vendors that supply them. The information was submitted directly from vendors in response to a request for information that was distributed worldwide via eTenders, the Irish Government’s electronic tendering platform.
I hope that this guide will be of considerable assistance, not only to HEIs looking to utilise a fit-for-purpose system that is congruent with the needs and circumstances of the institution, but also to those that are interested in developing their own, in-house systems.

Finally I wish to express my thanks to HEAnet, who partnered with us in gathering the information for this guide. It would not have been possible without their support and considerable expertise.

Dr Terry Maguire  
Director, National Forum for the Enhancement of Teaching and Learning in Higher Education
HOW THIS GUIDE WAS COMPILED

The information in this guide was submitted directly by interested vendors through a request for information (RFI) that was issued internationally by the National Forum and HEAnet through eTenders, the Irish Government’s tendering platform (Reference number: HEAnet_DESSI_LearningAnalytics18). RFIs are standard business processes, through which suppliers and vendors are asked to provide information on their products’ capabilities.

Individual vendors were not targeted. Rather, a general request was extended through eTenders, inviting responses from self-selecting vendors that met a range of criteria, most notably that they had already worked with HEIs in Europe to provide platforms that enabled analysis of data relating to student engagement and success.

Vendors were asked to respond to a standardised set of questions relating to:

- User functionality
- Service agreements
- Cost
- Infrastructural and technical specification
- Compatibility with platforms currently in use in Irish HEIs

In total, nine responses were received, all of which are included in this guide. The responses have not been altered or edited and are presented in the exact format in which they were submitted directly by the vendors themselves.
FITNESS FOR PURPOSE AND IN-HOUSE DEVELOPMENT CASE STUDIES

Fitness for purpose is a key driver of developing an institutional approach to data-enabled student success. An analytics capability must be seen as a means to achieve an end, not as an end in itself. Analytics offers the opportunity to answer questions in ways and at times that may never have been possible before, but it is crucial to bear in mind that these answers do not, in and of themselves, achieve change or improve outcomes for institutions, staff or students. It is the informed decisions that are made and impactful actions that are undertaken, informed by these insights, that can enable institutions and their students to reap the benefits of employing analytics.

It is essential, therefore, that institutions and institutional leaders begin by establishing the specific outcomes they want to achieve and the changes in behaviour they want their data to inform. Once defined, these outcomes will enable strategic planning about the exact questions that institutions want their leadership, staff and students to be able to answer and respond to in real time. An awareness of these questions will, in turn, enable institutions to make informed decisions about the tools and platforms that are best suited to their long-term goals, institutional ethos and operational conditions.

It is noteworthy that there are a number of Irish institutions that have opted to ensure fitness for purpose by either developing tools in-house or working directly with external developers to build bespoke approaches that are directly aligned with their needs, rather than investing in existing analytics packages. The National Forum has begun compiling a suite of case studies of such institutions that may be of benefit to other HEIs that are looking to extend their analytical functionality.

While this suite will increase in size over the coming months, five brief case studies are currently available. Four of these detail software developments and one outlines an analytical approach being taken in order to better understand learner data.

The case studies currently available at https://www.teachingandlearning.ie/resource-search/?fwp_resource_theme=dessi are as follows:

**Unishare at UCD**
Developed in-house, this CRM platform enables tracking of student queries to improve service and target resources

**CIT Faculty Dashboard**
Developed in-house, this dashboard continuously gathers and summarises a range of data to inform institutional decision making.
DBS Early Alert Reporting
This in-house dashboard dynamically merges data from a range of sources to identify students at risk of non-completion

Digital Footprint Analysis among the TU Dublin Partners
Working with academic colleagues to symbiotically improve student engagement and enhance data-enabled insights

Predictive Analytics at NUIG
Development of an algorithm and reporting suite that predictively identifies students at risk of non-completion

Developing an LA Policy and Strategy for IT Blanchardstown
Ensuring appropriate use of student data for learning analytics and defining an agreed roadmap for next steps

Programmatic View of Assessment at DCU
Enhancing VLE reporting to enable a coordinated approach to assessment and the identification and support of students at risk of non-progression

WIT’s Analysis of First-Year Progression Data
Developing an evidence base for understanding factors influencing student progression and for informing student success initiatives

UL’s Student Engagement and Success Unit (SESU)
Aligning academic, social and pastoral services to ensure an aligned, seamless approach to student success

LYIT’s Digital Attendance Monitoring System
Development of a platform that streamline attendance recording and enables detailed institutional reporting and planning
VENDOR SUBMISSIONS
PROVIDER: BLACKBOARD

Product(s)

Insights and Analytics — Encompassing Blackboard Analytics for Learn, Blackboard Predict and the Student Insights Toolkit

Provider contact

Alistair.Brook@blackboard.com

Product Descriptions

Blackboard’s Learning Solutions are designed to support the educational needs of your students, faculty, and institution—both now and in the future. Cost-effective combinations of Blackboard products and services are strategically blended to provide the technology and support best suited to your institution’s needs.

Blackboard is committed to helping institutions to increase access to education through flexible solutions, connected experiences, and importantly for Analytics, with “Data-Driven Insights”. Data Driven Insights are accessible, relevant and actionable, allowing Institutions to use data to inform decisions and change behaviours. It is a strategic shift that leverages data from all touchpoints and delivers insights at every level, providing the right information, to the right person, at the right time.

Institutions need both deep and focused insights about the teaching and learning experience to deliver meaningful and targeted action.

Through relevant reporting and metrics integrated into role-specific workflows, Blackboard solutions enable institutions to facilitate continuous improvement and unlock deep understanding of the teaching and learning process; helping inform decisions and shape behaviours.

At Blackboard we ask “Why?” is this important to institutions and what impact access to these data will have. Data Driven Insights therefore:

- Enhance understanding — By surfacing relevant insights and metrics within individual workflows, people at every level — leadership, educators, administrators and students — are able to identify and act on issues in real time; shaping behaviours and empowering a culture of educational effectiveness and institutional efficiency.
• Help make informed decisions — Through advanced analytics and executive-level dashboards, institutional leaders are able to identify trends in learning and operational performance, informing the types of decisions that help institutions function with greater efficiency, while still keeping pace with the rapidly-evolving needs of their students.

• Define and validate institutional performance — Through analytics and advanced reporting, institutions are able to define, monitor and measure the value their programmes provide students, helping to advance their reputation and access to performance-based funding.

With our suite of analytics products, including Blackboard Analytics for Learn, Blackboard Predict, and Student Insights Toolkit, we are empowering institutions to gain a holistic understanding of their educational environment so they can improve teaching and learning, drive student success, and optimise institutional performance at scale.

Looking to the future, we are building a platform that will bring together data from each and every one of Blackboard’s products and services, and surface insights into workflows that make the most sense for users. With Blackboard Data, institutions will gain a flexible, connected, and holistic perspective on the student experience in a SaaS environment that empowers faculty, instructional designers, and administrators to be responsive to the needs of today’s learners, and the learner of tomorrow.

Our analytics products include the following:

• **Analytics for Learn (A4L)** is a comprehensive data warehousing solution curated for analysis and organised to address a certain set of domain questions around teaching, learning, and student success. A4L draw longitudinal data from the VLE and an institution’s student information system (SIS) and organises it for reporting, allowing institutions to quickly and easily find answers to their questions. To help institutions to navigate the data model, A4L is packaged with the Pyramid BI Office business intelligence tool. A4L also integrates seamlessly with the VLE to deliver reports at course level. Its multi-layered infrastructure and flexible reporting interfaces support many combinations of stakeholders and use cases.

  A4L helps institutions gain insight into areas such as:

  – VLE adoption, including which staff are not adopting technology and which technology tools drive the best results.
  – Programme evaluation.
  – What student activities are correlated with desired outcomes like grades and course completion?
  – What instructional design practices improve student performance?
  – Which tools see the greatest effect on student engagement and success?

• **Predict** enables more targeted and scalable interventions of at-risk students by leveraging rich data sets and advanced analytics to proactively identify students in need of support. Simple, easy-to-interpret visualisations let instructors and advisors know which students are at risk and when it is time to intervene.
Predict brings together over a hundred data points about each student and several years of historical data. These data are then used to model the probability that a student will pass their course. Bringing comprehensive data into the advising picture allows institutions to model what could happen in the future and enables effective early intervention of struggling students.

Blackboard Predict enables institutions to:

- VLE adoption, including which staff are not adopting technology and which technology tools drive the best results.
- Programme evaluation.
- What student activities are correlated with desired outcomes like grades and course completion?
- What instructional design practices improve student performance?
- Which tools see the greatest effect on student engagement and success?

**Student Insights Toolkit** provides real-time, actionable information via reporting dashboards to students, instructors and administrators directly within the VLE. The dashboards contain data visualisations and other targeted lightweight data showing course progress, engagement and completion.

The Student Insights Toolkit allows:

- Administrators to monitor faculty engagement.
- Instructors to quickly identify action items and students needing attention.
- Students to see where best to spend time in the course to achieve their desired grade.

**Notable Features**

**Analytics for Learn** comes with a library of existing reports. Institutions are also able to generate their own custom reports and dashboards and use the A4L data model to find answers to key institutional questions, or as a tool to aid efficient decision making, define processes, and scale those processes. Any reporting defined in the tool can be served out to the appropriate institution constituents, based on their roles or the types of questions for which they tend to seek information.

Notable features include:

- Comprehensive and customisable data extracts from the VLE.
- Easy integration with any SIS, to provide context to the VLE data as well as final grade data for correlation reporting.
- A clear and well-defined structure to the data warehouse and comprehensive documentation to support self-service reporting.
• An extensible data model enabling the ingestion and modelling of data from additional sources, allowing the institution to use the solution either as a data mart to supply data to an institutional data warehouse, or as the foundation of a comprehensive institutional learning analytics solution.

• Full access to all historical activity on the VLE, enabling trend-based insights at day 1 of deployment.

• A suite of more than 140 reports and dashboards, plus the capability for the creation of bespoke reports.

• Multiple reporting interfaces to support different stakeholder groups:
  — VLE-Integrated – providing insight for instructors and students on courses.
  — Parametrised – enabling navigation through the institutional hierarchy to select an individual student or course and provide detailed insight.
  — Strategic – our Business Intelligence interface enables management reporting, trends over time and statistical analysis, along with multiple approaches to surfacing data to meet the requirements of end users.

Predict uses established data science methodologies to identify historical patterns unique to an institution. The algorithms that Blackboard’s data scientist teams have developed, identify which data best predicts student risk of course failure at the institution. These findings then feed into our Random Forest machine learning algorithm to create a predictive model customised for the specific institution. It is the output of this model that drives the insights in the user interface. Student at-risk predictions are available from teaching week 0 and the predictions are regularly updated as teaching progresses.

Notable features include:

• Week 0 student at-risk predictions
• Student at-risk predictions regularly updates as teaching progresses
• Reports available for lecturers, advisors and students
• Easy integration with popular VLE and Student Information Systems
• Custom integration for bespoke Student Information Systems
• Software as a Service (SaaS) solution for high up-time and rapid deployment
• Public APIs for extraction of prediction data into other institutional systems
The Student Insights Toolkit enable institutions to innovate around analytics by driving student engagement and success via nudges and embedded micro analytics.

Notable features include:

- Embedded micro-analytics directly within VLE workflows for maximum impact and to help students succeed
- Micro analytics data can be represented as text, charts, and/or graphs
- Customised for institutional needs
- Extensible

Underlying infrastructure required to support the product

Blackboard’s analytics solutions are available either as SaaS or managed hosted solutions. Analytics for Learn and the Student Insights Toolkit can be locally hosted if required. Typically, following a review of requirements and detailed scoping, we will provide infrastructure requirements for each institution that wishes to locally host the analytics solution. their roles or the types of

The product(s) can include data from the following systems

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Key features of the product’s service level agreement

Blackboard is responsible for the provision, operations, and maintenance of our analytics software and the underlying platform and infrastructure. Blackboard endeavours to ensure that the service is made available 24/7/365 with a specified target uptime of 99.7% on a monthly basis, which is financially backed by service credits. Blackboard performs regular backups to mitigate data loss and provides restoration and recovery services in disaster or outage scenarios. Blackboard hosts the service within highly secure data centres with redundant power, network, and infrastructure services. Blackboard performs 24/7/365 monitoring for uptime and intrusions, backed by alerting and management processes. Client support is provided 24/7/265. Blackboard’s Client Support Guide includes severity levels and target response times for support case submission.

Blackboard’s Client Support Services Guide and Service Level Agreement for our analytics products are linked below:

SLA: http://library.blackboard.com/docs/support/BlackboardAnalyticsServicesLevelAgreement.pdf

Implementation process, duration and institutional resources

At Blackboard, we tailor our implementation processes to ensure the best possible long-term outcome for each institution. This includes working with the institution to understand the current landscape for change management and working around the availability of staff. Although each product has its own implementation process, the phases are broadly the same:

1. Introduction to the product and implementation process
2. Gathering requirements and understanding challenges
3. Technical preparation
4. Technical implementation
5. Validation & knowledge transfer

Timelines again depend on the complexity of the project, but also on the availability and expertise of institutional staff, particularly where data from non-Blackboard sources are required. Scheduling of on-site activities around the availability of participants can also impact timelines. With this in mind, the typical timelines for these products are as follows:

- Analytics for Learn and Predict – 3 to 6 months
- Student Insights Toolkit – 6 to 10 weeks
A typical client-side project team would include:

- Project Sponsor
- Project Manager
- VLE Administrator
- SIS Database Administrator
- Stakeholder representatives

**Pricing Structure**

Pricing for Blackboard’s analytics systems designed to support student success is dependent upon many factors beyond institution FTE and/or number of users. Typically, following a review of requirements and detailed scoping, we will provide custom pricing for each institution. Below we provide a number of customer references together with indicative pricing examples.

- Institution A, FTE 20,000, currently uses our Analytics solution. We expect them to pay in the region of €72,000.
- Institution B, FTE 12,500, currently uses a variety of Blackboard Analytics solutions. We expect them to pay in the region of €95,000 per annum.
- Institution C, FTE 15,000, currently uses a Blackboard Analytics solution including customisations. We expect them to pay around €100,000 per annum.

*Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie*

**Reporting Features for Lecturers**

Each Blackboard product includes its own reporting features, and our Analytics products provide standard reports as well as, in many cases, customisable or bespoke reports. As a brief overview:

- Analytics for Learn provides 5 reports integrated into the VLE course, and these can be customised to meet the specific requirements of the institution. These reports include a comprehensive course dashboard with comparative data on course design and the activity and performance of individual students, as well as diagnostic reporting on student activity and performance.
- Predict provides a report for each course that shows a list of all enrolled students and their level of risk (defined through a machine learning algorithm) along with key activity and performance metrics. Further insight is provided on risk, activity and performance for each student, as well as email functionality to drive intervention.
- The Student Insights Toolkit can provide reporting on any data the institution chooses to surface, embedded within the relevant area of the course. Subjects include grading workload and student retention, engagement and performance.
Reporting Features / Apps for Students

Our products provide optional insights to students (based on institutional deployment decisions) that can help to inform their decisions regarding their studies. In general, these focus on the student’s activity and performance compared to the course average, with data mapped over the weeks of the course so that the student can see where their activity profile differs from their peers.

The Student Insights Toolkit can surface any required data. Examples include grade information, degree progress and forum engagement.

Enterprise Reporting Features

At Blackboard, we recognise that insight needs to be provided to all levels of the institution, and so we provide several options for management reporting. This helps to enable a culture of data-driven decision making. Specifically:

• Analytics for Learn includes a Business Intelligence interface that provides more than 100 insights into the adoption and usage of the VLE, and can be used to create bespoke reports, dashboards and publications to meet the needs of key stakeholders and use cases.
• Predict includes an interface that provides access to the predictions for all students. This can be filtered based on different variables including risk level, demographic variables, and course attributes, and is particularly of interest to programme co-ordinators and department heads.
• The Student Insights Toolkit can surface a broad range of data. Examples include the creation of a “Dean Dashboard” and to report on the progress of staff development.

How many HEIs are currently using the product? How many of these are in Ireland/the UK?

Many of our Higher Education customers make use of our Data Driven Insights in many different ways either by existing tools within our VLE solutions or using a variety of Blackboard Analytics offerings. The numbers below provide a snapshot of those currently using these different solutions:

• Total HEIs Using VLE solutions: 2,800
• Total HEIs using specific Analytics Solutions: 257
• UK HEIs using VLE Solutions: 199
• UK HEIs using specific Analytics solutions: 4
Examples of current users

Blackboard provides 4 customers that have practical experience of using the proposed solutions:

**Indian River State College**
*Fort Pierce, FL, USA*
*Kendall St Hilaire*
*Director*
*(772) 462-7119*
*ksthilai@irsc.edu*

Indian River State College (IRSC) deployed Blackboard Analytics solutions as a practical approach to improving student success. With the deployment of these solutions, IRSC has made significant gains by increasing online course enrolments, improving course and VLE quality along with increased faculty adoption. Critically, predictive analytics has been embraced by faculty to help assess students at risk for early intervention to dramatically impact on individual student success.

Further details can be accessed via the following:
https://rv.roinnovation.com/Blackboard/x/Default.aspx?da4589db8b73499baa126d0ddf536be5
https://rv.roinnovation.com/Blackboard/x/Default.aspx?0db8f9172a21465e81783b63b886cf8

**Charles Darwin University**
*Professor Robert Fitzgerald*
*Pro Vice-Chancellor Education Strategy Darwin, NT, Australia*
*+61417023539*
*robert.fitzgerald@cdu.edu.au*

Charles Darwin University has done substantial work in relation to learning analytics development and deployment across the institution. The main focus of Blackboard’s work has been on the integration between the VLE and SIS data for improving teaching and learning and retention. This has enabled enquiry-based reports around cohort comparisons, demographic data and course attributes, relative grades comparisons and grade centre and interaction data.

Further details can be accessed via the following:
Ulster University
Jordanstown, Newtownabbey Co. Antrim
Andy Jaffrey,
Head of the Office for Digital Learning
T: +44(0)28 9036 6160
www.ulster.ac.uk
http://addl.ulster.ac.uk

Ulster University is piloting Blackboard Predict, a predictive analytics solution which uses historical student data and outcomes to identify and compare characteristics with the current cohort of students. Ulster is using Predict to help inform interventions designed to increase the numbers of students completing a programme of study within a specific time frame (retention) and increase numbers of students who progress in and beyond education (progression).

Further details can be accessed via the following:
https://www.youtube.com/watch?v=SVr3gFpAFzM&feature=youtu.be

Drexel University
Michael Shelmet
Associate Director of Instructional Technology Office of Information Technology
Philadelphia, PA USA
Office: 215.895.1042
drexel.edu/it
Jeffrey Berman, Analytics Specialist (215) 895-4925
tjb77@drexel.edu

Drexel University are a long time Blackboard client. Blackboard Analytics have been used by institutional research to help with student retention.

Data infrastructure

The Blackboard Solution is hosted out of the Amazon Web Services (AWS) and Snowflake cloud environments.

GDPR & Security

The privacy and security of our clients’ data is of utmost importance to Blackboard. Blackboard has dedicated data privacy and security programmes in place to help ensure that client data is used in accordance with GDPR and other applicable data privacy laws and is protected with appropriate technical and organisational measures.
Blackboard’s Security Office is led by the Chief Information Security Officer (CISO). The Security team’s structure includes a Chief of Product Security and individuals with responsibilities across functional areas including: product security design and engineering, security operations and threat intelligence, vulnerability management, audit and security compliance, policy, and training and awareness. The core team is made up of 20 FTE positions with additional individuals across the company with security responsibilities that are guided by the governance and frameworks provided by the centralised Security team. There is additional contractor and vendor support for monitoring coverage. Blackboard’s security team has also established a Product Baseline Security Controls (PBSC) programme to assess our products’ adherence to a baseline set of security controls in alignment with global regulations and industry standards, and to document any gaps, risks, exceptions, and plans for remediation. Blackboard has a Global Privacy Officer (GPO) who is responsible for ensuring that we adequately protect client data and who leads our General Data Protection Regulation (GDPR) compliance programme. Blackboard has a Chief Compliance Officer responsible for our legal and regulatory compliance. The CISO, GPO, and Chief of Product Security report status to the CEO Leadership Team on a regular basis to discuss privacy and security related plans and progress. Blackboard has also established a Privacy, Security, and Risk Assessment council to discuss issues related to provide and security. Blackboard operations and business practices are routinely reviewed for compliance with corporate policies and procedures governing the security and confidentiality of information.

Blackboard’s security policies are aligned with industry standards such as the National Institute for Standards and Technology (NIST) 800 framework, European Network and Information Security Agency, SANS Institute, Open Web Application Security Project (OWASP), and Cloud Security Alliance (CSA). We are in the process of updating our architectures and processes to meet International Organisation for Standardisation (ISO) 27001, Centre for Internet Security (CIS), Service Organisation Control (SOC), and other standards. Blackboard has an overarching IT Security and Acceptable Use policy as well as topic specific policies addressing areas such as, but not limited to: Acceptable Use, Access Control, Audit and Accountability, Awareness and Training, Configuration Management, Contingency Planning, Identification and Authorisation, Incident Response, Maintenance, Media Protection, Personnel Security, Physical and Environmental Protection, Risk Assessment, Security Assessment and Authorisation, System and Communications Protection, System and Information Integrity, System and Services Acquisition, etc. Blackboard implements security measures including, but not limited to: redundant deny by default firewalls, network segmentation (private secure VLANs and subnets with storage and compute resources located in a private internal network), data encryption, strong authentication, logical separation, secure data handling and disposal, auditing and logging, 24/7/365 monitoring, vulnerability management, privileged and role based access controls, restricted access to data centres and server rooms, secure coding practices, comprehensive incident response processes, and personnel security (confidentiality agreements, background checks, security and privacy awareness training, etc.).

Blackboard has a regional hosting strategy with Blackboard’s flagship products and related client/student data hosted in EU data centres. Specifically, for our EU clients, our analytics products are hosted in the AWS and Snowflake environment in Frankfurt, Germany. While application hosting
and data storage takes place in the EU for our EU clients, access to the hosting environments from outside the EU may be necessary for client support, product maintenance, and similar purposes. Client Support is generally provided from the EU during regular business hours. To provide 24/7 follow-the-sun support and 100% support coverage, Blackboard’s global team of Client Support personnel may have access to environments containing client data from outside the EU (e.g., US, Australia) to address client support cases. Additionally, the product teams (development/operations personnel – mostly located in the US, and some in the EU) may have access to environments containing client data where required to update and maintain the product, as well as to provide troubleshooting assistance, when necessary. Blackboard’s support systems are located in the United States.

To ensure that client/student data receives the same level of data protection when it is accessed from outside the EU/EEA, Blackboard uses two (redundant) EU-approved data transfer mechanisms. The first one is Blackboard’s EU-US Privacy Shield certification. Our privacy shield certification can be found here: https://www.privacyshield.gov/participant?id=a2zt0000000TOD9AAO. Secondly, Blackboard also has an internal data transfer agreement based on EU-model clauses that allows for the access from outside the EU/EEA. You can find more on information on our GDPR implementation in our GDPR white paper, which is available at http://www.blackboard.com/legal/gdpr.html, and additional information on our data privacy programme in our Privacy Centre and Data Privacy and Security group on Blackboard Community, accessed below:

- Privacy Centre on bb.com: https://www.blackboard.com/legal/privacy-center.html
- Privacy and Security on Community Site: https://community.blackboard.com/groups/data-privacy-and-security

**Account management structure**

Blackboard provides an extensive Account Management and Support structure designed to not only support client needs but to give confidence that clients will receive the maximum value and impact from their investment. Blackboard will tap into the breadth and depth of our Analytics expertise to support our clients, to understand their strategic aims and articulate how Blackboard can best support you to achieve those aims.

**Personal, Familiar Points of Contact**

The primary Analytics Platform point of contact with be Blackboard Senior Account Executive, Alistair Brook. Alistair works closely with all of Blackboard’s client-facing departments and will support clients with commercial needs and escalations, ensuring you are always engaged with the appropriate resources as part of an analytics partnership with Blackboard. Alistair is cross-trained to provide broad information on the full scope of solutions and services offered by Blackboard and is supported by subject matter experts and platform support teams for each platform solution.
Maximising Your Investment
Blackboard also provides other specialist functions to help ensure our clients receive the best industry and pedagogical advice and support as and when required. These roles may include:

Solution Engineers (SE’s)
SE’s works with customers to ensure they understand the functional and technical side of the Blackboard product suite by crafting advanced demonstrations and being a conduit into experts within the company to ensure the upmost return on investment. Primary areas of focus include:

• Working with Alistair and client points of contact to craft customised demonstrations of the Blackboard solution to key stakeholders within organisations.
• Maintaining and developing solution and industry knowledge and then updating customers during client / partnership meetings and communications to ensure clients always have the best of breed knowledge and advice.
• Being a conduit into the wider team here at Blackboard to put clients in contact with the right people as is necessary.

Customer Success Advocates (CSA’s)
The CSA’s are a team of experienced professionals who have years of experience working with educational institutions to help grow the adoption of Blackboard’s solutions. CSA’s work directly with the institution, to provide the resources needed to achieve its goals as part of its investment with Blackboard. As a trusted advisor, the CSA brings a unique set of skills and benefits to the institution. Our Customer Success team focuses on:

• Understanding institutional challenges and working with the institution to help leverage and safeguard its investment in our analytics solutions.
• Meeting online and in-person with key personnel to review status, understand usage, and provide best-practice adoption advice, raising awareness and meeting adoption goals.
• Providing context as new capabilities are released as to how institutions can use them to help expand their use of our analytics solutions.

Technical Support Managers
Blackboard Client Support is committed to providing exceptional, real-time support via the phone, internet and email. Blackboard provides around the clock support with an unlimited number of requests for your institution’s designated System Administrators. Our Technical Support team is required to flexible, they achieve this by:

• Troubleshooting complex problems using a broad range of skills related to software functionality, application server setup, database management, data analysis, operating system configuration, performance tuning, installation, migration and upgrades to Blackboard products.
• Providing excellent client management via impeccable communication skills and follow through as well as analyse trends associated with your client base and report potential areas of risk to Product Support.
• Collaborating extensively with peers, Account Managers, Client Managers and members of the escalation team to ensure fluid communication.
• Prioritise issues of varying severity, effectively managing their resolution within defined service levels and updating appropriately both client and Blackboard employees with status.
Training Consultant
Blackboard Training Consultants are skilled project managers and professional educators with extensive experience in Higher Education, Further Education and schools. They provide clients with comprehensive education consulting services that include implementation planning and analysis, training curriculum design and Blackboard product instruction for all audiences. Consultants are assigned based upon the required skill sets ensuring clients benefit from relevant support and the best industry skills/knowledge available.

Client Manager
Responsible for supporting the Account Manager to ensure client satisfaction. In this capacity, the Client Manager will help:

• Ensure the smooth and complete transition of new platforms, products and services.
• Plan and manage the implementation of product upgrades.
• Identify and plan the evaluation of new applications and services.

Project Manager
Responsible for the successful and timely implementation of the projects. Specifically, the Project Manager schedules and leads team meetings, develops and distributes documentation, and manages the project plan. The Project Manager also maintains individuals’ task schedules, personnel assignments and budgeting information as well as being the client’s primary point of contact throughout the project.

Strategy/Functional Consultant
Leads a session that defines the strategic roadmap of the Blackboard functional launch plan in addition to providing hands-on configuration best practices, discussing integration methods and needs and defining the scope of any high-level integration and customisation requirements.

Currently supported federated access technologies
Blackboard can support multiple authentication credentials. In most cases our insights are surfaced within the VLE itself, using LTI or a custom integration to authenticate between systems, and so other authentication methods are not usually necessary.

API support
Blackboard has a large and growing public REST API suite for our products, and can also support alternative methods for extracting data.

Any education and research application that can call a REST API will be able to integrate with the analytics solutions outlined in this document. Blackboard can also support alternative methods for integrating its analytics solutions with education and research applications.
PROVIDER: CAPITA IT & NETWORKS WITH BARRACHD LTD

Product(s)

Higher Education Analytics

Provider contact

Ivor.McMahon@capita.ie
David.fairley@barrachd.com

Product Descriptions

Barrachd has been providing analytics solutions into the Higher Education for many years.

Our solutions range from:
• Business Analysis
• Solutions design
• Extract, Transform and Load (ETL) tools to extract data from disparate systems and data sources
• Databases, Data Marts, Data Warehouses
• BI solutions covering the whole student journey from application to graduation and alumni
• Student Number Planning, Staff planning, Finance planning, Workload Allocation solutions
• Learner Analytics and Predictive Analytics enables student behaviour analysis

In other words we are able to provide a full analytics service from understanding the business requirement to delivering the right information to the right people at the right time.

Notable Features

• Bespoke to the needs of the end users
• Easy to use and understand
• Helps Higher Education to plan many years ahead
• “What if” scenario planning
• Can predict events long before they occur, enabling early intervention
Underlying infrastructure required to support the product

The Barrachd solution will run on standard physical or virtual Intel servers. Alternatively, our solutions can be hosted in the cloud.

The product(s) can include data from the following systems

The Barrachd solution can report directly against most systems assuming an ODBC connection exists or can use data extracted from the core solution using ETL tools. The Barrachd solution can also use data provided by the organisation on flat files, CSV, comma delimited, spreadsheets and more.

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Key features of the product’s service level agreement

Barrachd solutions are developed on an IBM Cognos platform and we provide 1st and 2nd level support as part of the support and maintenance contract.

Barrachd operates a dedicated help desk facility and uses a CRM solution called SYSAID which records email or telephone calls.

Barrachd provides a standard SLA or can and has provided bespoke SLAs to meet individual client needs.
Implementation process, duration and institutional resources

No two Universities or Colleges operate in exactly the same way. Barrachd has many years of academic experience and are able to understand your exact requirements. This enables us to configure the solution to meet your precise needs.

We do this by deploying a 4 stage process as described in the diagram below:

- Understand existing data collection and operational systems
- Understand key requirements and vision for information management
- Assess suitability of current platform(s) to deliver these requirements
- Document proposed information management framework, and high-level data model
- Discuss and agree document with client team
- Develop proposal for road-map / timescale for implementation

This exercise can take from 2-20 days depending on the size and complexity of the solution you seek. At the end of this exercise Barrachd will provide a report detailing the organisations “as is” position, what it Visions and Objectives are, and provides a detailed roadmap with recommendations on how to achieve these ends.
Pricing Structure

The Barrachd solution can vary significantly depending on the organisations requirements.

The exercise described above will help to identify:

• What the organisation hopes to achieve
• What problems are we trying to resolve
• What the current position is
• What are the current systems in place and where does the data exist
• Does the organisation hope to create a central data store e.g data mart or data warehouse
• What are the analytic requirements of students, academics and professional staff
• What skills exist within the organisation and how much of the development work does the organisation hope to do itself.
• What are the ongoing support requirements of the organisation

The solution has a product cost (depending on what modules are required), requires licenses per named user (or server), and requires professional services to implement the solution. It is not until the organisational requirements are understood, that a solution can be designed and a price provided.

Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie

Reporting Features for Lecturers

The Barrachd solution can provide bespoke reports and dashboards to deliver the exact information that a lecturer requires to perform his/her daily, weekly, monthly, quarterly and annual task.

It can also deliver the planning tools that a lecturer may require to plan student numbers, class sizes, timetables etc.

Reporting Features/Apps for Students

All standard reports and dashboards in the Barrachd solution can be viewed on a smart phone, tablet, laptop or desktop device. Additionally, bespoke student apps can be developed to meet the student and organisation's needs.
Enterprise Reporting Features

Barrachd has developed a suite of enterprise reports and dashboards covering all aspects of Higher Education, including:

- Bespoke development or prebuilt applications including..............
- Applications/Admissions/Retention/Attrition
- Enrolment Dashboard
- UKBA and Student Visa Dashboard
- NSS (Student Satisfaction)
- League Table Dashboard
- Course & Module Analysis
- Research Funding Analysis
- Student Destination Analysis
- Mobile Computing/Active Reports
We have also developed a suite of Planning and Forecasting modules, as follows:

**Planning solutions**

- Student Number Planning
- Workload Planning
- Staff Planning
- Finance Planning
- Research Funding Planning
- Alumni & Fundraising Planning
- Estates Planning
- Student Achievement/Attrition (predictive)
- Other Planning
How many HEIs are currently using the product? How many of these are in Ireland/the UK?

Barrachd is pleased to include the following establishments in its Higher Education portfolio:

Barrachd is part of Capita PLC who could include a further 6 universities, 150 colleges and 22,000 schools who use their UNIT-e and SIMS products.

Examples of current users

Many Barrachd customers have been happy to provide references to organisations over the years. We will happily introduce the most appropriate contact based on any specific requirement.
Data infrastructure

Barrachd is able to provide on premise or cloud based solutions depending on a customer preference.

If the solution is on-premise we would use the customers own physical or virtual environment.

If the solution is cloud based, we are able to offer Microsoft Azure, IBM cloud or a highly secure hosting provider called Bright Solis, based in Dundee in Scotland.

GDPR & Security

The data can be housed in your own data centre or on one of the options mentioned above. The solution can be securitised at many different levels student to Vice chancellor, Administrator to Director and deployed in an extremely secure physical location offering up to I3 level security.

Account management structure

Each Barrachd client is assigned an Account Manager. Our Higher Education Account Manager, and the author of this response is David Fairley. David has been with Barrachd (and now Capita) for over 10 years and is responsible for the identification of prospective clients, through demonstrations, on boarding, solution development, implementation of the solution and ultimate hand over to our dedicated Customer Support team. David is also responsible for the ongoing relationship with the client.

Barrachd, and David, adopts a “customer for life” approach and is happy to have enjoyed relationships with customers for many years.

Currently supported federated access technologies

The solution can integrate with an existing security infrastructure to provide user authentication or by using Microsoft Windows authentication. If the solution uses active directory or similar LDAP solution for the purposes of single sign-on we can leverage an existing security policy to enforce corporate password and logon policies.

The solution can secure content by using the user and group definitions from your security system, without any changes required. A security namespace is included to provide the optional ability to define additional groups for securing content. These groups can simplify security administration by including users and groups from one or more authentication providers.
API support

The solution can be integrated through a REST API and if required an optional SDK.

We currently do not have any education and research applications currently using the API, instead they use the standard end user interface which is web based.
PROVIDER: **D2L**

**Product(s)**

Brightspace

**Provider contact**

stewart.watts@d2l.com

**Product Descriptions**

Brightspace is a Virtual Learning Environment that provides institutions everything they need to offer a best-in-class, engaging, and personalized learning experience to reach every student. Brightspace is the learning backbone in an ecosystem of learning experiences. Its flexibility supports a variety of learning models and materials as it acts as the centre of our customers’ eLearning ecosystem.

A key strength of the Brightspace platform is its powerful analytical tools, high-performance reports, and rich data visualisations. These help institutions profoundly shape student success by helping to establish, track, measure, and assess the effectiveness and integrity of courses within Brightspace. Our Core analytics package offers reporting that focuses on short-term, course and user level decision-making opportunities driven by data from your own environment. These include both class and user progress dashboards, inline tool reports and statistics, and administrator (course-level) reporting.

Our optional Performance Plus package builds on our core analytics by providing our customers a powerful suite of institutional level reporting, rich data visualisations and predictive analytic capabilities.

**Notable Features**

With Brightspace Core, Brightspace delivers easy, flexible access to data. Users can access course-based analytics for your lecturers and students via dashboards and reports. Users, with the appropriate permissions, can also access exportable data sets through our UI or a series of APIs. The Brightspace core analytics extend to providing lecturers real time access to student progress within a course via the **Class Progress Dashboard**. Within this, indicators highlight to the Lecturer where students are potentially falling behind the rest of the class. With a click of a
button the lecturer can drill down to the underlying report that will highlight the reason a student is falling behind. This could be a learning objective not achieved, or a poor grade. All details are at the lecturer’s fingertips - the rubric that was used to assess the student, the feedback provided (textual, audio or video), the original submission etc., are all available from the Class Progress Dashboard. Lecturers can also reach out to the student directly from the dashboard to connect with the student via email or instant messenger.

Performance Plus, an add-on package to the core Brightspace platform, enables institutions to extend their use of data to create knowledge, take action, and improve student performance through learning analytics with Brightspace Insights.

Another facet to the Brightspace Performance Plus add-on is the Brightspace Student Success System, which helps boost student performance at every stage. Predictive analytics help lecturers identify at risk students. Rich data visualisations show what is working and what isn’t — so lecturers can make improvements anywhere from the student-level to the program-level. Student Success System provides the tools and data needed to make informed decisions and further drive student performance and institutional effectiveness.

We also provide the ability for Brightspace data to be sent to other intelligence tools to perform research, analysis, and build reports or visualisations so institutions can meet their own unique needs. We provide a comprehensive library of data sets through Brightspace Data Hub and API, consisting of more than 60 raw data sets across key domains to provide access to both object dimensional data and user activity/event data. Brightspace Data Hub offers Daily Differentials along with full snapshots. Daily differential files will only contain additions and changes since the last differential was generated which means we get you your data fast. Data Sets are updated weekly with daily differentials. Additionally, Brightspace APIs can be used to gather data that is needed in a ‘real-time’, or on-demand cadence.

Our approach applies industry best practices for data access in a cloud-based application. It allows the platform to be scalable and stable while at the same time, protecting against maintenance risks and change management costs by separating the data from the underlying cloud architecture.

Underlying infrastructure required to support the product

Brightspace is a completely Cloud based platform delivered via Amazon Web Services (AWS). As such no specific infrastructure is required by the user to use Brightspace and the Analytics part of the platform.
The product(s) can include data from the following systems

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Key features of the product’s service level agreement

We have a 99.9% uptime Service Level Agreement for our Cloud Services and back this up with associated penalties. Our uptime stats are the best in the industry for the last 24 months.

Implementation process, duration and institutional resources

Please note that this question has been answered based on a full implementation of our Brightspace LMS. Our analytics tools are part of this implementation but cannot be implemented without Brightspace.

We have a well-defined implementation methodology refined over the years in working with hundreds of clients. However, our approach is collaborative and can flex to meet an institutions’ needs. Our goal is to provide clients a customized platform that has been configured to their needs and use cases.

D2L has more experience than just about anyone in the industry. Experience is practical knowledge. It helps us ask the right questions to scope our client’s needs; it helps us meet their timelines; it helps us lead them through complex integrations and workflows; and it delivers success. Our project team has the experience and expertise to guide institutions through the
implementation process and our hands-on workshops ensure we have a solid understanding of their specific challenges, goals, use cases and workflows so that we can tailor their Brightspace instance to their specific needs and ensure they are on track for a smooth adoption.

**Implementation Approach**

D2L provides a highly consultative, flexible implementation that supports your diverse stakeholders. An out-of-the-box implementation approach is not going to set clients up for success. In consultation with the institution’s teams, we consider not only how the LMS needs to be configured to support everyday learning but also how configuration decisions made today can foster improved student success and engagement over the long term. Getting the foundations right is essential to ongoing success.

Below is a breakdown for how implementation would be approached for an individual institution, from their perspective.

**Phase 1: Kickoff**

We introduce you to your D2L Project Manager and D2L Implementation Consultant who develop a full project plan with you that covers all aspects of your Brightspace implementation.

These two resources work with you to define expectations, scope the project, and establish timelines. At the kickoff stage, in collaboration with your team, we establish:

- project timelines
- roles and responsibilities for your team and ours
- define a change management process
- provide access to the Brightspace Implementation Center — a course in your Brightspace instance with all implementation workbooks and materials

**Phase 2: Discover and Design**

We listen to your needs, and learn about your organisation, background, vision, goals, and strategic initiatives. With this information, we make configuration decisions that support teaching and learning so that from day-one your users see the platform as an essential learning tool, rather than a barrier to their goals.

In **discovery** with your team, we:

- determine user stories and use cases
- knowledge share on configuration notes and recommendations
- define business processes
- set achievement criteria for design and configuration

In **designing** your solution, we provide:

- site design and configuration
- identify and integrate third-party vendors
- integrations (authentication and SIS)
- course migration support (if required)
Phase 3: Train and Coach
We set you up for success by connecting you with an expert D2L Trainer to deliver a tailored training plan. This includes:

- Administrator Training | This session is geared towards site administrators, helpdesk, technical support staff and other individuals from your institution who will be involved with the configuration and management of Brightspace.
- Faculty Training | This session is intended for users who will be leveraging Brightspace to develop courses. Administrative, helpdesk, and technical support staff are also encouraged to attend to gain a better understanding of how different users will be using the system. Additionally, we will provide your team access to our Brightspace Teaching and Learning Certificate Program.

At this stage we will also determine how you want to use the consulting hours with the instructional designer who will work to understand your needs and put together a plan.

Phase 4: Prepare for Final Launch
In preparation for launch, we give you the tools and know-how to ensure all technical integrations and workflows are reviewed and validated. This is also the time to determine how you want to use the hours with the Advisory Consultant who will focus on change management to drive adoption among your researchers.

We’re supporting you right through to launch by providing:

- Help desk services, available 24x7, to your Approved Support Contacts who are supporting your users in Brightspace
- Guidance to your core project team on feedback received from users.
- Updates through regular project status calls
- Check-in after your final launch to review any new requirements and formally close your implementation project.
- Change Management support and closing implementation with your approval and sign off

Implementation Duration
Implementation duration will vary depending on the size of the institution, the number of courses that will need to be migrated, the format those courses are in and the number of required integrations. A standard implementation duration is between 3-5 months. Whilst the prices for implementation services in this proposal are fixed, the amount of effort and resources that we will commit to delivering them are not, we stick around until the job is done and at no extra cost.

Required Resources
Based on our considerable implementation experience, the following is a summary of roles we recommend each institution include to achieve a smooth and efficient implementation. We have indicated the level of engagement as well required for each role.
H = High | M = Moderate | L = Low

**Project Manager (H)** | Your Project Manager (PM) will be the central point of contact and will also be primarily responsible for identifying, tracking, managing, and resolving project problems. The PM will proactively disseminate project information to all stakeholders while helping to ensure that the solution is of acceptable quality. It will also be the responsibility of the PM to manage the overall work plan to ensure work is assigned and completed on time, within budget, and that changes are approved and incorporated using prescribed channels.

**Training Lead (H)** | Prepares internal training materials and trains lecturers (optional – could be done by D2L). Number of roles vary.

**LMS Administrator (H)** | The Administrator(s) would maintain application configuration and enhancements, act as the Brightspace Support Contact (typically), and co-ordinates policy discussions. The number of roles vary.

**SIS Administrator (M)** | The SIS administrator is an expert when it comes to SITS and will coordinate the development and testing of your SIS integration with Brightspace. During the implementation, specific workshops are scheduled to support setting up and testing the SITS integration.

**Authentication Administrator (L)** | The authentication administrator is an expert when it comes to your authentication systems and will work with the project team to ensure your authentication platform is properly configured to work with Brightspace. During the implementation, specific workshops are scheduled to support setting up and testing the authentication integration.

**Curriculum / Instructional Designer (M->H)** | If available, Curriculum and Instructional designers are a great resource to help communicate and define your course and content management strategies. During the implementation, needs analysis sessions are scheduled to gather information and requirements related to your development, maintenance, and delivery of curriculum.

**Lecturers Representative (M)** | Representation from your lecturers helps provide lecturers students a voice to contribute ideas and feedback into the recommendations and configurations for the implementation of Brightspace at your institution. You may choose to involve lecturers in a broader sense and have dedicated workshops with them to share information and collect feedback. We recommend that at least one representative from your lecturers also participates in the needs analysis sessions.
The Secondary Resources that you may need

Project Sponsor (L) | A Project Sponsor should demonstrate leadership, commitment to the project and support of project team students. This C-level executive would become the focal point for problems management and decision-making whenever the Project Manager’s scope of authority is exceeded.

Student Representative (L) | If possible, we recommend that you include a representative from your student population to participate in appropriate needs analysis sessions. Similar to lecturers, students are one of your primary end users and often bring a unique perspective and ideas to implementation conversations.

Communication Lead (M) | It is important that you have a specific individual responsible for promoting and communicating the launch of Brightspace, and all the messaging related to it at your institution. This includes generating buzz by promoting features and changes that will excite lecturers and students, organizing lecturers info/feedback sessions, and supporting the training lead in promoting and communicating any specific training messaging as well.

Service Desk Staff (M) | Individuals in this role would support your students’ inquiries by answering questions, logging cases and escalating cases as required. The number of roles vary.

Pricing Structure

The price for the Brightspace Core learning environment is based on the FTE number of an institution. Pricing can vary depending on the size of that institution, the contract length, payment terms etc., however it typically falls somewhere between €8-12 per FTE.

Our Performance Plus bundle (which includes advanced and predictive analytics) will add an additional €1-3 per FTE on to the cost for Brightspace Core (again depending on size, contract length etc).

One-off implementation costs for Brightspace Core analytics tools are included in the initial fixed-price implementation bundle for the Brightspace Core LMS. This initial implementation cost varies based on size of institution but typically falls between €15,000 – €50,000.

Our Performance Plus analytics package carries additional fixed-price implementation costs which will vary based on the size of the institution. Typically, implementation of this package will range from €5,000 – €20,000.

Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie
Reporting Features for Lecturers

One key Dashboard for Lecturers is the Class Progress Dashboard, which allows lecturers to track student performance across an entire class. Lecturers can search for specific students and can customize how the progress reports appear by determining which sections to include and controlling the thresholds for the color indicators used in the visualisation charts. Lecturers choose four indicators of performance out of nine available options, which display in a dashboard table format for easy comparisons and printing, as shown below.

Class Progress Dashboard

Progress indicators can be easily changed or reordered, and each indicator visually highlights overall progress, recent activity, and areas of concern. With access to this information, you can develop plans to keep students engaged and on track. Further information is available by hovering over a visualisation to get more details on the performance indicator and by clicking on an indicator to drill down into the details of tool progress for a Student. This is also an entry point into the User Progress tool where lecturers can look at summaries and details of tools. With the appropriate permissions, lecturers can also have the enhanced ability to navigate between users and courses.
### Available Performance Indicators

**Content** | Displays how far the Student has progressed through the content in the course. Items made available to view are highlighted.

**Objectives** | Illustrates how successfully each Student is progressing through assigned objectives. The focus is on completed activities and both completed objectives and objectives needing help are presented.

**Grades** | Presents the current final grade and visually represents the scores of the last 15 items. Hovering over each bar provides details of each column including grade item name and score.

**Login History** | Displays the number of logins to the system each day and summed as a total. Hovering over each bar provides details of each column including date and number of sessions.

**Discussions** | Presents the key indicators of engagement for each user across all discussions including the number of new posts a Student has read, the number of new posts the Student has made, and the number of replies the Student has made to other messages.

**Surveys** | Displays how far a Student has progressed through the assigned surveys in the course.

**Assignments** | Presents the current average on all assignments as well as a visualisation of the scores of the last 15 items. Hovering over each bar provides details of each column including the assignment name and score.

**Quizzes** | Presents the current average on all quizzes as well as a visualisation of the scores of the last 15 items. Hovering over each bar provides details of each column including the quiz name and score.

**Checklist** | Displays how far a Student has progressed through the checklists in the course. Items due within the next seven days are highlighted.
Lecturers can also use the **User Progress tool** to gain quick insight into the usage patterns of individual students. In the Progress Summary, a student’s current grade is included with the potential maximum final grade and the potential minimum final grade. We explain the User Progress tool further in the section below, on analytics options for students.

**Inline Tool Reports** can also be generated for the following tools: content, competencies and rubrics, assignments, discussions, grades, quizzes and survey (self-assessments). For example, inside the Quizzes tool lecturers can access tool-specific reports to view statistics such as class averages based on individual tests. Statistics can even drill down to the individual questions, including how frequently wrong answers are selected.

Many reports can be exported to a CSV file.

---

**Student Success System (Predictive analytics within Performance+ package)**

As part of our optional Performance Plus package, Brightspace Student Success System empowers lecturers with predictive analytic tools to help improve student success by identifying at-risk students before it is too late to help them. In providing early identification of at-risk students, predictive analytics enables lecturers to identify and understand where issues exist and eliminate them by creating appropriate resolution plans to address the problem. Therefore, graduation and retention rates can increase when at-risk students are identified early and supported throughout the term. Visualisation and statistical indicators also provide diagnostic insights to aid in the design of individualized interventions.
Brightspace Student Success System | View Student Engagement via Social Learning with the Sociogram

The predictive analysis used by Brightspace Student Success System leverages real-world courses to build predictive models. Weekly predictions are based on the following domains:

- **Course Access** | The course access domain compiles Brightspace logins as well as accesses of course-specific homepages as a demonstration of a student’s engagement in a course.
- **Content Access** | The content access domain describes engagement by tracking access to content material for the course.
- **Social Learning** | The social learning domain uses data captured discussions as another indicator of student engagement. The sociogram visualisation identifies students that may be performing well in terms of their grades but may be disconnected from the class socially which could present a risk for dropping out or transferring. This visualisation allows lecturers to see source data from this domain for the predicted final grade.
- **Assessments** | This domain describes student assessment performance. The chart provides a compact visualisation of student performance across all course assessments individually and in comparison with classmates. This visualisation allows lecturers to see source data from this domain for the predicted final grade.
Brightspace Student Success System | At-a-glance view of Students at risk, potential risk, or successful

We make it easy for lecturers to track students who are at risk through a course homepage widget that is only visible to lecturers. This widget displays up to five students that the Brightspace Student Success System has determined to be at risk, from which lecturers can drill down to get more information and intervene. Content is updated once a week and the subtitle will change to show the week for which the predictions pertain. This information is anonymous by default so that lecturers have to intentionally hover over or click the “show names” links to see the students at risk. Once an lecturer clicks on a student’s name, the dashboard page for that user will show more information about the user’s predicted outcome, including predicted grades. Additionally, via the Brightspace Student Success System student dashboard, lecturers can view an added text display of the success index as well as qualitative statements about the things that are negatively affecting a student’s predicted success, called indications. There can be up to four indications listed — one for each domain of the predictive model: social learning, content views, course access, and assessments.
Brightspace Student Success System | Student Dashboard

Our solution saves lecturers time so that there is no need to manually configure predictive models each time a new course is offered. Lecturers can copy the model configuration settings from a past course and apply them to an upcoming course all at once.
Reporting Features / Apps for Students

We feel that it is critical to student success for them to understand their progress across a course. The User Progress Dashboard is a one-stop-shop for all the things a student has done in a course. Students can easily see where they’re at in terms of course progress and grades. It’s quick and easy for them to get an all-in-one view of how they are doing and to make adjustments to help get the results they want (e.g., meet with the lecturer, increase participation in class, devote more time to studying).

Within the User Progress tool, the Summary Report combines summaries from all the tools (e.g., grades, discussions, etc.) on a single page and highlights the newest updates. The User Progress tool also allows students to see how they compare to the rest of the students in their course and monitor their own progress accordingly. Students or Tutors can easily create and print progress reports and share them with their peers or third parties such as auditors, parents, or guidance counselors.
Enterprise Reporting Features

Our optional Performance Plus package is composed of products that help institutions make intelligent, informed decisions and to further drive student performance and user effectiveness. The analytics portion of this package includes both advanced analytics (Brightspace Insights) and predictive analytics (Student Success System). Advanced analytics offers rich visualisations of achievement, assessment, and engagement analytics. Predictive analytics empower you to quickly see at-risk students and, with a click, action that data. With insight into student achievement early on in courses, along with a predictor of how a student will finish in the course, lecturers can provide tailored interventions to help course correct learning paths. These capabilities help improve retention, completion, and graduation rates.

For further information, please visit https://www.d2l.com/products/package/performance/

We have provided more information on the Insights and Student Success System tools below.

**Advanced Analytics | Insights**

Insights empowers not only lecturers, but also program coordinators and administrators with deeper analysis and visualisations by focusing on achievement, assessment, and engagement data. You can not only track what is going on in a course through data, but also access information to help inform and direct your decision making. It is not enough to simply pull data. Data needs to be delivered in reports that make sense because of the important decisions you are making that impact the success of your Students and institution.

**Brightspace Insights**
Assessment reports are geared towards lecturers and take the analytics up a notch from what is available in Brightspace Core to allow lecturers to look for trends/patterns (i.e. Grade Heat Maps) and to help improve course effectiveness (i.e. by taking a much deeper dive into activities like Quiz Item Analysis which goes deeper than the Quiz Statistics. Achievement reports are geared towards program coordinators and lecturers to help them understand competency/learning objective alignments across programs and organisation as well as to measure achievement levels both for an individual Student within a course and across courses.

### REPORT

#### DESCRIPTION / DATA OBJECTS

<table>
<thead>
<tr>
<th>REPORT</th>
<th>DESCRIPTION / DATA OBJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Report Category: Engagement</strong></td>
<td></td>
</tr>
<tr>
<td>Total Logins</td>
<td>Number of logins per day or per month for a given date range.</td>
</tr>
<tr>
<td>Tool Access</td>
<td>Total page views per tool (e.g. Content, Discussions, Quizzes, Assignments, etc.) for a given time period.</td>
</tr>
<tr>
<td>Tool Access — Course</td>
<td>Total page views per tool (e.g. Content, Discussions, Quizzes, Assignments, etc.) for a given course over a given time period.</td>
</tr>
<tr>
<td>Course Access</td>
<td>The number of users that accessed a course on each day over a selected date range.</td>
</tr>
<tr>
<td>Enrollments and Withdrawals</td>
<td>Displays current enrollment and withdrawal figures aggregated for each role and course offering. Data objects include Org Unit (course), User and Role attributes, along with enrollment status for a given date range.</td>
</tr>
</tbody>
</table>

| **Report Category: Assessment** |                                                                                         |
| Quiz Item Analysis      | Displays a set of statistical measures for assessing the quality and characteristics of quizzes and individual items (questions) in a quiz. The Quiz Item Analysis report interprets data for each T/F or M/C question using the following formulae: Upper 27%, Lower 27%, Discrimination Index, Point Biserial, and Standard Deviation. The following data points for the overall quiz are included as well: Number of Examinees, Number of Questions, Total Possible Points, Standard Deviation, Reliability Coefficient (KR-20), Highest Score, Upper Quartile, Median Score, Lower Quartile, Lowest Score, Average Score. |
## Report Category: Assessment (contd.)

<table>
<thead>
<tr>
<th>Report Category</th>
<th>Description / Data Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz Question Statistics</td>
<td>Displays course quiz question responses and final quiz score distributions. Provides an overview of the questions within a quiz, the number of responses per question, and a question score and final quiz score distribution.</td>
</tr>
<tr>
<td>User Quiz Scores</td>
<td>Displays user quiz attempt and average details.</td>
</tr>
<tr>
<td>Course Grades</td>
<td>Track grades by Student and course, as well as the completion rate of grade components. You can drill-down from the course view to see Students’ overall grades and grades on specific components.</td>
</tr>
<tr>
<td>Grades Heat Map</td>
<td>Depicts the grade results as a percent for the grade items within an org unit.</td>
</tr>
<tr>
<td>Academic Risk</td>
<td>Identifies academically at-risk Students, using grades as a risk domain and a user-defined baseline as a risk threshold.</td>
</tr>
<tr>
<td>Rubric Achievement</td>
<td>Contains a comprehensive analysis of the structure of rubrics and achievement rates of their associated activities over time.</td>
</tr>
<tr>
<td>Certification Tracking</td>
<td>Use the Certification Tracking report to monitor employee certification efforts via their submission of documents to the Dropbox tool and completion of assessments in the Quizzes tool. You can assess employees at an Organisation level, as well as at a course level.</td>
</tr>
</tbody>
</table>

## Report Category: Achievement

<table>
<thead>
<tr>
<th>Report Category</th>
<th>Description / Data Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress on Competencies Across Courses</td>
<td>Displays progress for one or more competencies across all courses that utilize the competency. The report groups data by Competency, Learning Objective, and Assessment Activity, and shows a summary of progress for each course.</td>
</tr>
<tr>
<td>Progress on Competencies By Course</td>
<td>Displays overall progress on Competencies, Learning Objectives, and Assessment Activities within one or more courses. The report groups data by course, followed by Competency, Learning Objective, and Assessment Activity.</td>
</tr>
<tr>
<td>REPORT</td>
<td>DESCRIPTION / DATA OBJECTS</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Individual Progress on Competencies Over Time</strong></td>
<td>View an individual Student’s progress on competency achievement over time. Data is grouped by Course, followed by Competency, Learning Objective, and Assessment Activity.</td>
</tr>
<tr>
<td><strong>Course Learning Outcome Evaluation</strong></td>
<td>A course learning outcomes report that displays the achievement results for offerings of a master course over chosen semesters.</td>
</tr>
<tr>
<td><strong>Program Learning Outcome Evaluation</strong></td>
<td>A Program Learning Outcome report displaying achievement results over selected semesters for master courses aligned with a selected program.</td>
</tr>
<tr>
<td><strong>Learning Outcome Alignment</strong></td>
<td>Displays the outcome relationships between learning outcomes from two selected levels of the organisation (such as course template, program, department, or organisation).</td>
</tr>
<tr>
<td><strong>Curriculum Mapping</strong></td>
<td>Displays the presence of learning activities within a course or multiple courses which are related to learning outcomes defined within the organisation (such as program, department, or organisation).</td>
</tr>
</tbody>
</table>
We are making changes and improvements to our Insights platform through 2019. Below is a sneak preview of what is to come.

What’s on the horizon? Even better analysis and actionable data!
Our customers love that we listen to their needs to inform the direction of our solutions and shared future. Through customer inspiration, we develop products and services to meaningfully improve the work of learners and educators. When it comes to making data truly actionable, our easy-to-understand visualizations make it efficient and effective to spot trends in large quantities of data.

We’re actively developing a new version of our advanced analytics solution, Insights, as a part of the Performance Plus package. The combination of our data sets via DataHub in Brightspace Core and new visualizations will provide you with the learning intelligence to easily make informed decisions for your organization.

As part of these new updates, we’re excited to announce the upcoming release of the Adoption Dashboard in December 2018. Measuring and understanding adoption of the learning environment is where most users start their data journey. This dashboard allows customers to clearly understand who is using Brightspace, how often, and in what ways. The Adoption Dashboard allows you to Analyze and Act on login trends, course access, tool usage, and enrolment data. To the left are screenshots of the prototype.

Following the Adoption Dashboard, in 2019, we will develop an Engagement Dashboard to help you understand how student and faculty engagement through Brightspace is resulting in organizational success. The Engagement Dashboard will contain reports that allow lecturers and advisors to pinpoint where and when to intervene by making it easy to identify “at-risk” groups or individuals. This feature will be a great resource in helping you reach every learner.

We’re not done there. Also, in 2019, we will create Assessment and Outcomes dashboards, to provide visibility into outcomes alignment, progress and achievement for an individual and across courses, and statistical reporting around quizzes and questions.

Additionally, D2L is investing in rolling out a new, ad hoc report designer which will provide a modern, intuitive user experience to enable you to create, manage, and share custom reports.

We’re always planning something great, and we love to hear from educators about the challenges they face and how we partner with them in solving those challenges. We’d be happy to further discuss our plans for the future of analytics and hear more about what you’re interested in accomplishing.

**DataHub**

Our customers can also access comprehensive data as data sets via Data Hub. Data Hub provides interfaces to download complete data sets (from a selection of over 60 different export packages) for your own research and analysis. Brightspace Data Sets consist of raw, user-level data from Brightspace. All the data sets are available as weekly Full exports and daily differentials with Brightspace Core.
Data Hub allows authorised users to access to pre-defined collections of data (data sets) from Brightspace. Administrators can then export data sets as CSV files for further analysis in third party tools giving you the flexibility to filter, aggregate, and transform data for your needs. API-based access to data is also available to allow you to build automated data integration with Business Intelligence (BI) tools.

<table>
<thead>
<tr>
<th>Data Freshness Options</th>
<th>Brightspace Core</th>
<th>Hourly Data Freshness Add-on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting needs</td>
<td>Lower-frequency reporting needed</td>
<td>Time-sensitive of high-frequency reporting needed</td>
</tr>
<tr>
<td>Full data sets</td>
<td>Refreshed weekly</td>
<td>Refreshed daily</td>
</tr>
<tr>
<td>Differential data sets</td>
<td>Refreshed daily</td>
<td>Refreshed hourly</td>
</tr>
</tbody>
</table>

Brightspace DataHub – Accessing data exports for download
• **Gain access to raw, user-level data** | Use the Data Hub UI or API to gain access to Brightspace Data Sets in CSV format.

• **Easily combine data sets** | Brightspace Data Sets are designed to work with each other. Import your data sets into a database to combine the data sets you need to create more complex data sets or reports.

• **Create custom aggregations and filters** | Import your data sets into a database to filter and aggregate on the fields that answer your questions. You can always review the user-level data to fine-tune your results.

• **Generate data visualisations and reports** | Import your data sets into a database to use with your favorite Business Intelligence (BI) tool or spreadsheet and create data visualisations.

• **Use your data for research** | Mine your data and combine with data from other systems for research to gain further insights.

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### How many HEIs are currently using the product? How many of these are in Ireland/the UK?

There are over 800 educational institutions using our Brightspace Core LMS globally. The vast majority of these institutions are HEIs.

Within Ireland, we currently work with both University College Dublin and Dublin Institute of Technology, both of whom also have access to our Performance Plus advanced analytics suite. We also work with the Irish Aviation Authority and Irish Rugby Football Union, both of whom use Brightspace Core.

Within the UK and the wider European region, we work with a large number of HEIs, including (but not limited to) University of Surrey, University of Huddersfield, Bournemouth University and Technical University Delft, all of whom also purchased our Performance Plus advanced analytics suite.

### Examples of current users

All of our current European customers would happily discuss both the product, and their working relationship/partnership with D2L. As opposed to providing specific contact details here, we would request that any interested Irish HEIs contact us directly, so we can arrange for a relevant reference call.
Data infrastructure

Brightspace is hosted in the cloud using Amazon Web Services (AWS). AWS services and tools allow us to place key components into Virtual Private Clouds, which are connected to create a highly available and secure architecture. Each VPC is designed to maximize the efficiency and performance of the components contained within it.

GDPR & Security

We take a layered approach to security to protect our clients’ information. D2L is ISO 27001 certified and we annually undergo SSAE16 SOC 2 audits. This is in addition to the certifications held by our hosting facilities. While other vendors defer responsibility of your data and security to their hosting provider, D2L has its own Security Management System of policies, procedures, and controls based on the ISO 27001 control framework, following ISO 27002 control best practices where applicable. D2L uses an industry leading Security Information and Event Management (SIEM) solution to collect, aggregate and correlate millions of system events a day across D2L’s infrastructure to provide monitoring teams with real time insight into potential security events.

The Brightspace platform supports Single Sign On (SSO) and integration with various authentication solutions including Active Directory, LDAP, and CAS. Client connection to the Brightspace platform is via TLS cryptographic protocols with RSA encryption, so client data is transferred securely. Individual user sessions are identified and re-verified with each transaction using a unique token created at login.

Code for the Brightspace application is developed and tested following principles set out in the Open Web Application Security Project (OWASP) Top Ten framework to help ensure Brightspace is a secure platform. Authentication mechanisms like LDAP and federated services can be integrated into the application. Security analysts regularly look for vulnerabilities through code reviews, application scans, and internally-run penetration tests. Third parties validate the technical controls by conducting regularly-scheduled network penetration and application vulnerability tests.

Our cloud environment features industry standard controls such as stateful firewalls, intrusion detection, and network security monitoring. Access to client data by our personnel is strictly limited to only those whose role requires access for support purposes. All access is logged. Any potentially unauthorized access is immediately investigated. Job roles with access to client data are higher tiers of Customer Support and Deployment personnel who are responsible for configuring and customizing a client’s Brightspace Learning Environment. Access is audited quarterly. Data at rest is encrypted in the Brightspace Cloud. Volumes are encrypted using the industry standard AES-256 algorithm, and these unique keys which are managed by D2L to ensure your data is kept secure.
System and client data are backed up on a regular basis using synchronous encrypted data transfer to offsite storage to ensure that client services can be restored quickly in the event of a disaster. All customer data is stored in secure data centres and is replicated over secure links to a disaster recovery data centre. This design provides the ability to rapidly restore service in the case of a catastrophic loss.

**Account management structure**

Through the Customer Success Manager our partnership efforts with each institution continue long after the contract is signed. This single point of contact will work with each institution to define and monitor customer success goals, will provide product and service knowledge and coordinate discussions with other D2L teams when needed. Our Customer Success Managers are non-quota carrying members of our team who are 100% focused on ensuring you are getting the most out of the solution and partnership. They will engage prior to implementation beginning and will work with each institution throughout this process to ensure a smooth transition.

Each institution will also be provided a Project Manager, Implementation Consultant, and a Trainer as the primary implementation contacts, however institutions may also interact with other specialized members of our Deployment Services group if needed. We have included breakdowns of our team members roles and responsibilities below. No sub-vendors will be engaged — these are all D2L employees.

**Customer Success Manager** | Your CSM is responsible for your success with the Brightspace platform and is accountable for your growth, adoption and satisfaction. He/she will share resources, tools and techniques to help you design a roadmap to success and continually improve to achieve your organisational objectives.

**Project Manager** | Your PM will help ensure that your implementation is executed on time and within budget. He/she will be primarily responsible for identifying, tracking, managing and resolving project issues and ensuring all the necessary resources are allocated for successful project completion. He/she will also be responsible for project planning, execution, monitoring, controlling, closure, and will report project status, including issues and risks, on a regular basis. During the implementation, your PM will coordinate activities and manage the performance of the D2L Implementation Team.

**Implementation Consultant** | Your IC will be the technical lead(s) throughout the implementation. He/she will work with you to design and deliver business and technical solutions, and to provide hands-on consulting related to the configuration and management of our products and integrations.

**Trainer** | Your trainer will work with you to develop a comprehensive training program to support your implementation. He/she will also deliver or coordinate the delivery of training sessions.
Advisory Consultant | The Advisory Consultant is actively involved in working with D2L clients on strategic planning initiatives, implementations, and use case applications related to change management, platform adoption, competency-based education, learning outcomes assessment, learning analytics, data and data management. Our consultants have passion for the educational process and helping to making as smooth and seamless as possible to reach every student.

D2L Creative Services Instructional Designer | We have a large Creative Services team at D2L which is made up of Instructional Designers, Courseware Designers, accessibility specialists and more, most of whom have a strong background in education. This team works with many of our customers to uplift stagnant content or dated and unengaging courses/modules and transforms them into pedagogically sound and highly interactive online experiences for your students. During your implementation, our creative services team will work with you to create a new gold standard for your modules in Brightspace or to upskill your academic and technical teams, so they can provide your students with a best-in-class online learning experience themselves.

Currently supported federated access technologies

As Brightspace Core analytics, Insights and our Student Success System are all accessed via the main Brightspace platform, user authentication and control will be via the same implemented methods as deployed for the wider implementation. User authentication and role authorisation are two important parts of the security and permissions/role-based architecture of the Brightspace platform. All users have to be authenticated against a database or directory before they can log into the system. During an institution’s implementation, our implementation team will arrange workshops to solidify their single sign-on / access requirements. We then assist with set up and Brightspace configuration for the integration with a compatible single sign-on provider. The single sign-on authentication integration will be implemented such that an end user can authenticate into a single, trusted system (client provided) and then seamlessly access Brightspace. The client institution will be responsible for generating and presenting single sign-on links within their trusted system as per the D2L single sign-on API specification. D2L will work with the institution to test and validate that the integration is working effectively. We also have other authentication options, including LDAP and SAML integrations, if desirable. At this point in time OpenID Connect is not supported in Brightspace.
API support

Brightspace APIs allow you to programmatically retrieve Brightspace data in real-time. We capture activity as it happens in Brightspace as learning events and then aggregate the event data to help you gain deeper insights into engagement and adoption. This data is available via the Data API. For example, you can retrieve the number of times a course was accessed in a given day grouped by role.

The Data Hub is a tool in Brightspace for generating and accessing data extracts. The data export framework is the API layer that the functionality of the Data Hub is built upon. These routes let you gather information about the back-end service and extract it in a useful format you can use with other tools for analysis or reporting (for example, CSV). Further details can be found here: https://docs.valence.desire2learn.com/res/dataExport.html

D2L provides API access to the core Brightspace platform and associated data only.
PROVIDER: JISC

Product(s)

Jisc Learning Analytics Service

Provider contact

Jonathan.Shaile@jisc.ac.uk

Product Descriptions

The Jisc Learning Analytics service (https://www.jisc.ac.uk/learning-analytics) is globally unique and provides the data infrastructure and software to reduce student attrition, increase student attainment and allow rapid intervention for students disengaged or at risk. It empowers higher education providers to harness the power of the data they already possess to:

1. Transform their students’ learning experience
2. Support their wellbeing
3. Help them achieve more

It includes the following core components:

- **Learning Data Hub (LDH)** — a secure and cloud-based repository of student data, synchronised in ‘real-time’ with the relevant institutional systems. Systems currently integrated are detailed in the ‘data from systems’ section below. Additional systems can and will be integrated based on user need. The LDH also enables effective internal system integration within an institution, if not already established.

- **Data Explorer** — A tool that provides quick, flexible and tailored visualisations for teaching, support and management staff of relevant information from various systems for cohorts or individual students, to enable better insight into the student success and the effectiveness of the broader curriculum.

- **Study Goal** — A mobile app for students that allows them to view their academic progress and engagement data. The app also provides a stand-alone attendance monitoring solution for lecturers and other teaching staff which requires no additional hardware or systems.

- **Traffic Light Calculator (TLC)** — A tool that provides teaching and support staff with descriptive analytics to indicate which students may have problems and help plan interventions before they get into a crisis. The traffic light thresholds are customised to each institution and utilise assessment, virtual learning environment (VLE) and attendance data to provide both a per student and per module perspective.
• **Learning Analytics Predictor**— A tool that enables teaching and support staff to use enhanced predictive data modelling, utilising all available student data and machine learning, to more accurately identify students who might have problems and plan earlier interventions.

*Federated authentication is supported.

Jisc also provides **comprehensive support** to higher education institutions during their learning analytics journey including:

• **Code of practice**— to ensure the legal, ethical and logistical issues are dealt with effectively. [https://www.jisc.ac.uk/guides/code-of-practice-for-learning-analytics](https://www.jisc.ac.uk/guides/code-of-practice-for-learning-analytics)

• **Readiness assessment**— a report, per institution, based on an onsite visit

• **Implementation support**— selecting and integrating the data sources, cleaning the data, configuring the products and viewing and interpreting the results.

• **Intervention planning**— **working with you to** make better use of analytics to improve student success

• **Community of practice**— sharing knowledge of developments in learning analytics and how they are using the Jisc Learning Analytics service. [https://analytics.jiscinvolve.org/wp/](https://analytics.jiscinvolve.org/wp/)

**Notable Features**

Jisc’s Learning Analytics service has been co-designed with universities so that it meets their needs. We have worked with more than 20 universities and colleges to develop a practical solution for staff and students. This means that it’s an analytics solution that’s developed by the university sector, for the sector.

Among the advantages this brings are:

• We provide an active **community of support** that brings together those who are using the service regularly to share practice and work out the best solutions. Participating in this community also enables you to work with us to develop innovative new approaches to meet your needs. For example, we are currently looking at how learning analytics can support early interventions to address student mental health issues and help institutions to design more engaging curricula to improve retention and satisfaction. [https://analytics.jiscinvolve.org/wp/](https://analytics.jiscinvolve.org/wp/)

• We have developed tailored **advice and guidance** which is designed to help you address issues on the ground that can inhibit the take up of learning analytics. An example of this is our code of practice that sets out the responsibilities of educational institutions to ensure that learning analytics is carried out responsibly, appropriately and effectively. [https://www.jisc.ac.uk/guides/code-of-practice-for-learning-analytics](https://www.jisc.ac.uk/guides/code-of-practice-for-learning-analytics)
• Our service is based on an open architecture and is deliberately vendor agnostic. It is therefore interoperable with leading commercially developed solutions. We have designed it this way in recognition of the growing range of products and solutions which institutions may wish to plug in to enhance their individual capabilities.

• We also enable affordable access to complementary solutions via our learning analytics purchasing framework. This helps you to add on new, quality-assured third-party solutions as they emerge in this fast-developing area. It will help you to buy cost-effectively and with confidence, get the supplier contracts right and stay informed about innovation in the marketplace. (https://docs.analytics.alpha.jisc.ac.uk/docs/learning-analytics/Suppliers-in-the-Framework)

By using the learning data hub — our secure cloud-based warehouse of student data — you will be able to benefit sooner from our unique big-data approach to Learning Analytics. For example, the potential to perform cross-institutional analysis and benchmarking with others in the HE sector participating in the service. We are also looking to extend the range of data that the hub can store and present to include other data across campus, for example environmental and activity data as part of our Intelligent Campus initiative (https://www.jisc.ac.uk/rd/projects/intelligent-campus)

Our predictive model sources and utilises live student assessment data for model training and predictions. As it is based on machine-based learning these predictions are bespoke to each institution which makes them more accurate.

As UK higher education’s foremost not for profit educational technology provider we are set up to work at scale and partner on the ground with national governments, agencies and providers to bring you a more cost effective and sustainable solution. For example, we are currently partnering with the Higher Education Funding Council for Wales to set up universities in Wales to use our solution. https://www.hefcw.ac.uk/documents/news/press_releases/2018%20Press%20Releases/11%20Jul%202018%20Learning%20Analytics%20Wales%20press%20release%20English.pdf.

Underlying infrastructure required to support the product

The Jisc Learning Analytics service is wholly located and stored within the European Amazon Web Service cloud infrastructure, therefore there are minimal infrastructure requirements. The main requirements are data integration, with the following (uploaded to the service, daily or weekly, via Secure File Transfer Protocol (SFTP)).

a) Validated UDD (Unified Data Definition) standard student, staff and student academic progression data (including student assessment data);

b) Student activity data (which, as a minimum requirement, has to be one of either VLE activity data or student attendance activity data);
Optionally, student and staff data can be integrated using our UDD extensions facility. Optional activity data (Library, Panopto, Wifi logs etc) can also be integrated, for additional descriptive and predictive purposes. As part of our support services we can work with institutions to establish the above data infrastructure.

To display descriptive analytics for the current academic year to staff and students we will need access to live (current academic year) datasets. This data is then used by our Learning Data Hub, Data Explorer, Study Goal App and Traffic Light Calculator.

If you wish to take the capabilities of the service further and specifically utilise our Learning Analytics Predictor (machine learning) predictive engine to create institution specific, bespoke models we will need access to datasets from the previous two academic years.

The product(s) can include data from the following systems

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<td>Scientia Syllabus+</td>
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<td>Exam Schedular</td>
</tr>
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<td>Attendance Systems</td>
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<td>Celcat</td>
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<td>DSPace</td>
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**Key**

1 = Currently provided (dedicated software plugin or standard system integration)
2 = Currently provided (in-house / bespoke data integration done, in partnership with institutions)
3 = In pipeline for development (working with system Vendor/ specific institutions)
4 = We have capacity for further integrations on request and would be happy to liaise directly with system vendors and/ or individual institutions to develop integration
Key features of the product’s service level agreement

Our Service Level Agreement covering current and agreed UK LA national service for Higher Education is appended, see Annex A.

This SLA details our industry standard approach to:

- Service and Support Provision;
- Support Channels and Hours of Operation;
- Essential and Scheduled Maintenance;
- Data Back up and Restoration;
- Response, Diagnosis & Support desk timeframes and Customer Service Response times - as illustrated and described below.

If required we can tailor and adapt our SLA provision to meet the needs of new consortia in different nations for example, however this would be agreed upon prior to any contract agreement/signature.

We use a call management system that tracks your interaction with us and this provides an efficient tool to manage your query, whether this is to log a simple ‘how-to’ enquiry or to report a system critical issue. All contacts are logged into the system and allocated priority based on the information supplied.

We use a standard support structure where contact via telephone and/or email is supported, by the following levels of support:

- Jisc 1st Line Support: extended office hours — triage of query with access to ‘how to’ and FAQs
- Jisc 2nd Line Support: office hours — technical experts
- Jisc 3rd Line Support: office hours — software development and 3rd party hardware support

Implementation process, duration and institutional resources

We follow a phased approach as follows to support institutions in the take up of our service:

**Step 1: Orientation**
Establishing learning analytics awareness.

**Step 2: Discovery**
This focusses on establishing institutional readiness, undertaking onsite interviews and providing a forum to discuss challenges etc. and then providing a report to you of our findings.

**Step 3: Organisational set up**
This determines the service components to be piloted, verifying your approach to legal, ethical and GDPR considerations, and getting a signed service level agreement in place.
Step 4: Data Integration
To achieve this, we will establish with you authentication, secure data transfer, plugins, xAPI. We will also validate the data sources that will be used in the service and establish the data fields that we will be included in the (UDD) Unified Data Definition.

Step 5: Data Demonstration
We will set up a Webinar or other opportunity with you to show Data Explorer in action with your institutional data. We will also establish the set-up, evaluation and user acceptance testing for the service.

Step 6: Piloting
We will run the features of our service that you have selected with us for a target period which will enable us to define the scope and size of your deployment of the service and evaluate how it is likely to perform.

Stage 7: Transition to full service deployment
This is the full-service roll out and integration with other institutional processes and services.

The duration time for steps 1-7 typically takes 4-6 months (this will be dependent on amount of resource allocated to the development).

Support Resources
We have found through experience that Learning Analytics deployment is more effective if we take a holistic institutional approach. Therefore, we would expect to work closely with the following Institutional representatives and during our Orientation and Discovery Steps as described above we will work with you to establish who your key contacts would be as follows, for example:

- An Executive Sponsor
- Project board/team
- Data/developer/technician
- Learning technologist
- Academics
- Student Support Services
- Systems Specialists in:
  - student records
  - virtual learning environment
  - absence monitoring
  - library management system
Pricing Structure

Discovery and Onboarding
Initial setup (detailed above) is based on effort required given an institution’s data landscape and available internal resources. Based on experience to date the price of this activity is typically between £15,000 and £20,000.

Service fee

<table>
<thead>
<tr>
<th>Learning Analytics Service Fees</th>
<th>2018/19 Individual institution price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Subscription</td>
<td>£ 7,500</td>
</tr>
<tr>
<td>Students* Band 1</td>
<td>£ 2.70</td>
</tr>
<tr>
<td>Student Band 1 limit</td>
<td>15,000 students</td>
</tr>
<tr>
<td>Students* Band 2</td>
<td>£ 0.75</td>
</tr>
<tr>
<td>Price Cap</td>
<td>£ 60,000</td>
</tr>
</tbody>
</table>

*The service fee is made up of a base subscription of £7,500 per annum and a variable fee based on undergraduate student headcount. For up to 15,000 students this is £2.70 per student (Band 1). For additional students beyond the 15,000 threshold the price falls to £0.75 (Band 2). The service fee is subject to a cap of £60,000 per annum.

Institutional specific customisation and development
We welcome working with institutions to develop and customise their learning analytics approach. The price will be based on an agreed statement of work.

Consortia pricing
Jisc is happy to work with consortia to explore a tailored offering and volume discount.

Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie

Reporting Features for Lecturers

Data Explorer provides a range of built-in visualisations, giving tutors and other staff members an overview of student activity, such as VLE usage, attendance and assessment – at both aggregated and individual student levels. It also provides risk predictions built by Jisc’s learning analytics predictor. Staff can explore activity at different levels, such as by tutor group or module, by faculty/school/department. This helps to identify areas of the curriculum that are not functioning as planned, enabling better use of resources to maximise the benefits to current or future cohorts of students. Through providing quick and flexible visualisations of VLE usage, attendance,
assessment and performance the dashboard can support discussions between academics and the students they mentor. Additional visualisations within the dashboard for modules can identify how well the content is being utilised and can support curriculum review/ instructional design enhancements.

Data explorer also works hand in hand with our Traffic Light Calculator tool. This works by bringing together data related to student engagement with their learning environment with physical attendance and assessment data. This data is then rag-rated to identify at-risk students. This information can then help you to plan effective personal interventions with your students. The use of the Traffic Light Calculators will also allow an overview for management of how students are performing at course, subject and faculty level and to identify under-performing areas of the curriculum.

**Reporting Features/Apps for Students**

Students often have limited information on how well they are progressing academically. Enabling them to access richer information and timely feedback can help them stay engaged, achieve more and enjoy a better learning experience.

**Study Goal** is our mobile app for students for Apple IOS and Android, which provides them with insights into their own academic progress and their engagement data. It encourages them to take control of their own learning by setting their own goals and benchmarking themselves against their peers. It gives each student a window not only on their academic progression but on his/her personal learning analytics. The app enables them to review data about their engagement with learning activities such as lecture attendance, online learning and assessments. It also allows a student to see the information a tutor has access to on the dashboard to facilitate informed discussions.

Most students are comfortable with using mobile apps to update information in many areas of their lives, including fitness trackers. Study goal draws on the motivational aspects of fitness trackers and enables students to:

1. Access timely up-to-date attainment and activity data — all in one place
2. Easily understand activity data, through simple visualisations and charts
3. Identify their study behaviour patterns — to empower self-regulated learning
4. Set themselves goals and targets
5. Review progress and develop better ways of learning
6. Record attendance at lectures (institutionally specified feature)
Enterprise Reporting Features

Current reporting is enabled from data access through two functional channels:

1. You can use a Rest API access (using Python programming environment, for example) to access live and historical data from our Learning Data Hub (LDH).
2. We also make available scheduled and optional (institution opt-in basis) data extracts (via scheduled SFTP, in a variety of formats including JSON, TSV, XML), for any data which is individually generated as part of Learning Analytics.

Predictive Analytics based reporting:
We can also provide Business as Usual/data processing or predictive model runs (per student), for example:

Daily extracts of outputs (indication and relevant scores) from the predictive model engine (Jisc Predictor), Traffic Light Calculator (Jisc TLC) and the Study Goal (Attendance tracking) attendance records per student in full.

For the future we plan to move to integrate the data held in our learning data hub with business intelligence systems and other relational database management systems used by universities for example Tableau, Power BI and ODBC to give you more powerful cross-institutional reporting and analytics.

How many HEIs are currently using the product?
How many of these are in Ireland/the UK?

We have in excess of 25 higher education and 6 further education UK institutions using the service. This includes a consortium deal with the Higher Education Funding Council for Wales. In addition to this we have a further set of higher education institutions who are piloting the service with a view to signing as customers from 2019.

Examples of current users

Contacts at University of Gloucester, University of Greenwich, and University of South Wales have all agreed to provide this. Please contact the vendor for further details.
Data infrastructure

The Jisc Learning Analytics data infrastructure, software, and individual institution data stores and are located wholly within the cloud. They are stored and held securely, in a multi-tenanted environment, solely within Amazon Web Services (AWS). The only exception to this is any client-side (native) Apple and Android student apps that may be stored locally by institutional preference.

AWS cloud provision is served through Amazon’s European cloud data centre/network, by both Jisc and HT2 (www.ht2.co.uk, our development partner). Further information can be found at: https://aws.amazon.com/about-aws/global-infrastructure

In the near future, subject to the United Kingdom exiting the European Union, Jisc will arrange with AWS for suitable segregation of any Irish Republic education institutions, into new European (non-UK) multi-tenanted data centre/network.

GDPR & Security

All systems are physically located within datacentres operated by Amazon Web Services (AWS) in Dublin. The information security of AWS is managed in conformance with the requirements of ISO 27001, providing Jisc and our customers with assurances of the security of the datacentre and virtualisation aspects of the service. The security of the operating system and application stack is managed by Jisc.

Any transfers of data between Jisc and AWS are conducted over secure, encrypted connections.

Staff at Jisc are subject to Jisc’s “Secure Working Practices Policy” that covers the physical security of information when working in a Jisc office or remotely at other locations. Encryption is provided, as standard, wherever possible and practical for data which is classified as any of “at rest”, “dynamic” (live/ changing), and “in transit”.

Contractual arrangements with suppliers and customers identify our obligations under GDPR and the requirements for us to have in place organisational and technical measures that safeguard customers’ personal data.

Role-based access means that users only see data that is relevant to their role.

The Learning Analytics Service is included within the scope of Jisc's ISO27001 certificate.

A Data Protection Impact Assessment (DPIA) for the Learning Analytics Service is available as a separate attachment. See Annex B.
Account management structure

The Jisc Members and Customers division runs an account management function to provide UK universities, colleges and alternative providers with information about the digital technology service and products that might be applicable to them as well as assistance with the services each institution is currently using. Institutions who purchase a subscription to the service are allocated an account manager as their main point of contact with Jisc once the service is up and running. Account managers generally look after a small number of institutions arranged on a regional basis.

The Learning Analytics Service is part of a dedicated Data and Analytics Directorate in which the service team who provides support, advice and guidance for customers is based. The Team is responsible for all aspects of support:

- During the on-boarding and set up, each institution is supported by specialist Senior Analytics Consultants and Data Integrators who provide individual technical support in the pre-sales and implementation period.

Following this the wider team provides on-going support for the full-service working closely with the Account Management team to ensure any issues that arise or opportunities that are identified to develop deployment of the service are dealt with effectively.

Currently supported federated access technologies

We currently provide SSO (single sign-on) support for UK HE & FE institutions using SAML (the open standard for federated authentication) via the UK Access Management Federation. This will also include support for international institutions via the eduGAIN service.

Out provision includes coverage for all SAML compliant software, including Shibboleth, OpenAthens, simpleSAMLphp, etc.

Jisc’s Trust & Identity Services, including the UK Access Management Federation, are all included within our ISO9001 and ISO27001 certification.

Further information:
https://www.jisc.ac.uk/uk-federation
https://www.ukfederation.org.uk/
https://www.shibboleth.net/
API support

We provide programmatic access to all institution data (self and system generated data, including aggregated query outputs performed on big datasets) within the Learning Data Hub (LDH). This is via secure (encrypted) RESTful API access to all LDH data, including organic service data (created by the Traffic Light Controller (TLC), predictive model processing/outputs, or data-inputs made by academic/tutor staff - via student interventions, or student input/feedback/actions via the Study Goal app).

We support a wide range of data integration tools/interfaces, and dedicated API’s as part of the service, as follows:

- Blackboard (inc self/managed hosted Learn, and soon to be the new Bb Ultra & Bb SaaS versions), Moodle, MS Dynamics are currently provided (via a dedicated software plugin or standard system integration)
- Banner, Tribal SITS/EBS, Agresso, Quercus, U4SM and Canvas are currently provided (via in-house /bespoke data integration done, in partnership with institutions)
- Brightspace/D2L, Capita, Scientia Syllabus+, Celcat, CDS and Salto Systems are in the pipeline for development (working with system Vendor/specific institutions)
- We also have capacity for further integrations on request, for example with a range of library and repository, timetabling and access systems and we would be happy to liaise directly with system vendors and/or individual institutions to develop integrations.
PROVIDER: **SEAtS SOFTWARE**

**Product(s)**
SEAtS Software Learning Analytics

**Provider contact**
pmcbride@seatssoftware.com

**Product Descriptions**
SEAtS Cloud based Predictive Analytics solution uses Machine Learning technology that processes data from any source daily and generates a student success/risk score. SEAtS Analytics offer deep dive insights from these scores into individual progress at credit/module level and peer/cohort comparison.

**Notable Features**

Our solution uses machine learning to identify patterns and uses this learning to predict outcomes for similar cohorts of students.

Our solution drives student success by identifying critical early interventions that will increase engagement, student retention and achievement ratios.

Physical data like class attendance and library visits are interwoven with digital data from timetables, socio-demographic profiles and historic attainment to understand how a student learns. The result is a personalised view of engagement, retention and achievement for every student.
Underlying infrastructure required to support the product

For Readers — a broker server needs to be installed on premises
For i-beacons no underlying infrastructure required

The product(s) can include data from the following systems

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Key features of the product’s service level agreement

Monday – Friday
08:00 – 18:30 excluding all Bank and Public (National) Holidays in the Republic of Ireland.
Service availability Target 99.98%
Full SLA available at contract negotiation stage
Implementation process, duration and institutional resources

We would recommend 90 days for implementation, but have recently implemented an institution in New Zealand in 39 days.

The resources required would depend on the size of the project, usually we would suggest the institution appoints an internal project manager and have the support of an experienced IT person who understands data.

Pricing Structure

Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie

Reporting Features for Lecturers

- Lecturers can merge, swap and cancel classes via the system.
- Lecturers can view reports on attendance and engagement and any bespoke report designed for their requirements.
- All access to reports can be permission based as per the institution’s requirements
- Lecturers and Tutors can record absences on their tablets or mobiles at the request of students.
- The SEAtS e-Register app can be used on mobile devices or laptops to execute a spot check or flash roll call on demand in any teaching setting.

Reporting Features/Apps for Students

- Students can record absences or be notified of location changes through their student calendar app.
- Students can record attendance on geo-enabled mobiles.
- Student Cards can be read by suitable mobile devices or latest generation NFC enabled mobile and tablets.
- Students can view their attendance and engagement on their mobile device
Enterprise Reporting Features

Our powerful KPI Dashboards are designed to meet the SMT needs, they bring together different views of information in a single place, providing one of the most powerful ways to visualize and understand large volumes of data in a concise and easy to understand format. The SEAtS Consulting Team help our customers identify, design and build the right Dashboards for their institution. Key Indicators powered by our powerful student engagement data repository and analytics software.

The SEAtS team will help you to:
• Identify the Metrics that really matter
• Build Easy to Understand Visual Representations for each data set
• Connect Dashboard Indicators to the detail behind them with our suite of standard reports
• Make sure it’s easy to access and use
• Most importantly we will use audited, verified data from within the SEAtS repository because the data in front of the SMT must be accurate because bad data makes for bad decisions.

How many HEIs are currently using the product?
How many of these are in Ireland/the UK?

We only work with in the HE / FE sector and currently work with over 30 institutions in Ireland, UK, USA and New Zealand – our clients use some or all of our suite of products which include Student Attendance, Engagement, and Predictive Learning Analytics together with Student Visa Compliance and Campus Space Utilisation.
Examples of current users

Contact details available upon request from vendor

Data infrastructure

On the Cloud - Microsoft Azure

GDPR & Security

A large part of GDPR compliance is making sure that there are procedures in place that ensure that data processes are mapped and auditable. We have added elements to our application development cycle to build features in accordance with the principles of Privacy by Design. Any access to the Client Data that we process on your behalf is strictly limited. Our internal procedures and logs make sure that we meet the GDPR accountability requirements in this regard.

We have established a process for onboarding third-party service providers and adopting tools that makes sure that these third-parties meet the high expectations that SEAtS and its customers have when it comes to privacy and security. We have further launched a datacenter in Germany to store the databases of EU customers to improve performance and provide additional assurance that your data enjoys the level of protection envisioned by the GDPR.

Account management structure

We provide a dedicated Account Manager and a Project Manager for each customer. We also have a full support desk in place

Currently supported federated access technologies

ADFS, Shibboleth, Azure AD, Edugate.

API support

We have built as number of APIs for the main HE systems. Further support and development can be arranged as required
PROVIDER: **COLIN HARVEY — SOFTCAT PLC (TABLEAU)**

**Product(s)**

Tableau

**Provider contact**

colinha@softcat.com  
+353-1-9601287

**Product Descriptions**

Softcat PLC have a strategic partnership with Tableau. We’re a Gold partner and have years of experience in working alongside them to provide our customers with the insights they need to work more effectively as simply as possible.

Tableau helps people see and understand data. Seven words that drive everything Tableau does. And they’ve never been more important.

In 2020 the world will generate 50 times the amount of data as in 2011 and 75 times the number of information sources (IDC, 2011). Within these data are huge opportunities for human advancement. But to turn opportunities into reality, people need the power of data at their fingertips. Tableau is building software to deliver exactly that.

Our products are transforming the way people use data to solve problems. We make analyzing data fast and easy, beautiful and useful. It’s software for anyone and everyone.

We believe data analysis should be about asking questions, not about learning software. We make inspiring, easy-to-use products that help people achieve greatness with data. So that data can reach its full potential and positively impact the world.

Data yearns to be free, to tell its stories to all those who care about its revelations. Discovering and sharing those stories should be easy. But it’s not. Why? Most software intended to help people access and understand data is hard to use. For too long, data has been trapped behind scripts, wizards and code. Tableau liberates data and puts it in the hands of the masses.

When a company gives people self-service analysis tools, they feel different. Respected. Capable. Powerful. People start to drive their organization forward in ways that could never have been anticipated. They express their full ingenuity and creativity.
Unfortunately, most business analytics products are built to centralize and control data, not democratize it. As a result, people at most companies are reliant on specialists just to answer basic questions. They stumble through Escher-like spreadsheets to work around inflexible business systems. Or they’re being stonewalled by enterprise-wide business intelligence platforms that spend more time in development than helping anyone.

There’s no power in that approach. The power is in giving people the ability to think, act and deliver.

https://www.tableau.com/products#video

We design our products to focus on people. People working for big and small businesses, serving in government and building not-for-profit organizations. Bloggers. Students. Anyone. Everyone.

We architect our products from the ground up, to put the user first and everything else second. We are making a clean break from the past and taking a disruptive new approach to analytics. Product design is at the heart of everything we do.

The result so far? People in every industry love it. Because what you see is what you understand.

**Notable Features**

**Visual Analytics**
Perceptual and cognitive factors drive our product design. We painstakingly deliberate over every aspect of visual analytics.

When we considered color selection, we hired one of the world’s foremost color cognition experts to engineer Tableau’s color palettes. To encode how shapes are represented, we studied people’s comprehension of shapes when they overlap. We custom-designed our maps because the usual online maps are meant for driving directions, not for data analysis.

Why all the effort? Because the right visual representation of data sparks just the right insights. A story unfolds as people navigate from one visual summary to another. Visual analytics creates the exploratory experience necessary for ordinary people to answer questions quickly.
Big Data
Exploring and analyzing big data translates information into insight. However, the massive scale, growth and variety of data are simply too much for traditional databases to handle. For this reason, businesses are turning towards Big Data technologies such as Hadoop, Spark and NoSQL databases to meet their rapidly evolving data needs. Tableau works closely with the leaders in this space to support any Big Data platform that our customers choose. Tableau lets you find that value in your company’s data and existing investments in Big Data technologies, so that your company gets the most out of its data. From manufacturing to marketing, finance to aviation-Tableau helps businesses see and understand your data.
Business Dashboards
A good business dashboard informs with a glance. A great business dashboard combines high performance and ease of use to let anybody get data-driven answers to their deeper questions. Dashboarding with Tableau allows even non-technical users to create interactive, real-time visualizations in minutes. In just a few clicks, they can combine data sources, add filters, and drill down into specific information. Sharing a dashboard requires no programming, whether it’s on Tableau Server, Tableau Online, or any portal or web page. The best part is Tableau can connect to multiple data sources, providing new opportunities for discovering new insights hidden in your data.

Collaboration
Data analysis shouldn’t be an isolating task — that’s why Tableau is built for collaboration. Team members are able to share data, make follow up queries, and forward easy-to-digest visualizations to others who could gain value from the data. Making sure everyone understands the data and is able to make informed decisions is critical to success. Tableau makes collaborating around data easy. From web editing and authoring to data source recommendations, give everyone the ability to engage with the data they need.

Publish your dashboard to Tableau Server or Tableau Online in seconds, making it easy for everyone in your organization to see your insights, ask questions, and make decisions. Learn how you can start sharing your data discoveries today.
Maps
Tableau is designed to make the most of geographical data, so you can get to the “where” as well as the “why.” With instant geocoding, Tableau automatically turns the location data and information you already have into rich, interactive maps with 16 levels of zoom—or use custom geocodes to map what matters to your business. Census-based population, income, and other standard demographic datasets are built in. In the visual environment of Tableau, you can explore the world through data and share what you find in just a few clicks. You can even import geographic data from R or GIS (or whatever other spatial files or custom geocode data you have) and make it more easily accessible, interactive, and shareable via Tableau Online, Tableau Public, and Tableau Server.

https://www.tableau.com/solutions/maps#reveal

Smart Analytics
Organizations are looking for technologies that help more people do sophisticated analysis. At Tableau, we’re investing in analytical capabilities that help anyone — from data scientists to business users — get to answer’s faster and uncover unanticipated insights. Through machine learning, statistics, natural language, and smart data prep, we are making analytics more approachable to users of all skill levels.

Survey Analysis
It’s easier than ever to perform surveys — and just as easy to get buried in survey data. Use Tableau to hear the voice of the customer coming through loud and clear. Tableau uses visual analysis as an interface to the data, which means anyone can investigate survey responses in-depth with key statistical measures built in. Zoom in and out of geographic regions and overlay census data with one button to find what’s unique about your audience. Then, share the experience with colleagues in one single comprehensive and interactive report that tells the story from every angle and at every level of drill-down. See how Tableau users conduct advanced survey analysis below.
Time Series Analysis
Time series analysis is crucial to understanding your data. The ability to look forward and backward, to drill down from years to days and see data trends over different periods of time is essential for the most comprehensive analysis. Tableau’s built-in date and time functions let you drag and drop to analyse time trends, drill down with a click, analyse times by day of the week, and easily perform time comparisons like year-over-year growth and moving averages.

Underlying infrastructure required to support the product
Tableau provides a full Enterprise strength platform with flexibility on deployment options.
You can deploy Tableau locally in your own server farm, at a Cloud vendor of your choice, or as a Tableau hosted service.

Tableau is able to connect to and exploit your existing infrastructure thus reducing the dependency on the physical Tableau server.

Detailed specifications for Tableau server and desktop are available online — https://www.tableau.com/products/techspecs#server
In summary for Server:

<table>
<thead>
<tr>
<th>System Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Microsoft Windows Server 2016, 2012, 2012 R1, 2008 R2, Windows 7, 8, and 10 on x64 chipsets</td>
</tr>
<tr>
<td>- Amazon Linux 2, CentOS 7, Ubuntu 16.04, 17.04, Red Hat Enterprise Linux (RHEL) 7, Oracle Linux 7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum System Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>The minimum specifications are only suggested for prototyping and testing of Tableau Server. The installer checks for the minimum system requirements and will not proceed on computers with less than these hardware minimums:</td>
</tr>
<tr>
<td>- 2 cores</td>
</tr>
<tr>
<td>- 64-bit processor</td>
</tr>
<tr>
<td>- 8 GB system memory</td>
</tr>
<tr>
<td>- 15 GB minimum free disk space</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>The minimum configuration recommended for production usage of Tableau Server is based on these hardware specifications:</td>
</tr>
<tr>
<td>Single computer</td>
</tr>
<tr>
<td>- 8 physical cores, 2.0 GHz or higher CPU</td>
</tr>
<tr>
<td>- 64-bit processor</td>
</tr>
<tr>
<td>- 32 GB system memory</td>
</tr>
<tr>
<td>- 50 GB minimum free disk space</td>
</tr>
</tbody>
</table>

| Multi-node and Enterprise Deployments: |
| Contact Tableau for sizing and technical guidance. |
| Read our Tableau Server Scalability white paper for architecture recommendations and to see benchmark results. |
| View additional white papers for more information about scalability, high availability and optimizing Tableau for the Enterprise. |

<table>
<thead>
<tr>
<th>User Authentication and Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supports Microsoft Active Directory, SAML 2.0, OpenID Connect, and built-in Tableau users and groups for user authentication and group membership definitions. Kerberos support for Microsoft SQL Server, Microsoft SQL Server Analysis Services and Cloudera Impala. LDAP for Tableau Server on Linux.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Virtual Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrix environments, Microsoft Hyper-V, Parallels, VMware (including vMotion), Amazon Web Services, Google Cloud Platform and Microsoft Azure.</td>
</tr>
<tr>
<td>All Tableau products operate in virtualized environments when they are configured with the proper underlying Windows operating system and minimum hardware requirements. We recommend VM deployments with dedicated CPU affinity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internationalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of Tableau’s products, with the exception of tabadmin, are Unicode-enabled and compatible with data stored in any language. The user interface and supporting documentation of Tableau Server are in English, French, German, Spanish, Brazilian Portuguese, Japanese, Korean and Simplified Chinese.</td>
</tr>
</tbody>
</table>
And for desktop:

- Tableau Server Data Sources
- Action Matrix®
- Action Vector 2.0 or later®
- Amazon Athena
- Amazon Aurora
- Amazon Elastic MapReduce
- Amazon Redshift
- Apache Drill
- Aster database
- Box
- Cisco Information Server
- CloudHadoop: Hive and Impala; Hive CDH 3.1, which includes Hive 7.1, or later; Impala 1.6 or later (incl. Kerberos support for Impala)
- Datapine Enterprise Edition 1.2 or later®
- Dendro
- Diaspora
- ETASOL 4.3 or later®
- Firebird 2.1.4, or later
- Google Analytics
- Google BigQuery
- Google Cloud SQL
- Google Sheets
- Hortonworks Hadoop Hive 1.1 or later
- HP Vertica 6.x or later
- IBM BigInsights®

* Available for Windows only

OPERATING SYSTEMS

Windows
- Microsoft Windows 7 or newer (64-bit)
- Microsoft Windows 8.1 or newer
- Intel Pentium or AMD Opteron processor or newer
- 2 GB memory
- 1.5 GB minimum free disk space

Mac
- iMac/MacBook computers 2009 or newer
- OS X 10.10 or newer
- 1.5 GB minimum free disk space

VIRTUAL ENVIRONMENTS

- Citrix environments (non-streaming), Microsoft Hyper-V, Parallels, VMware, Microsoft Azure and Amazon EC2.
- All of Tableau’s products operate in virtualized environments when they are configured with the proper underlying Windows operating system and minimum hardware requirements.

INTERNATIONALIZATION

- These products are Unicode-enabled and compatible with databases stored in any language. The user interface and supporting documentation are in English, French, German, Spanish, Brazilian Portuguese, Japanese, Korean and Simplified Chinese.
The very nature of analytics means that each customer will have their own specific use cases based upon the complexity of data, volumes of data, number of users, concurrency rates, refresh rates etc. For this reason Tableau has produced an overview on scalability to help with initial implementation and future planning — https://www.tableau.com/sites/default/files/whitepapers/scalability_overview_4.pdf

The product(s) can include data from the following systems

Tableau has invested heavily in native connections to key applications, underlying databases, data lake technologies, web connectors, MS Excel and odbc connectors. Below is a list of currently supported connectors:

- Tableau Server Data Sources
  - Action Matrix
  - Action Vector 2.0 or later
  - Amazon Athena
  - Amazon Aurora
  - Amazon EMR
  - Amazon Redshift
  - Apache
  - Apache Drill
  - Aster Database
  - Bose
  - Cisco Information Server
  - Cloudera Hadoop Hive and Impala, Hive CDH/HAS, which includes Hive 1.2, or later; Impala 1.0 or later (incl. Kerberos support for Impala)
  - DataStax Enterprise Edition 2.2 or later
  - Denodo
  - Dropbase
  - ERASUL 2.2 or later
  - Firebird 3.1.4 or later
  - Google Analytics
  - Google BigQuery
  - Google Cloud SQL
  - Google Sheets
  - Hortonworks Hadoop Hive 1.2 or later
  - HP Vertica 6.1 or later
  - IBM BigInsights
  - IBM DB2 9.1 or later for Linux, UNIX, or Windows (available on Tableau Desktop/Server on Windows only)
  - IBM PDA Netezza 4.5 or later
  - Ibis Files
  - Impala
  - MapR Distribution for Apache Hadoop 2.6.0 or later
  - Marketo
  - Matlogic
  - MemSQL
  - Microsoft Access 2007 or later
  - Microsoft Azure Data Lake
  - Microsoft Azure Data Warehouse
  - Microsoft Azure SQL
  - Microsoft Excel 2007 or later
  - Microsoft OneDrive
  - Microsoft PowerPivot 2008 or later
  - Microsoft SharePoint Lists
  - Microsoft Spark on HCatalog
  - Microsoft SQL Server 2005 or later (incl. support for Kerberos)
  - Microsoft SQL Server Analysis Services 2005 or later; multidimensional mode only (SQL Server support for Kerberos)
  - Microsoft SQL Server PDM V2 or later
  - MemDB
  - MongoDB
  - MySQL 5.0 or later
  - OData
  - Oracle Database 11.0 or later
  - Oracle Eloqua
  - Oracle Hyperion Essbase 11.1.1 or later
  - PDF
  - Pivotal Greenplum 4.x or later
  - PostgreSQL 8.3 or later
  - Presto
  - Progress OpenEdge 20.2.21 patch 4 or later
  - Quickbooks Online
  - Salesforce.com, including Force.com and Database.com
  - SAP HANA 1.0 or later
  - SAP NetWeaver Business Warehouse 7.30 with SP20+ recommended; also requires SAP GUI for Windows 7.20 or later client
  - SAP Sybase ASE 15.5 or later
  - SAP Sybase 12.5 or later
  - ServiceNow ITSM
  - Snowflake
  - Spark SQL requires Apache Spark 1.2.1 or later
  - Spatial files (hdf5, shapefiles, KML, GeoJSON, and Mapinfo file types)
  - Splunk Enterprise 6 or later
  - Statistical Files: SAS (* .sas7bin), SPSS (* .sav), and R (*.csv, *.sav)
  - Tableau Data Extract
  - Teradata V2 R6.3 or later
  - Teradata Aster Data cluster: 5.0 or later
  - Teradata OLAP Connector 14.10 or later
  - Text files — comma separated value (csv) files
  - Additional databases and applications that are ODBC 3.0 compliant
  - Tons of web data with the Web Data Connectors

Providing institutional systems are built on a platform from the support Tableau list and access is available to that data either directly or via export we do not perceive any problems including data from these platforms. We would be happy to demonstrate this.
Key features of the product’s service level agreement

<table>
<thead>
<tr>
<th>Plan Features</th>
<th>Standard</th>
<th>Tiers of Support</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Options</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Communities and Knowledge Base</td>
<td>Online</td>
<td>Online</td>
<td>Online, Phone (P1 &amp; P2)</td>
</tr>
<tr>
<td>Coverage</td>
<td>BH</td>
<td>BH, 24x7 P1</td>
<td>BH, 24x7 (P1 &amp; P2)</td>
</tr>
<tr>
<td>P1, P2 Issue Response Time</td>
<td>8h, 24h</td>
<td>2h, 8h</td>
<td>30 min, 2h</td>
</tr>
<tr>
<td>P1, P2 Issue Update Frequency</td>
<td>24h, 72h</td>
<td>24h, 48h</td>
<td>12h, 24h</td>
</tr>
<tr>
<td>Named Customer Contacts</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Technical Account Manager</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Deployment Reviews</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Recurring Status Calls &amp; Service Reports</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Upgrade Planning Assistance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Special Program Access &amp; Forum Access</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Senior Support Team</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>24x7 Mission Critical Phone Support</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Case Escalation and Oversight</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Onsite Escalation Management</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Prioritized Feature Request Reviews</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Product Roadmap Participation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Feature Request Feedback Sessions</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**What does Communities and Knowledge Base mean?**

Tableau’s Community and Knowledge Base are fantastic self-serve resources available to all customers.

In addition to providing a platform which is flexible and robust enough to support your strategy, Tableau offers the most active user community in the BI market. For example, Tableau Public provides a free of charge service for the community to publish reports which are of interest to the public at large [https://public.tableau.com/en-us/s/gallery](https://public.tableau.com/en-us/s/gallery)
Active forums, regular webinars, availability of eLearning and free video tutorials [https://www.tableau.com/learn](https://www.tableau.com/learn) provide a wealth of support to your users long after project go-live. Tableau provides a Customer Success programme to align your long-term goals with practical guidance such as how best to share internal knowledge, are there best practices from other customers that are of use and how to plan for upgrades.

**Implementation process, duration and institutional resources**

In our experience Tableau is simple from a technology perspective to deploy and adopt and projects are most successful when aligned to a clear strategy which includes

- Having an engaged and active user community who feel empowered
- Support from a wider community
- Readily available training and guidance
- A tool that supports your strategy rather than imposes pre-conditions on it

In Gartner’s recent customer survey for analytics and BI platforms, Tableau scored top for User Enablement.
This is probably the single biggest area to ensure the success of a BI strategic. There are a number of factors which contribute to this. Tableau offers three, flexible options for implementation which are dependent upon your internal resources and desire to become self-sufficient. These are starter, essentials and comprehensive.
Starter:
- Perfect for customers who want to start quickly with very little upfront investment.
- We help you with the things you need to build a strong foundation, such as user education.
- More affordable in the short-term, but it may take longer to get to realizing the full potential of your environment. (opportunity cost of time can be more expensive in the long-run).
- Relies on you the customer to continue to build out the environment.

Essentials:
- We help you deploy and build a framework for scale.
- From governance and security frameworks to a solid plan around user adoption, we’ll give you the foundations and guidelines you need to continue to build and scale your analytics.
- Nice balance of upfront investment and maximum expediency.
- Get the peace of mind knowing that you are going down the right path and being set up for success.

Comprehensive:
- Everything you need to quickly realize value from your analytics investment.
- We will help you establish, deploy and drive adoption of analytics across your organization.
- Leverage our expertise to avoid common pitfalls and get to value faster.
- Minimal risk and time to value, and take the lead from the experts, stress free.

“The biggest surprise was how easy it was to use. We can uncover trends easily. Things that used to take us hours now take us mere seconds.”

BRIDGITT MILNER, SENIOR ASSOCIATE DIRECTOR OF STRATEGIC PLANNING AND RESEARCH, INDIANA UNIVERSITY
A typical starter package would include core services and training and would run over a 2-4-week period. An example of a starter pack is below:

### Tableau Customer Solutions

**Prescriptive Services**

<table>
<thead>
<tr>
<th>Prepared by:</th>
<th>Prepared for:</th>
<th>Date:</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tableau Carson</td>
<td>HEANet RFI</td>
<td>Monday, October 22, 2018</td>
<td>This document outlines a list of prescribed services to ensure you accelerate your time to value and maximize your investment in Tableau. This document is not an official quote and does not include pricing information. Final pricing and any associated discounts will be provided as a part of a formal quote from Tableau.</td>
</tr>
</tbody>
</table>

#### Deployment

Tableau prescribes a set of recommended services based on the size and mix of user types in your deployment. These recommendations are intended to help you gain maximum value from your Tableau investment.

Below are the number of licenses for each role in your deployment:

- **Creators:** 5
- **Explorers:** 10
- **Viewers:** 100

#### Service Tiers

Tableau offers three flexible service tiers to align to your needs. Each tier lets you decide the appropriate blend of cost, effort, time to value, and risk you are comfortable with. Our **Starter** tier is designed as a cost-effective way to lay a foundation of knowledge. Our **Essentials** tier is the ideal blend of service to build an analytics framework that accelerates user adoption. Our **Comprehensive** tier is designed to maximize time to value and minimize risk.

#### Below are the quantities of each offering included in your recommendation:

<table>
<thead>
<tr>
<th></th>
<th>Starter</th>
<th>Essentials</th>
<th>Comprehensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eLearning for</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Creators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public/Virtual</td>
<td>3</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Voucher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server Administration</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server Architecture</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Onsite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desktop I:</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundamentals</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Course</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Desktop II:</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desktop III:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Accelerated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Tableau Prep I</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual Analytics</td>
<td>2</td>
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</tr>
<tr>
<td>Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art + Data Workshop</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packaged Engagements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discovery Workshop</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5 Day)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement</td>
<td></td>
<td></td>
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<tr>
<td>Discovery Workshop</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10 Day)</td>
<td></td>
<td></td>
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<tr>
<td>Engagement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server Rapid Start</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Essentials</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dashboard Design</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hourly Engagements</td>
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<tr>
<td>Discovery/</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roadmap Hours</td>
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<td></td>
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</tr>
<tr>
<td>Server Deployment/Review</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Data Preparation</td>
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<tr>
<td>Hours</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Dashboard Development</td>
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<td></td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Governance Plan</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Building</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Support

- **Extended Support:** Deployment
- **Premium Support:** Deployment

### $5,000 | $24,600 | $54,500

The specific needs for each client would be agreed prior to contracting.
Pricing Structure

It should be noted that as part of the Tableau Academic programme Tableau software is available free of charge for lecturers and students. License fees only apply to administrators. Details of qualification criteria are available on the teacher’s community FAQ https://community.tableau.com/docs/DOC-10250

Tableau pricing is simple to understand. It is based on the role of the user. Prices are per user per month with a minimum of a 12-month contract commitment. Softcat would be able to supply and transact this pricing in Euro’s at the point of RFQ.

Tableau Creator

$70
USD/user/month
(taxed annually)

Discover insights with a powerful suite of products that support your end-to-end analytics workflow.

Includes:
- TABLEAU DESKTOP
- TABLEAU PREP
- And one Creator license of
- TABLEAU SERVER

Tableau Explorer

$35
USD/user/month
(taxed annually | min. 10 Explorers required)

Explore trusted data and answer your own questions faster with full self-service analytics.

Includes one Explorer license of
- TABLEAU SERVER

Tableau Viewer

$12
USD/user/month
(taxed annually | min. 100 Viewers required)

View and interact with dashboards and visualizations in a secure, easy-to-use platform.

Includes one Viewer license of
- TABLEAU SERVER
<table>
<thead>
<tr>
<th>ACCESS</th>
<th>CREATOR</th>
<th>EXPLORER</th>
<th>VIEWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web and mobile</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Embedded content (✓)</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interact with visualizations and dashboards</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Download visualizations as images (pdf, png) (✓)</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Download summary data (✓)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Download full data (✓)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Create and share custom views</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERACT</th>
<th>CREATOR</th>
<th>EXPLORER</th>
<th>VIEWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment on a dashboard or visualization</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Create a subscription for yourself</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Receive data-driven alerts</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Create subscriptions for others</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Create data-driven alerts</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COLLABORATE</th>
<th>CREATOR</th>
<th>EXPLORER</th>
<th>VIEWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit existing workbooks and visualizations</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Create and publish new workbook from existing published data source (✓)</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Create and publish new workbook with a new data source (✓)</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create and publish new data sources</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create new workbooks based on pre-built Dashboard Starters (✓)</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>PREPARE</td>
<td>CREATOR</td>
<td>EXPLORER</td>
<td>VIEWER</td>
</tr>
<tr>
<td>Create new data flows (.tif) (✓)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Edit and modify a data flow (.tif)</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export data (.tde, .hyper or .csv)</td>
<td>✓</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>CREATOR</th>
<th>EXPLORER</th>
<th>VIEWER</th>
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<tbody>
<tr>
<td>Manage users and permissions (✓)</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Manage content and certify data sources (✓)</td>
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<td></td>
<td>✓</td>
</tr>
<tr>
<td>Server administration</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
Should you wish for Tableau to fully host the solution there is a small uplift to cover the cost of managing the service. This is as below –

### Tableau Creator

- **$70**
- USD/month
- Licenses required
- Discover insights with a powerful suite of products that support your end-to-end analytics workflow.

### Tableau Explorer

- **$42**
- USD/month
- Licenses required
- Explore trusted data and answer your own questions faster with full self-service analytics.

### Tableau Viewer

- **$15**
- USD/month
- Licenses required
- View and interact with dashboards and visualizations in a secure, easy-to-use platform.

Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie

### Reporting Features for Lecturers

It should be noted that as part of the Tableau Academic programme Tableau software is available free of charge for lecturers and students. License fees only apply to administrators. Details of qualification criteria are available on the teachers community FAQ

https://community.tableau.com/docs/DOC-10250

Tableau provides a wealth of aids for Lecturers including a dedicated community –

https://community.tableau.com/community/teachers/overview.
Access is made available to shared, education workbooks.

Whitepapers with guidance on best practises are available at https://www.tableau.com/learn/whitepapers/8-ways-universities-are-making-impact-data

Numerous case studies are also available here: https://www.tableau.com/resources/education-and-k_12_education-and-higher_education
Reporting Features / Apps for Students

It should be noted that as part of the Tableau Academic programme Tableau software is available free of charge for lecturers and students. License fees only apply to administrators.

A recent report by PWC found 69 per cent of employers will demand data science and analytics skills from job candidates by the year 2021. Tableau helps students gain these highly desirable skills which will be key in driving the Irish economy forward.

https://www.tableau.com/academic/students#product-video

Tableau provides students with a dedicated community where they can receive help, guidance and exchange ideas https://community.tableau.com/community/students/overview

In addition, Tableau offers students a discount on Tableau certification which is an industry recognised and highly desired qualification.

Enterprise Reporting Features

Visual Analytics
Perceptual and cognitive factors drive our product design. We painstakingly deliberate over every aspect of visual analytics.

When we considered color selection, we hired one of the world’s foremost color cognition experts to engineer Tableau’s color palettes. To encode how shapes are represented, we studied people’s comprehension of shapes when they overlap. We custom-designed our maps because the usual online maps are meant for driving directions, not for data analysis.
Why all the effort? Because the right visual representation of data sparks just the right insights. A story unfolds as people navigate from one visual summary to another. Visual analytics creates the exploratory experience necessary for ordinary people to answer questions quickly.

Big Data
Exploring and analyzing big data translates information into insight. However, the massive scale, growth and variety of data are simply too much for traditional databases to handle. For this reason, businesses are turning towards Big Data technologies such as Hadoop, Spark and NoSQL databases to meet their rapidly evolving data needs. Tableau works closely with the leaders in this space to support any Big Data platform that our customers choose. Tableau lets you find that value in your company’s data and existing investments in Big Data technologies, so that your company gets the most out of its data. From manufacturing to marketing, finance to aviation - Tableau helps businesses see and understand your data.

Business Dashboards
A good business dashboard informs with a glance. A great business dashboard combines high performance and ease of use to let anybody get data-driven answers to their deeper questions. Dashboarding with Tableau allows even non-technical users to create interactive, real-time visualizations in minutes. In just a few clicks, they can combine data sources, add filters, and drill down into specific information. Sharing a dashboard requires no programming, whether it’s on Tableau Server, Tableau Online, or any portal or web page. The best part is Tableau can connect to multiple data sources, providing new opportunities for discovering new insights hidden in your data.

Collaboration
Data analysis shouldn’t be an isolating task — that’s why Tableau is built for collaboration. Team members are able to share data, make follow up queries, and forward easy-to-digest visualizations to others who could gain value from the data. Making sure everyone understands the data and is able to make informed decisions is critical to success. Tableau makes collaborating around data easy. From web editing and authoring to data source recommendations, give everyone the ability to engage with the data they need.

Publish your dashboard to Tableau Server or Tableau Online in seconds, making it easy for everyone in your organization to see your insights, ask questions, and make decisions. Learn how you can start sharing your data discoveries today.
Maps
Tableau is designed to make the most of geographical data, so you can get to the “where” as well as the “why.” With instant geocoding, Tableau automatically turns the location data and information you already have into rich, interactive maps with 16 levels of zoom—or use custom geocodes to map what matters to your business. Census-based population, income, and other standard demographic datasets are built in. In the visual environment of Tableau, you can explore the world through data and share what you find in just a few clicks. You can even import geographic data from R or GIS (or whatever other spatial files or custom geocode data you have) and make it more easily accessible, interactive, and shareable via Tableau Online, Tableau Public, and Tableau Server.

https://www.tableau.com/solutions/maps#reveal

Smart Analytics
Organizations are looking for technologies that help more people do sophisticated analysis. At Tableau, we’re investing in analytical capabilities that help anyone—from data scientists to business users—get to answer’s faster and uncover unanticipated insights. Through machine learning, statistics, natural language, and smart data prep, we are making analytics more approachable to users of all skill levels.

Survey Analysis
It’s easier than ever to perform surveys — and just as easy to get buried in survey data. Use Tableau to hear the voice of the customer coming through loud and clear. Tableau uses visual analysis as an interface to the data, which means anyone can investigate survey responses in-depth with key statistical measures built in. Zoom in and out of geographic regions and overlay census data with one button to find what’s unique about your audience. Then, share the experience with colleagues in one single comprehensive and interactive report that tells the story from every angle and at every level of drill-down. See how Tableau users conduct advanced survey analysis below.
Time Series Analysis

Time series analysis is crucial to understanding your data. The ability to look forward and backward, to drill down from years to days and see data trends over different periods of time is essential for the most comprehensive analysis. Tableau’s built-in date and time functions let you drag and drop to analyse time trends, drill down with a click, analyse times by day of the week, and easily perform time comparisons like year-over-year growth and moving averages.

How many HEIs are currently using the product?
How many of these are in Ireland/the UK?

---

Florida International University

“Tableau showed me a fun, user-friendly connection between data and design — I couldn’t get enough!”

— CHRISTINA CASCANTE, FORMER STUDENT

Pepperdine University

“Learning data analytics with Tableau opened my eyes to which direction in my career path I wanted to take.”

— ANDREW TOUSSAINT, STUDENT

University of Oxford – United Kingdom

“I liked how easy it was to just drag and drop properties that I wanted to visualize, as well as selecting different forms of visualization (bubbles, bar charts, etc.).”

— BRANDON TURNEY, STUDENT

Worldwide over nearly 700,000 students and lecturers have used Tableau in the last 9 years in nearly 7,000 institutions, 253 of which are in the UK and Ireland.
Customers within Ireland include DCU, Trinity College Dublin, National University of Ireland Galway, The Department of Education and SOLAS. There are number of UK based institutions that can provide references where required at a later stage having worked with Softcat on their own deployments.

**Examples of current users**

Contact details are available from vendor upon request
Data infrastructure

You can deploy Tableau locally in your own server farm, at a Cloud vendor of your choice, or as a Tableau hosted service. Softcat PLC are one few VAR’s in the UK&I and currently hold Microsoft’s #1 Gold Partner status in the UK. As a business, we’re investing heavily in to our IT Priorities, with Hybrid Infrastructure at the forefront of this – more information on this can be found here: https://www.softcat.com/what-we-do/it-priorities/hybrid-infrastructure/

Tableau partners with and is compatible with Amazon, Google and Microsoft cloud platforms:

Tableau online is hosted on AWS
GDPR & Security

The General Data Protection Regulation (GDPR), effective 25 May 2018, strengthens and unifies data protection for all individuals in the European Economic Area (EEA). The GDPR imposes enhanced rules on companies, government agencies, non-profits, and other organizations that offer goods and services to people in the EEA, or that collect and analyze data tied to EEA residents. The GDPR applies to all organizations doing business with individuals in the EEA, whether the organizations are based in the EEA or not. It also addresses the export of personal data outside the EEA, so companies need to take a measured approach to their personal data collection and protection practices.

Tableau has always believed in the importance of handling personal data in a way that is both thoughtful and comprehensive and will continue to protect customer data in accordance with all current and future legislative guidelines, including GDPR. We believe that the GDPR is an important step forward for clarifying and enabling individual privacy rights. Softcat PLC are also a GDPR compliant business.

Tableau provides robust governance control measures (like data source certifications), features (like live query), and tools (like using open metadata for internal audits) within the product itself. [https://www.tableau.com/legal/gdpr#product](https://www.tableau.com/legal/gdpr#product)

Tableau is dedicated to providing transparency and building trust. We have engaged in a company-wide effort to implement GDPR-compliant privacy practices and are dedicated to continuous improvement in this area. [https://www.tableau.com/legal/gdpr#policies](https://www.tableau.com/legal/gdpr#policies)

Protecting customer privacy and respecting confidential information is fundamental to our core value of delighting our customers. Our robust security practices include conducting annual SOC 2, SOC 3, and ISAE 3402 audits for the Tableau Online service. [https://www.tableau.com/legal/gdpr#security](https://www.tableau.com/legal/gdpr#security)

The GDPR restricts the export of personal data to countries outside the EU and the European Economic Area (EEA) unless certain controls are in place. Tableau gives its customers assurances that personal data will be transferred and processed in compliance with EU data protection law in multiple ways.

Tableau is a certified Active Participant in the EU-US Privacy Shield Framework and is therefore subject to the investigative and enforcement powers of the Federal Trade Commission.
In addition, Tableau offers customers Model Clauses that make specific guarantees around transfers of personal data for in-scope Tableau services.

In committing contractually to both the Privacy Shield Framework and the Model Clauses, Tableau has invested in the operational processes necessary to meet the exacting requirements of European data privacy requirements.

**Account management structure**

There is a strong Account Management team based in Ireland. This ensures continuity of service, access to support skills and ensures that Tableau customers are included in events which provide the opportunity to exchange ideas.
Currently supported federated access technologies

Tableau Server supports several types of single sign-on (SSO) and other authentication methods. In most SSO scenarios, users don’t have to explicitly sign in to Tableau Server. Instead, the credentials they’ve used to authenticate already (for example, by signing in to your corporate network) are used to authenticate them to Tableau Server, and they can skip the step of entering a username and password to access Tableau Server. In the following authentication methods, users’ identities as established externally are mapped to a user identity defined in the Tableau Server identity store.

When you configure Tableau Server to use an SSO or alternative authentication solution, all authentication is handled by the external solution. However, Tableau Server will manage user access to Tableau resources based on the site roles stored on Tableau Server.

Tableau Server supports these authentication methods:

- **SAML.** You can configure Tableau Server to use SAML (security assertion markup language) for SSO. With SAML, an external identity provider (IdP) authenticates the user’s credentials, and then sends a security assertion to Tableau Server that provides information about the user’s identity. You can use SAML to access Tableau Server if you have configured Active Directory or local authentication on Tableau Server. For more information, see SAML.

- **Kerberos.** If Kerberos is enabled in your environment and if the server is configured to use Active Directory authentication, you can provide users with access to Tableau Server based on their Windows identities. For more information, see Kerberos.

- **Mutual SSL.** Using mutual SSL, you can provide users of Tableau Desktop, Tableau Mobile, and other approved Tableau clients a secure, direct-access experience to Tableau Server. With mutual SSL, when a client with a valid SSL certificate connects to Tableau Server, Tableau Server confirms the existence of the client certificate and authenticates the user, based on the user name in the client certificate. If the client does not have a valid SSL certificate, Tableau Server can refuse the connection. For more information, see Configure Mutual SSL Authentication.

- **OpenID.** OpenID Connect is a standard authentication protocol that lets users sign in to an identity provider (IdP) such as Google. After they’ve successfully signed in to their IdP, they are automatically signed in to Tableau Server. To use OpenID Connect on Tableau Server, the server must be configured to use local authentication. Active Directory authentication is not supported. For more information, see OpenID Connect.

- **Trusted Authentication.** Trusted authentication lets you set up a trusted relationship between Tableau Server and one or more web servers. When Tableau Server receives requests from a trusted web server, it assumes that the web server has already handled whatever authentication is necessary. Tableau Server receives the request with a redeemable token or ticket and presents the user with a personalized view which takes into consideration the user’s role and permissions. For more information, see Trusted Authentication.
API support

Tableau’s developer tools and APIs allow you to integrate, customize, automate, and extend Tableau to fit the specific needs of your organization. Go beyond what’s in the box to make Tableau the perfect fit for your organization.

https://www.tableau.com/developer

Examples of API capabilities include
- Extensions, create dashboard extensions so users can interact directly with data in third party applications without leaving Tableau. E.g. write-back
- Data Connectivity, create connectors to new data sources
- Automation
- Data Science Integration, integration from R, Python and Matlab
- Embedded Analytics, embed your dashboards into other applications

Tableau supports and encourages API usage through resources including our developer online community and GitHub.

Tableau does not develop industry specific APIs, rather it adopts an open methodology which benefits all sectors. One area of particular interest to HEI’s would be integration from R, Python and Matlab and embedded analytics enabling users to embed your dashboards into other applications.
Tableau’s developer tools and APIs allow you to integrate, customize, automate, and extend Tableau to fit the specific needs of your organization. Go beyond what’s in the box to make Tableau the perfect fit for your organization.

Capabilities

Extensions

Tableau’s new Extension Gallery is live! See what Tableau developers and partners have created in the Extension Gallery, now in beta.

Create dashboard extensions so end users can interact directly with data in third-party applications, without leaving Tableau. Capabilities like write-back, custom actions, deep integration with other apps, and custom UI are all at your fingertips. Join the Extensions API Feedback Program.

LEARN MORE →

Data connectivity

Create connectors to data sources that are not currently supported by Tableau, including websites and custom applications. With the Web Data Connector, CUDA driver, and more, get the data your organization needs.

LEARN MORE →

Automation

Programmatically eliminate tedious content management tasks—allowing you to more effectively maintain and update workbooks, data sources, and users on Tableau Server.

LEARN MORE →

Data science integration

Give more people the ability to use statistical models. Integrate and visualize the data from your R, Python, and Matlab models in Tableau.

LEARN MORE →

Embedded analytics

Make your Tableau content available anywhere. It’s easy to embed your vizzes into other business applications like Salesforce and Microsoft SharePoint, so more of your people use data to make decisions.

LEARN MORE →
PROVIDER: **TEXUNA TECHNOLOGIES LTD**

Product(s)

- BI and Big Data Analytics
- Higher Education Data Warehouse
- Discovery and Disclosure
- Identity and Access Management

Provider contact

tender@texunatech.com

Product Descriptions

In a world with increasingly sophisticated expectations concerning service and personalization, data must be seen as a fundamental asset, and organizations must improve their level of maturity of handling that data as an enterprise.

Our products support data flows and transformations to provide a data platform for reporting and analytics. The platform is based on a metadata driven framework for speed and efficiency of deployment and delivery and allows project teams to focus on the business and digital service transformation. We have product services that support BI reporting, Analytics, eDiscovery as well as modern approaches to identity management that help transform the student experience.

Our business-friendly project methodology guarantees early and frequent realization of benefits. Our Disciplined Agile Delivery helps assure projects on-time and to-budget while providing the flexibility needed to ensure that the right priorities are in place to secure project outcomes. We combine the best of Prince2, Lean, Scrum and Kanban to deliver strategic objectives. Texuna is laser-focused on the business case. Texuna’s expertise and experience with cloud solutions and open source software absolutely minimize capital investment costs, service fees and a shared focus on business outcomes.
Notable Features

BI and Big Data Analytics

- Blended Data At Source for More Accurate Insights;
- Dashboard support: Power BI, Quicksight, Tableau, Qlikview/qliksense, D3.js, Looker, Geckoboard;
- Metadata publication for data governance, audit trail, and data provenance;
- Predictive analytics, Business Intelligence, Reporting, and distribution;
- Big Data Manipulation and Full Analysis Capability;
- Simplify embedded analytics into multiple secure portals and mobile apps;
- Support flexible OLAP and reporting via SSRS, Greenplum, Mondrian, Pentaho, Talend;
- Support legacy including Crystal Reports, SAP Business Objects;
- Predictive analytics through tool integration like Weka, R, Scikit-learn, Numpy, MADLib, RapidMiner/Knime, Mahout, Tensorflow;
- Big data analytics support with Zeppelin, Spark or Impala.

Higher Education Data Warehouse

- Enterprise Class Fully Managed Data Warehouse as a Service;
- Data Futures and Sector Analysis data mart immediately available out-of-the-box;
- Fully orchestrated data pipeline covering ODS, MDM, EDW, BI, analytics;
- Integrate Learner Analytics data, focus on outcomes and Student Experience;
- Dashboard reporting via PowerBI, Quicksight, or Tabelau, Qlik, Business Objects;
- Service includes Extraction, Cleansing, Matching, Reconciliation, Transformation, Warehousing, Publication, Analytics;
- Fully managed high performance, high availability EDW cluster nodes;
- GDPR compliance: obfuscation and/or encryption at rest and in transit;
- Automated publication of data dictionary, glossary, report catalogue, data lineage;
- Plugin: SITS/SRS, SAP/Unit4/Oracle/ES, CoreHR/SAPHR, VLE (Moodle/Blackboard), Sharepoint, Salesforce/MsDynamics, Office365/GoogleDocs, ActiveDirectory.

Discovery and Disclosure

- Cloud agnostic: deployable on any public cloud or privately on-premises;
- Automated custodian and keyword identification, auto-suggest, document clustering, auto-encoding;
- Deduplication, identify near duplicates, document clustering and auto encoding;
- Integrate with FGK or Encase for forensic investigations of devices;
- Full dataset indexing of text, images and metadata with threading;
- Export function with metadata and index for discovery production sets;
- Manual and automated redaction across specific text, paragraphs, sections;
- ManifoldCF integration for access to streaming real-time data;
- Multi-user group access with permissioned roles for collaborative review, QC;
- Optical Character Recognition (OCR) support for images / scanned documents.
Identity and Access Management

- Manage Identity Lifecycle Accounts and Credentials;
- Application Access Management via central or remote permissions and groups;
- Dramatically cut helpdesk password reset support costs via Fido2.0 devices;
- Federation and social sign-on via SAML, JWT, OAuth2.0, OpenID Connect;
- Active Directory, OpenLDAP, ReSTful web services integration, secured via HTTPS/TLS/SHA2/AES256;
- Monitor privileged users, event statistics, behavior and intrusion patterns;
- EAV extensible data model supporting Shibboleth SAML2 attribute exchange hub;
- Support Multi-Factor and Biometric Authentication (2FA, TOTP, *U2F/UAF/CTAP/WebAuthn);
- Account Administration Delegation, plus manage permissions/user groups centrally;
- Self-Sovereign asynchronous cryptography (U2F PKI authentication and digital signature).

Underlying infrastructure required to support the product

Texuna provide a fully managed hosted solution as SaaS on cloud infrastructure within the EEA region (typically Dublin) and secured to ISO 27001 standards. However, it is also possible to deploy the whole infrastructure as code in-house on a VMWare or OpenStack virtualization platform.

Texuna are certified partners of Hitachi / Pentaho (who a suite of open source Business Intelligence products which provide data integration, OLAP services, reporting, dashboarding, data mining and ETL capabilities), Amazon Web Services, and Cloudera.
The product(s) can include data from the following systems

The Barrachd solution can report directly against most systems assuming an ODBC connection exists or can use data extracted from the core solution using ETL tools. The Barrachd solution can also use data provided by the organisation on flat files, CSV, comma delimited, spreadsheets and more.

### Student Management Systems
- Banner
- Agresso
- U4SM
- Quercus

### VLEs
- Blackboard
- Moodle
- Sakai
- Brightspace/D2L
- Canvas

### Library & Repositories
- Koha
- Capita
- Sierra
- Summon
- DSpace

### Key features of the product’s service level agreement

The SLA guarantees a monthly uptime percentage of at least 99.9% for cloud SaaS. Three different support level options are available as per the detailed pricing schedule, with different response times (Enterprise, Premium, Standard).

Severity level definitions and response times, as well as financial recompense, are only available under an Enterprise support package.

### Implementation process, duration and institutional resources

Typical projects are generally packaged into 90-day phases, with early agile iterated MVP releases to Production, and it is feasible to get several key systems integrated and delivered as SaaS within this timescale subject to readiness. A Discovery phase is usually required for larger projects to understand the real business needs, priorities and focus on quick wins and strategic priorities in
an agile approach. Texuna have experienced staff who are very familiar with the tools and have actively implemented complex installations that use a range of different data sources - sometimes numbering in the hundreds of different feeds. Success is heavily dependent on timely access to often heavily guarded and protected data, do Discovery also includes a stakeholder and readiness assessment, as well as a governance and data quality review.

Texuna are able to support you through the whole of your implementation and ‘business as usual’ phases with our comprehensive solution services offering. The result is that your implementation is customised to suit your unique requirements. This can be simply extracting, transforming and loading data from a variety of sources to a single database or data warehouse, or it may also include the full use of a business analytics package so that you can maximise the use of your data in terms of generating actionable insights, improving student experience or transforming digital services.

Pricing Structure

Pricing details are available in the separate pricing catalogue. Our SaaS offerings are priced per server virtual machine, by storage required, and by the level of support service required. Prices are based on monthly subscriptions. There are no charges based on number of FTE or users accessing the system whether as staff, students or academics.

Any customisation or in-house implementation charges and change control items may be purchased through our Cloud Support Services day rates. Discounts may be possible for larger pre-planned projects.

Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie

Reporting Features for Lecturers

Data Explorer provides a range of built-in visualisations, giving tutors and other staff members an overview of student activity, such as VLE usage, attendance and assessment – at both aggregated and individual student levels. It also provides risk predictions built by Jisc’s learning analytics predictor. Staff can explore activity at different levels, such as by tutor group or module, by faculty/school/department. This helps to identify areas of the curriculum that are not functioning as planned, enabling better use of resources to maximise the benefits to current or future cohorts of students. Through providing quick and flexible visualisations of VLE usage, attendance, assessment and performance the dashboard can support discussions between academics and the students they mentor. Additional visualisations within the dashboard for modules can identify how well the content is being utilised and can support curriculum review/instructional design enhancements.
Data explorer also works hand in hand with our Traffic Light Calculator tool. This works by bringing together data related to student engagement with their learning environment with physical attendance and assessment data. This data is then rag-rated to identify at-risk students. This information can then help you to plan effective personal interventions with your students. The use of the Traffic Light Calculators will also allow an overview for management of how students are performing at course, subject and faculty level and to identify under-performing areas of the curriculum.

### Reporting Features for Lecturers

#### BI and Big Data Analytics

- Subject specific data marts are created to answer questions and provide evidence that address real needs. These data marts combine various data, which is listed separately below (e.g. year-on-year and BME analysis is common throughout). Reporting can be classified generally as:
- Student application and enrolment reports — Analysis of application and enrolment statuses for a course or programme against targets and entry qualifications.
- Academic advisor/engagement reports — Analysis of student and academic advisor engagement including wider resource/service usage.
- Student demographic reports — Analysis of student by factors such as BME, POLAR3&4, Gender, Disability etc.
- Internal course/programme reports — Analysis of student by factors such as Mode of Study, Level of Study, Highest Qualification on Entry and Tariff Points
- External course/subject reports - Analysis of student by an institution’s course and JACS/HECoS Subject groups supporting sector analysis.
- Student derived fields — Analysis of derived fields as defined by sector bodies such as HESA and OfS, related to demographic data, qualification classifications and highest qualifications on entry, course subject groupings and full-time equivalence, module/cost centre groupings and full-time equivalence.
- Employment reports — Analysis of a student’s activity after graduation.
- Statutory return reports — Analysis of how data submitted in statutory returns are externally transformed and delivered (e.g. in benchmarking league tables, understanding the alignment of finance, staff and student returns, also addressing potential data quality issues).
- Sector reports - Analysis of sector entrance and exit data (e.g. tariff Vs outcome/employment benchmarking, National Student Survey analysis).
- Financial tracking reports — Analysis of student fees to modules/courses/departments they should contribute.
- Module/course profitability reports — Analysis and modelling of current and future income scenarios.
- Payroll forecasting reports — Analysis and modelling of payroll, supporting greater accuracy in financial planning.
- Market intelligence reports — Analysis of students applications and decisions across HE institutions.
- Resource usage reports — Analysis of a student’s learning patterns and resource/service usage.
• Student sentiment reports — Analysis of a student surveys, both quantitative and qualitative with sentiment analysis.
• Module/programme/course review reports — Analysis focused on student performance/gains and satisfaction/feedback.
• Key performance indicator reports — Summary analysis focused on intake, entrance, attainment, satisfaction, outcomes and employment/further studies.
• Learning intervention reports — Analysis of students behaviour and resource/service usage to enable interventions to address issues.
• Learning gains reports — Clustering via machine learning, and analysis of students and learning gains made.
• Learning advancement reports — Clustering and analysis of student learning behaviours (e.g. identification of study methods for different segments that lead to better outcomes).

Higher Education Data Warehouse

• Version control and slowly changing dimensions allows for trusted, authoritative analysis across time.
  — This gives early sight and transparency around data supporting the investigation of emerging trends or unexpected changes and improves the visibility and ability to address data quality.
  — Recreating historic reports is accurate, trustworthy and simple.
  — Better clarity exists with real-time business intelligence information due the provision of a single source of the truth
• A single, centralised trusted source of data increases the availability and accessibility of accurate data. This acts as a catalyst for evidence based decision making and understanding, it helps build a data driven culture based on data principles and stewardship.
• Clear definitions for data and derivations, from a self publishing EDW that promotes a common understanding of data with uniformity.
  — With a governance tools showing the lineage, derivation and transformation of data.
• Burden reductions, with ETL / ELT used to provide a planned data pipeline approach, so efforts better directed to data quality improvements, analysis of data and improving the maturity of "Data Assets Under Management".
• The centralisation of logic out of BI tools supports conformed reporting and removes the burdens of regular localised development of ETL code. Similarly, there is a movement away from local hero led cultures for "Data Assets Under Management".
• A sible centralised warehouse/data vault consolidates existing data stores and technology stacks, therefore simplify infrastructure architecture and reducing maintenance costs.
Discovery and Disclosure

- Student application reports — Analysis of applications for a course or programme
- Student demographic reports — Analysis over time of student counts by Domicile, Ethnicity, Gender and Disability.
- Course report 1 — Analysis over time of student counts by Mode of Study, Level of Study, Highest Qualification on Entry and Tariff Points
- Course report 2 — Analysis over time of student counts by an institution’s course and JACS/HECoS Subject groups.
- Student derived fields — Analysis of derived fields as defined by HESA, related to demographic data, qualification classifications and highest qualifications on entry.
- Course derived fields — Analysis of derived fields as defined by HESA, related to course subject groupings and course full-time equivalence.
- DLHE reports — Analysis of a student’s activity after graduation

Identity and Access Management

- Simplified manage and understanding of Identity Lifecycle Accounts and Credentials.
- Application Access Management via central or remote permissions and groups.
- Dramatically cut user management support costs.
- Flexibility with Federation and social sign-on.
- Active Directory, OpenLDAP, ReSTful web services integration, secured via HTTPS/TLS/SHA2/AES256.
- Monitor and reporting of privileged users, event statistics, behaviour and intrusion patterns.
- EAV extensible data model supporting Shibboleth SAML2 attribute exchange hub.
- Support for Multi-Factor and Biometric Authentication (2FA, TOTP, U2F/UAF/CTAP/WebAuthn).
- Account Administration Delegation plus manage permissions / user groups centrally.
- Self-Sovereign asynchronous cryptography (U2F PKI authentication and digital signature).
- Enforce directory services, user management processes and security policy.
- Strong password policy configuration and enforcement (Salt and Hash).
- Centralise GDPR compliance, secure storage of personal data with audit-trail.
- High Performance and High Availability via cluster or elastic service.
- Devolved access control to simplify management of huge user base.
- Open source software implementation with optional blockchain audit trail.
- Data encryption at rest gives data protection and privacy guarantees.
- Ability to independently assure individual identities through auxiliary KYC services.
Reporting Features/Apps for Students

BI and Big Data Analytics

- Academic advisor reports — To track interactions between students and lecturers and how this impacts student learning.
- Learning gains reports — To better understanding learning gains made.
- Resource usage reports — To understand service and resources available that are/are not utilised.
- Learning advancement reports — Targeted resource usage reports, to understand model study methods that may lead to better outcomes.

Subject specific data marts using data listed as “Features for Lecturers” above are also often created for student unions and representatives to better understand needs to address of monitor and evaluate initiatives being undertaken.

In short, any data held may be used within Student apps (e.g. scheduling data, assessment data etc). Sector models are used as the vocabulary for the chief data entities, such as the HESA Data Futures for DDS and Jisc learning analytics project Unified Data Definitions (UDD) for data marts.

Higher Education Data Warehouse

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Discovery and Disclosure

Please see features/benefits above, which may be used to disseminated appropriate data to students.

Identity and Access Management

- Enhanced User Experience — single approach to access credentials.
- User self-service features and customisable user journey with homepage personalisation

Enterprise Reporting Features

Texuna deploy scalable and responsive data models during planning and delivery to support all required enterprise reporting features. Universal datasets will be engineered to include all the fields for both current and future reporting scenarios. Redundancy will simultaneously be avoided to guarantee speed and performance of queries. Data model granularity will be sufficient to permit transaction level drill-down.

Texuna use a Data Vault 2.0 approach (hub/satellite schema) as a foundation for a traditional star-schema based Enterprise Data Warehouse. Conformed dimensions provide a ‘single version of the truth’ and the data vault provides a ‘single version of the facts’ for all enterprise reporting and analytics. Simplified star schemas make enterprise reporting easy to use with any existing BI or reporting tools available in-house. We have expertise to support tools like Tableau, SAP Business Objects, Qlik, Alteryx, PowerBI and open source alternatives such as Pentaho and Talend. We can also provide big data and analytics expertise with Apache Spark, Zeppelin, Jupyter, R and Weka. BI and analytical tool choices will be tailored to each university's needs.

A strong bias toward more configuration and less development will maximize future options. Modern BI and ETL tools provide sophisticated configuration capabilities which will be heavily prioritized over any custom programming of complex transformation routines. This also assures quicker debugging, shorter delivery cycles, increase adaptability to changing requirements and lower long-term support costs.

Texuna's team is balanced with academic as well as financial experts that bring in best practices of statutory, budgetary and management reporting as well as implementation specialists with deep knowledge of business intelligence systems.
How many HEIs are currently using the product? How many of these are in Ireland/the UK?

The Texuna Analytics product is just recently launched as a service. Customers include:
- JISC — UK (since 2016) (Jisc runs the JANet network which is functionally similar to HEAnet).
- Oxford Brookes University — UK (since 2018)
- London Metropolitan University — UK (since 2018)

Examples of current users

**JISC**
Vibhuti Laroiya
Business Intelligence and Datawarehousing Manager
Email: vibhuti.laroiya@jisc.ac.uk
Tel: 02036975873 Ext: 8735

**Oxford Brookes University**
Helen Harbour
Head of IT PMO
Email: hharbour@brookes.ac.uk
Tel: 01865483328

Data infrastructure

End-to-end secure cloud-hosted infrastructure-as-software is usually delivered over Amazon Web Services (AWS) and Azure. However, it is also possible to deploy in-house on top of OpenStack or VMWare, as well as containerized microservices deployed on a Kubernetes based stack.

GDPR & Security

All data is encrypted at rest as well as in transit using TLS based on AES256 encryption standards. By default, Texuna/AWS designs are based on ‘nothing-accessible and everything auditable’. This makes privacy impact assessment easier, facilitating security by design for GDPR compliance. Security and audit strategies are designed around data and user access. Restrictions are only removed based on actual requirements.

Audit, history and versioning features will ensure all previous versions of a record are stored and are available for authorized users to review. This includes data changes as well as key ‘events’.
Texuna also have a dedicated eDiscovery and eDisclosure service that can be used to explore and highlight any required structured and unstructured content across the whole university data estate including emails and chat systems.

Data can be stored in-house, or in the public cloud within secure private networks according to government best practices, with the option to store data in Dublin data centers or in the U.K.

**Account management structure**

Dedicated account management services are provided so that Texuna is able provide the best quality of service to meet each University’s requirements. We will be delighted to explore ways in which we can be of service to the University and further our partnership.

Texuna have a complement of 35 staff with the majority employed on our client projects. We have the skills and capacity to provide a fully functional team for multiple engagements on site with any University. We regularly manage multiple engagements and pressures from a portfolio of projects.

Our projects management staff meet regularly each week to review operational projects. We plan technical resource allocations 2 months in advance so that we can anticipate any issues early and address them in good time. We have been operating in this way for over 10 years and in that time have a strong track record of delivering our projects on time and budget to a high level of customer satisfaction.

**Currently supported federated access technologies**

Texuna can provide user authentication services and/or integrate with existing identity providers. We provide a high availability secure access solution for UK schools to get single sign-on access to 11 legacy services with the Department for Education. We support a wide range of commonly used authentication methods including:

- LDAP
- Microsoft Active Directory
- A local authentication method
- Role-based access controls (RBAC).

In addition we support the following authentication protocols and standards:

- Single Sign-On (SAML2.0)
- Shibboleth identity provider
- OpenID Connect (OIDC) / OAuth2.0
- Fido UAF U2F CTAP / W3C WebAuthn
Texuna offer flexible onboarding and off-boarding processes to provide integration with any authentication service required for the initial implementation and to migrate to an alternative provider during the lifetime of the solution should this be required.

**API support**

Texuna’s platform is based on API driven microservices compliant with UK Government Digital Services specifications. We can deliver a fully functioning API to join back-end systems with a new front end Single Page App that uses best practice open source design patterns and standards.

Texuna specialize in REST API endpoints. We use YAML-based documentation to automate code generation in a language independent way. This streamlines development with well-formatted documentation and test stubs provided through Swagger. Simplified integration code and automatic test scripting give high-quality assurance long term over the REST API. Performance and penetration testing of REST API guarantees security and availability of live services.

Application supports API integration, and can be customised to expose further functionality. All open standards for integration are supported. Basic functionality requires security credentials to be set up. Existing API plugins are available for a range of higher education systems including all the key vendors from Finance/HR (Advanced - E5, Unit4, SAP, Oracle, SAGE etc.), VLE (Blackboard and Moodle etc), and SIMS (Banner SRS, Tribal SITS etc) and loggin systems from EZProxy, Eduroam, web servers, logstash etc.

Please contact vendor to discuss your API requirements.
PROVIDER: **TRIBAL EDUCATION LTD**

**Product(s)**

Student Intelligence  
Student Insight

**Provider contact**

bid.notifications@tribalgroup.com

**Product Descriptions**

**Student Intelligence**

Education institutions often find themselves data rich but insight poor. Although huge quantities of data about their student’s background, achievement, progression and engagement is available, the insights it provides are not always presented to staff or students in an accessible or intelligent way. Students cannot track their attendance, behaviour and assessment outcomes against institution’s expectations, so they can improve their motivation or focus. Staff are unable to easily see when a student might be falling behind or in need of support.

Student Intelligence enables students to take control of their own learning. It helps student to self-reflect and make informed choices about what is needed to maximise their success. Students (and lecturers) have access to six charts;

1. Their assessment results position compared with current students in their cohort  
2. The outcomes for previous students with similar assessment results  
3. Their VLE activity compared with current students in their cohort  
4. The outcomes for previous students with similar VLE activity  
5. Their attendance profile position compared with current students in their cohort  
6. The outcomes for previous students with similar attendance profiles

It enables staff to see the engagement levels of students, their current achievement and how active they are on institution systems. They can quickly identify students who might be falling behind or in need of support. Staff can see patterns, compare individuals to peers and identify issues, all of which improve the student experience and helps students to complete their course.
Staff can see the same charts as students for students and modules that they are responsible for. In addition, they will also have access to the following charts:

1. Assessment result distribution for current student cohort compared to historic cohorts
2. VLE activity for current student cohort compared to historic cohorts
3. Attendance for current student cohort compared to historic cohorts

The overwhelming impact of seeing attendance, behaviour and assessment feedback compared to their peers can be very motivational for students. Students expect institutions to make use of the data they have and help them stay motivated and engaged.

**Student Insight**

Identifying students who are at risk of dropping out, or who are not making the academic progress they are capable of, is often challenging and based on a limited set of indicators, such as academic results. Student Insight uses rich data sets and advanced learning analytics to help education providers to predict student performance and identify students at risk of dropping out or failing, so effective interventions can be made at an early stage.

Student interactions with education services, such as the library and virtual learning environments leave a digital footprint which can be used to assess how engaged the student is with their academic studies, to predict the likelihood that a student is going to be academically successful and generate warnings for students who appear to be off track. Together with demographic data, assessment results and other information, this data is presented as simple, easy-to interpret visualisations that let staff know when it’s time to intervene.

Staff can quickly identify students that are at risk of not completing their course. With access to information about all levels of student engagement, staff can see patterns, compare individuals to peers and identify issues. This presents opportunities for groups of students to experience specially targeted interventions with services tailored to their uses and preferences which improve the student experience and help them to complete their course.
Notable Features

**Student Intelligence**

Student Intelligence helps you to:

- Give students autonomy — let students take control of their own learning, giving them a better idea of their current performance in real-time and what behaviour is important to reach their goal.
- Focus support — access real-time data on how a student is behaving compared to expectations and quickly identify students who might be falling behind or in need of support.
- Intervene earlier — identify issues earlier by proactively monitoring student progress and seeing students who are at risk of low performance, so you can execute successful intervention strategies that get students back on track.
- Understand student needs — identify students who are at risk of not completing their course successfully and understand what steps need to be taken for successful progression.

The overwhelming impact of seeing attendance, behaviour and assessment feedback compared to their peers can be very motivational for students. Students expect institutions to make use of the data they have and help them stay motivated and engaged.

**Student Insight**

- **Increased retention** — Student Insight allows staff to identify students who are at risk of dropping out and see which cohorts of students or courses have a greater retention risk. This will allow you to proactively carry out retention management and, ultimately increase retention across the institution and for courses for which there are historic retention issues.
- **Greater and more meaningful engagement** — Student Insight drives opportunities for engagement of staff with students by allowing staff to proactively monitor student progress and likely outcomes. It facilitates meaningful discussions with students because staff can identify issues earlier, understand where issues have been observed and have more opportunity to discuss potential problems with the student.
- **Improved grade scores** — Student Insight allows staff to identify students for whom there is a risk of failure, again providing an opportunity to discuss with the student what their issues may be and find out whether they are struggling. This can help to improve average grade scores and outcomes for each individual student.
- **Greater understanding of student needs** — By enabling staff to become more proactive in their use of data, Student Insight facilitates greater opportunities for contact with the student and consequently helps staff to develop good student-staff relationships. In this way, students are more likely to be open about their issues and needs, giving staff better understanding of their problems.
- **End-to-end Student Journey engagement** — Student Insight uses predictive analytics to help understand students and where they may end up. As a result, it can underpin student support processes across all stages of the Student Journey.
• **Fully integrated** — Student Insight fully integrates with your student information systems which your staff and students use, so you can benefit from rapid deployment and adoption. It also easily integrates with many other systems such as VLEs, libraries / repositories, timetabling solutions, attendance systems, access systems, CRMs, Microsoft 365 or any system that contains student or university data.

Overall, Student Insight allows you to identify and understand potential issues earlier and set up meetings with students to help them, before it’s too late. These targeted intervention strategies will help to improve student outcomes.

Underlying infrastructure required to support the product

Both Student Intelligence and Student Insight are Software as Service solutions, delivered via the cloud, so no underlying infrastructure is required to use the systems.

However, as data will be extracted from your in-house systems to the data warehouse you will need access to an Extract, Transform and Load (ETL) tool. This can be provided by Tribal or can be a 3rd party system and can be either hosted on-premise or in the cloud.
The product(s) can include data from the following systems

**Student Intelligence**

<table>
<thead>
<tr>
<th>Student Management Systems</th>
<th>VLEs</th>
<th>Library &amp; Repositories</th>
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<tbody>
<tr>
<td>Banner</td>
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**Student Insight**

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Key features of the product’s service level agreement

Tribal provides a 24 x 7 x 365 service with minimum 99.97% infrastructure availability.

This is achieved by building resilience into every critical component, including: multiple firewalls, load balancers, Internet feeds, SAN Controllers, hypervisors, VMs and database servers. These are all serviced from a three-tier data centre with dedicated layer two and three links to a disaster recovery site.

Application support is provided by an ITIL aligned support provision. Support hours are Monday to Friday between 09:00 and 17:00 hours (excluding public holidays).

To support our solutions Tribal employs over 70 support professionals worldwide who are structured into the following three Levels:

• Level 1 provides call triage and case tracking services to effectively answer low complexity or non-technical queries and escalate accordingly.
• Level 2 provides both technical and / or application level support that can involve complex queries or technical analysis.
• Level 3 provides maintenance engineering skills for problem resolution. Level 3 may provide Code Modifications or Maintenance Releases as part of the resolution plan.

Our Customer Portal provides 24 x 7 online access to incident logging, monitoring and progress. On logging a support call the originator is automatically sent an email notification of the incident number and confirmation of the call details. The features available via the portal include:

• Ability to create new and track existing incidents
• Ability to add or view action notes associated with an incident
• Ability to download to excel an extract of open & closed incidents
• Ability to access knowledge base articles

Support Services - Response and Resolution Commitment

Tribal will prioritise all support requests based on its reasonable assessment of the Priority Level of the problem reported and respond to faults to achieve the stated Service Levels in respect of responses and resolutions. For clarity, the Service Level Targets only apply within the Support Hours.
The following table details Tribal’s Service Level Targets (SLT) for Application support:

<table>
<thead>
<tr>
<th>Fault Type</th>
<th>Definition</th>
<th>Response SLT</th>
<th>Resolution SLT</th>
<th>Typical Resolution Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Application Fault (Priority 1)</td>
<td>High business impact and high urgency no existing Work Around available</td>
<td>1 Working Hour</td>
<td>8 Working Hours</td>
<td>To provide a Customer acceptable Work Around or Fault correction. Corrective Resolution may involve a restarting of the service, or a restore from a previous version, or the application of a fix to a previously reported issue. A new product defect at this Priority level is typically delivered as a Patch.</td>
</tr>
<tr>
<td>Major Application Fault (Priority 2)</td>
<td>Medium business impact and high urgency no existing Work Around available</td>
<td>2 Working Hours</td>
<td>5 Working Days</td>
<td>To provide a Customer acceptable Work Around or Fault correction. Corrective Resolution may involve a restarting of the service, or a restore from a previous version, or the application of a fix to a previously reported issue. A new product defect at this Priority level is typically delivered as a Patch.</td>
</tr>
<tr>
<td>Important Application Fault (Priority 3)</td>
<td>Medium business impact and medium urgency existing Work Around available</td>
<td>4 Working Hours</td>
<td>20 Working Days</td>
<td>This Priority level has a Work Around available. A new product defect at this Priority level is typically delivered as a Minor Release of the software and scheduled for deployment into a Customer Non-Production Environment.</td>
</tr>
<tr>
<td>Minor Application Fault (Priority 4)</td>
<td>Low business impact and low urgency or no business impact and low urgency Existing Work Around available or unnecessary</td>
<td>8 Working Hours</td>
<td>No SLT commitment</td>
<td>This Priority level has a Work Around available. A new product defect at this Priority level is typically corrected in a future Major Release of the software. Provision of a correction to Priority 4 Faults is at Tribal’s sole discretion for corrective activity.</td>
</tr>
</tbody>
</table>
The following table details Tribal’s Cloud Service Level Target (CSLT):

<table>
<thead>
<tr>
<th>Cloud Fault Type</th>
<th>Response CSLT</th>
<th>Resolution CSLT</th>
<th>Typical Resolution Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restoration Request</td>
<td>1 Working Hour</td>
<td>1 Working Day</td>
<td>Restoration Request</td>
</tr>
<tr>
<td>Critical Cloud Fault and Critical Alerts (Priority 1)</td>
<td>1 Working Hour</td>
<td>5 Working Days</td>
<td>To provide a Customer acceptable Work Around or Cloud Fault correction. Corrective Resolution may involve a restarting of the service, alternations to the configuration of the Cloud Environment, or application of Managed Platform features (reset database optimisations etc.) a restore from a previous version, or the application of a fix to a previously reported issue.</td>
</tr>
<tr>
<td>Major Cloud Fault and Major Alerts (Priority 2)</td>
<td>2 Working Hours</td>
<td>5 Working Days</td>
<td>To provide a Customer acceptable Work Around or Cloud Fault correction. Corrective Resolution may involve a restarting of the service, or a restore from a previous version, or the application of a fix to a previously reported issue.</td>
</tr>
<tr>
<td>Important Cloud Fault and Important Alerts (Priority 3)</td>
<td>4 Working Hours</td>
<td>20 Working Days</td>
<td>This Priority level has a Work Around available.</td>
</tr>
<tr>
<td>Minor Cloud Fault and Minor Alert (Priority 4)</td>
<td>8 Working Hours</td>
<td>No CSLT Commitment</td>
<td>This Priority level has a Work Around available.</td>
</tr>
</tbody>
</table>
Implementation process, duration and institutional resources

Student Intelligence
Data is collected from your Student Records System, Attendance Monitoring System and VLE using an Extract, Transform, Load (ETL) tool in the Unified Data Definitions (https://github.com/jiscdev/analytics-udd) and Activity XAPI formats (https://github.com/jiscdev/xapi) and put into Tribal’s cloud hosted data warehouse.

During this period, it is useful to have communication access to staff who understand the data at your institution so that any queries about data structures or coding can be resolved quickly. At the same time, we activate the federated authentication for the front-end analytics tool. With access to the appropriate technical resources, this process can be completed in two weeks.

Student Insight

Approach
To implement Student Insight, we follow the Cross Industry Standard Process for Data Mining (CRISP-DM). It is a process model which embraces an incremental and feedback-driven data science. The following outlines how we would approach a standard implementation with CRISP-DM.

CRISP-DM is an iterative process designed to focus on aligning the data mining process to the needs and values of your business.

Business Understanding

Business objectives
Business objectives will state what your goals for implementing learning analytics are from an institutional perspective. They may relate directly to established institutional-level goals or aspirations that you already have in place, and with which a learning analytics initiative is being aligned. Or they may be entirely new strategies which are being developed from the outset with a vision for more data-enabled processes. They will identify the key improvement areas you have as an institution for which you envisage a role for learning analytics.

Success criteria
We must define criteria for assessing whether the application of Learning Analytics has been successful or not. In practice, these are likely to be qualitative descriptions of what "success" looks like along-side quantitative objectives for what you anticipate Student Insight will allow you to do in your student support processes.

Data Mining Objectives
Having a clear frame of reference defined by your institutional level objectives allows us to state the goals for learning analytics in ways which relate directly to the data. There may be multiple data mining objectives aligned to business objectives.
Data Understanding

We review the quality of the data and our understanding of how it reflects the student experience, in relation to its intended use, and the conclusions of the Business Understanding stage. We use Descriptive Statistics to begin to understand the patterns in the data and to highlight where these may differ from our expectations.

This stage is very important to establish what is, or is not, realistically achievable with the data, and for us to be clear what the data means. To be successful in this we engage closely with institutional staff who have a deep understanding of their data and its relationship to business and administrative process.

Although not formally an aspect of data understanding, in practice this stage will involve mapping from your student records data to the standard form used by Student Insight. Further data quality assessment is undertaken on the post-mapped data. The proposed format for the data to be delivered to Student Insight is one that we have been using extensively in the UK, based on the emerging Jisc Universal Data Definitions (UDD) (https://github.com/jiscdev/analytics-udd/tree/v1.4.0), to which Tribal has actively contributed.

An initial assessment of data sources is normally undertaken, including:
1. Technical access
2. Relevance
3. Volume and history
4. Quality and timeliness
5. Integration issues
6. Complexity
7. Map-able to a standard form?

Data Preparation

Once we have the extracted data, we will apply some basic pre-processing transformations and begin work on extracting meaningful statistics to use in the models generated. We have a series of modules for the creation of derived statistics from student activity data, forming the building blocks of a data pipeline. The data pipeline is built to allow us to extend these modules or to add new ones within the scope of the project.

Modelling

Model-building encompasses both data science perspectives and the framing of the Business Understanding stage. In model building, we are concerned primarily with feature selection and model complexity to choose the best approach according to historical data. In data science, we are concerned with tuning precision and recall and with the selection of the decision boundaries used to flag-up students as being particularly at-risk, marginally at-risk, or likely to be low risk.

The modelling stage involves repeated iteration over the technical component of evaluation.
**Evaluation**

Evaluation has both a technical and a project component. The technical component is concerned with predictive model performance, and project evaluation is important so that we can better support further work.

We estimate the performance of models by computing key performance metrics from historical data:
- Precision
- Recall
- Receiver Operating Characteristics (ROC)
- Area Under Curve (AUC)

The historical data is randomly partitioned and typically 2/3 of the data is used to prepare the predictive model and the remaining 1/3 is used to test the model. The 1/3 fraction has known outcomes which are compared against the predictions. This gives us a prospective assessment of how well we expect the model to perform; we use these metrics to "tune" the predictive models before deploying them.

Having tuned the predictive models using knowledge of your business objectives and success criteria to get the appropriate balance between precision and recall, it is straight-forward to provide a quantitative estimate of the finalised model performance. We will produce meaningful information which allows stakeholders to realistically assess the extent to which using Student Insight would make student support more effective and efficient.

**Deployment**

Once Tribal has the data in place via the UDD mentioned above, we will use this to model the hierarchical structure of your institution so that navigation is logical and authorisation to view data on groups of students can be sensibly controlled. Tribal will also set the model thresholds based around the evaluation criteria. Tribal will then deploy the solution to the cloud hosted environment and give access to appropriate individuals in your institution.

**Timescales**

The first technical milestone after project initiation is for student records historic data to be captured. We prefer at least as many years of historic data as the duration of a typical course to allow confidence in our predictions. Initial work on data mapping and quality assessment can be undertaken in advance of the Business Understanding stage but reaching the technical milestone is contingent on having provisional outcomes from the Business Understanding stage.

Once the data has been captured, Tribal will begin the Data Understanding stage. During this period, it is important for you to make a suitably knowledgeable person available to Tribal consultants to answer technical questions about the meaning of data or to resolve any problems or inconsistencies. We would expect this work to require 3-4 weeks of elapsed time.

At the end of this period, Tribal will deliver an initial implementation that shows the historically influential features pertaining to a single objective such as course withdrawal, and a prototype
predictive model using a subset of the data attributes available. Nominated staff will receive access to this site and a presentation on the findings and the methods used to reach the conclusions. This is essentially test deployment, which will be used to revisit and clarify the outcomes from Business Understanding.

Following clarification of the Business Understanding, Tribal will begin working on the deployable predictive models to cover all the data mining objectives and exploiting a wider range of the available data attributes. This is expected to take a further period of 3-4 weeks, at the end of which the dashboards will be updated to show the predictive models for all students involved in the implementation.

Overall, the estimated implementation timescales will be from two to five months, depending upon university resources.

**Support Resources**
During the Data Understanding and Data Preparation phases we communicate with institutional staff who understand the data and configuration of the systems being used so that we can answer any questions about the meaning of the data or any coding issues. Additionally, support from a project sponsor or project board to support the Business Understanding and Evaluation phases will help drive a successful project.

**Pricing Structure**

*Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie*

**Reporting Features for Lecturers**

**Student Intelligence**
For each student there are 6 charts available based on their engagement and achievement data.

1. Their assessment results seen as a position in the distribution of their current cohort
2. The outcome distribution of historic students with similar assessment results
3. Their VLE activity seen as a position in the distribution of their current cohort
4. The outcome distribution of historic students with similar VLE activity
5. Their attendance profile seen as a position in the distribution of their current cohort
6. The outcome distribution of historic students with similar attendance profiles

In addition, they will also have access to:

1. Assessment result distribution of current cohort compared to historic cohorts
2. VLE activity compared to historic cohorts
3. Attendance compared to historic cohorts
Student Insight

Understanding likely student outcomes
Student Insight uses data in the student information system and combines it with external data held in learning systems such as the VLE and Library. The system processes the source data to generate a set of statistics, from which the key features are selected to train a “machine learning” model which captures the complex way in which these features are correlated with a chosen student outcome. It goes further by fitting a model to the underlying patterns in the data which are associated with each student outcome. For example: students may have patterns of activity with learning content on the VLE for a module which tend to be associated with passing that module. Starting with extracting features that summarise each student’s VLE activity, the model that Student Insight builds will identify which combination of features and specific engagement patterns are, on average, associated with good student outcomes.

Once the model has been trained from historic data for which student outcomes are already known, they can be applied to a current cohort of students to predict their most likely outcome from what we already know about them. Student Insight uses this to generate a score for each student which, for example, relates to the risk that the student will not achieve a good grade for a module. The higher the risk score, the greater the risk that the student may complete a unit of study with poor outcomes and may benefit from additional support to help them stay on track.

The course withdrawal risk score indicates how at risk the student is from withdrawing from the programme that they are enrolled on. This can be used directly by academic or student support staff to understand which individual students are at risk of not continuing their course, based on their engagement and other student factors. It allows the institution to manage student retention more effectively, intervening where they identify individual and groups of students who are at higher risk of dropping out.

The academic performance risk score is generated for each module that a student is taking. It indicates the risk that the student will fail a module, based on their engagement and other student factors. This can be used by academic staff to identify individual students whose activity suggests that they are not on track to complete the module successfully and they are at risk of failing. Staff may then decide that action needs to be taken with the individual to help reduce this risk.

Understanding influences on student outcomes
Some analytics solutions generate a single overall prediction of the student’s outcome, but do not allow the user to understand how the prediction was calculated. In contrast, Student Insight allows the user to see what factors have led to an increased risk for the student. Users can view this information on the Influence Chart.
The Influence Chart allows staff to assess which factors have the most influence on the student’s predicted outcome. This can be useful information to help the staff understand the issues the student is facing, and to guide discussion with students about an appropriate course of action to take.

This technology also allows us to deal with the fact that the available data is often fragmented. For example, while some information is known on the first day of a course, such as facts about the student’s background and the course, VLE activity, assessment outcomes, and module results all arise at different times. It may be that some data sources are not available for all courses, for example attendance monitoring may be implemented only for some academic departments. Student Insight will utilise those sources that are available. This is also useful in enabling us to work with clients to broaden the range of data sources after an initial implementation while leaving prior data and predictive models unaffected.

**Proactively manage student progress and performance**

Where Student Insight makes a real difference is that it brings together historic data about student performance and predicts what might happen to the student based on what we know about them as a student, what we can observe regarding their interactions with teaching and learning resources such as the VLE or Library, and what happened in the past.

Student Insight uses these observations and identifies where the student is statistically most likely to end up, based on what we have seen about similar students on the same courses in previous academic years. This is driven by the underlying predictive model, which makes a correlation between student and activity-based features and the student outcome, such as withdrawal.

This enables staff to become more proactive in managing student progress and performance, since they are given information ahead of time, rather than reacting based on information that is collected downstream of issues occurring. They can use the risk score to judge whether some action might be necessary.
Where staff are concerned about the progress an individual student is making, they can access the student’s profile directly from the list of students. For example, a personal tutor who is reviewing the performance of the students they are responsible for, can drill into a student record.

Proactively manage student progress and performance

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Managing student interventions with Student Support

In addition to the option of using the light-weight intervention tracking support outlined above, Student Insight may be integrated with a Case Management Tool. An API is used for this integration. The following outlines how this works in the context of the Tribal case management tool, Student Support.

Through integration with Tribal Student Support, when an intervention is created in Student Insight, it may also be created as an Enquiry. The Student Support module provides the capability for students and staff acting on their behalf to log issues. Issues get allocated to enquiry queues that may be monitored by student support teams on can then take appropriate action. Student Support allows staff to keep a chronological log of the actions that take place in response to a student enquiry and automatically emails the student, support staff and other parties involved in resolving the issue of any updates. These capabilities allow support staff to proactively deal with student issues and keep a running record of the decisions which have been made and any actions agreed with the student. Tribal Student Support is not including in the price for Student Insight.
Notifications
Automated notifications delivered through email will inform staff of students and groups that they have responsibility for that they may need to investigate further. The system will use individual student risk scores to flag to staff students whose trajectory indicates that there is a high risk of poor academic outcomes or, at worse, of withdrawing from their course. In addition, the system will support notifications based on non-predictive data, such as identifying individuals and groups showing poor engagement patterns.

Reporting Features/Apps for Students

Student Intelligence

For students there are 6 charts available based on their engagement and achievement data*.
1. Their assessment results seen as a position in the distribution of their current cohort
2. The outcome distribution of historic students with similar assessment results
3. Their VLE activity seen as a position in the distribution of their current cohort
4. The outcome distribution of historic students with similar VLE activity
5. Their attendance profile seen as a position in the distribution of their current cohort
6. The outcome distribution of historic students with similar attendance profiles

*Students will only have access to their positions relative to current cohorts if cohorts are large enough to anonymise other students, students in small cohorts may be combined with other cohorts in similar academic positions to create a set large enough for anonymity
Student Insight

Access to Student Insight is provided using APIs. These APIs allow the students to access their position within their cohort (at enough scale for anonymity) for attendance, VLE usage and assessment performance as well as how students who behaved similarly to them in the past went on to achieve historically.

Enterprise Reporting Features

Monitor student cohorts

Student Insight uses information about the organisational and academic structure of your institution to allow you to monitor student risk and outcomes for different groups and cohorts of students. This provides staff with an accessible and simple way to identify groups of students who may be at higher risk of poor outcomes. For example, heads of faculty may monitor student outcomes for those courses offered by their department.

Student Insight allows staff to view student risk predictions alongside what has happened in the past and the current position. This allows a better assessment of how predicted outcomes compare to the picture of what happened in the past. By bringing together historic, current and predicted data, we make it easier for staff to decide when it may be appropriate to take a course of action, and what that course of action should be.
Understand factors associated with risk

For a given outcome, for example Student Withdrawal and an organisational unit which could be from the entire institution down to a specific module, you can view what factors were most correlated with that outcome and how influential they were upon that outcome. This allows you to see what characteristics are influential in different modules or subject areas and enables course designers to create the appropriate environment for success depending on the needs of the students.
How many HEIs are currently using the product?
How many of these are in Ireland/the UK?

Since 2015 Tribal has been working with Jisc on the Effective Learning Analytics (https://www.jisc.ac.uk/rd/projects/effective-learning-analytics) Programme, during this period we worked with 9 institutions to design, develop and deliver pilot implementations of a Student Analytics solution.

These included Exeter, University of Suffolk, Edgehill, University of South Wales, Aston University, University of Brighton, Regent’s University London, Abertay University and City University, London.

This involved being a key part in the design of the Unified Data Definitions (https://github.com/jiscdev/analytics-udd) a standard set of intrinsic data about students and their relationship with the institution and the XAPI activity statements (https://github.com/jiscdev/xapi). The pilot implementations typically but not exclusively delivered predictive analytical models around retention, progression and achievement to staff in academic and support roles. The Effective Learning Analytics Programme is now complete and Tribal is offering Student Intelligence as a descriptive analytics tool using the defined data structures developed from this pilot.

Examples of current users

Please contact vendor for further information

Data infrastructure

These products are delivered via the cloud and we are proud to partner with Microsoft to offer proven, secure and robust delivery via Azure. The service takes advantage of the Azure public cloud which offers a cost-effective solution that is both market leading and highly secure.

Azure data centres are ISO 27001 certified. Through years of experience Microsoft has developed data centres with military grade perimeter controls and boundary protection. Tribal blends Microsoft’s physical prowess with a blend of technology and automation plus human expertise to deliver services, architecture, security and 24 x 7 x 365 operations backed by Azure certified engineers and architects.

Azure have many regions within the European Economic Area (EEA), we are proposing that the data centres for this solution would be held in the North Europe Region (Ireland). No data will be replicated to an area outside of the EEA.

Our chosen Cloud Infrastructure Managed Service partner is Rackspace, which is the largest hosting provider in the world. Our partnership with Rackspace allows us to deliver best of breed Cloud provision to meet the specific needs of our customers.
GDPR & Security

As a leading provider of services and technology to the education sector, personal data is at the heart of what we do. Our customers rely on us to manage and process sensitive information relating to their students and staff. Tribal has carried a full global review of our policies, procedures and business processes; business systems; and supplier relationships with regards to GDPR to ensure our systems, services and staff fully comply with the GDPR. We are following the guidelines issued by the Information Controller’s Office.

As thought leaders in our field, we have not only improved our own processes, systems and services, where necessary, to comply with the regulation, but also support our customers and 3rd party service providers in understanding their own obligations in this matter, including:

- Keep abreast of current & evolving guidance
- Refresh training on data protection and information security
- Ensure change management programme overseen by a Senior Information Risk Owner (SIRO)
- Identify policies and guidance for updating to include new rights
- Identify privacy notices for review / gaps to update and include new information requirements, using plain and concise language
- Identify key projects involving ‘high risk’ to privacy rights
- Develop and integrate Data Privacy Impact Assessments (DPIAs) into business processes and project and risk management procedures
- Shorten time lines and review breach reporting and notification procedures

The data will be housed geographically in the Azure North Europe region (Ireland), in servers in data centres which are part of the Microsoft Azure cloud computing service. The database service, MongoDB, is configured as a multi-node replica set for guaranteed availability and replication of data. The data is stored on encrypted disks, for added physical security and the database backups are stored on encrypted disks. All communications between the database nodes are securely encrypted and all communications between the application and the database are securely encrypted. The application runs as a secure web service; all communications between the application and the user are securely encrypted.

Account management structure

A dedicated Account Manager will be assigned to you once the implementation is complete and the service is fully operating in the live environment. The Account Manager will be the key contact for you and will own the strategic relationship and ensure the deployment of company-wide resources where necessary to provide comprehensive service and support to your organisation.

The overall objective is to develop a long-term relationship where Tribal’s solution continues to meet your business needs both now, and in the future and where our organisations can work together to drive further development of the solution and the benefits it provides.
Many factors will work together to support an effective relationship, including:
- User Groups — to encourage feedback and share experiences and ideas for improvement
- Senior management involvement — to increase visibility of business needs and drivers for change
- Harnessing technology — to maximise development and use of the system
- Identifying key issues for the future — as a driver for continuous improvement.
- Maintaining regular dialogue, including both formal and informal meetings and service reviews
- Developing a project plan, ensuring that information is effectively disseminated to members of the teams across both organisations
- Commitment to improvements that support quality in terms of product development and service delivery

Currently supported federated access technologies

OAuth, SAML and OpenID Connect are supported. Authentication is designed to be modular and extensible so if there are other standard authentication technologies required these could be simply integrated.

API support

Student Intelligence
None

Student Insight
Student Insight can support any APIs; it is an API first system. Every action or interaction with Student Insight is called by an API so any extensions required, or even complete replacement of the UI are possible by the system owner.

Student Insight is interoperable with all the education and research applications mentioned in this RFI. Student Insight is designed to be modular and extensible so if there are other APIs required these could be simply integrated.
PROVIDER: VERTICE INTEGRATION SERVICE LIMITED (VERTICE)

Product(s)

Oracle Analytics Cloud

Provider contact

alistair.mcdonald@verticecloud.com

Product Descriptions

Oracle Analytics Cloud, with autonomous functionality, is a scalable and secure public cloud service that provides a full set of capabilities to explore and perform collaborative analytics for you, your workgroup, and your enterprise.

More detail can be found here: https://docs.oracle.com/en/cloud/paas/analytics-cloud/acsgs/what-is-oracle-analytics-cloud.html#GUID-E68C8A55-1342-43BB-93BC-CA24E353D873

With Oracle Analytics Cloud, you also get flexible service management capabilities, including fast setup, easy scaling and patching, and automated lifecycle management.

Built on a high-performance platform with flexible data storage, Oracle Analytics Cloud provides a complete set of tools for deriving and sharing data insights.

- Data preparation: Analysts can ingest, profile, and cleanse data using a variety of algorithms.
- Data flow: Analysts can prepare, transform and aggregate data, and then run machine-learning models at scale.
- Data discovery: Subject matter experts can easily collaborate with other business users, blending intelligent analysis at scale, machine learning, and statistical modeling.
- Data visualization: Analysts can visualize any data, on any device, on premises and in the cloud.
- Data collaboration: Large organizations and small teams can share data more simply, as you don’t need to manage or consolidate multiple versions of spreadsheets.
- Data-driven: Application developers can utilize interfaces that enable them to extend, customize, and embed rich analytic experiences in the application flow.

With Oracle Analytics Cloud, you can take data from any source, and explore and collaborate with real-time data.
You can interact with your personal data, ingest and harmonize data sources, collate and manage disparate inputs, and handle data with coherence and consistency during organizational sharing.

As you visually research and discover, you can review and visualize both personal and corporate data, and gain insights at key stages of the iterative information cycle.

You can also perform role-based visualization, for example, as a Sales VP, Sales Manager, Marketing Analyst, or Services Manager. You can initiate data collaboration based on any data, and access real-time data with a variety of interface options. You can display data in a choice of Oracle reports and dashboards.

**Notable Features**

**Autonomous Features:**
- Automated insights, visualization and narration
- Automated data discovery and data preparation
- Proactive and personalised insights
- Automated patching
- Automated backups

**Other Enterprise Features:**
- Personalized search and visualization that provides responses customized to the user
- Drag-and-drop blending between self-service data and enterprise data
- Proactive, self-learning insights via Day by Day, a native mobile app integrated with Oracle Business Intelligence Cloud
- Optimized connectivity to on-premises data warehouses using Remote Data Connector
- Self-service visualization on OBI data models through lift and shift of OBI data models, reports, and dashboards to the cloud
- Data transformation at scale leveraging Apache Spark
- Easy definition of data ingestion, preparation, transformation, and persistence using Oracle Analytics Cloud data flows
- Sandboxing and partitions to external sources for Oracle Essbase
- Unified catalogue and search across all data
- 40+ data sources, including direct connectivity to SaaS, databases, big data and NoSQL, and generic ODBC/JDBC
- Easy self-service data preparation and blending
- Fast, fluid self-service data discovery, visualization, and storyboarding
- Automatic visualization of insights and one-click advanced analytics
- Visualization via Oracle Synopsis mobile app and on the desktop (for 50 users per OCPU)
- Easy what-if scenario modelling with data visualization and Microsoft Excel-based consumption
Underlying infrastructure required to support the product

No underlying infrastructure is required to support the product. Oracle Analytics Cloud is a Cloud based Platform as a Service offering provided and hosted by Oracle. The customer chooses from a list of data centres where they wish to configure and host their Platform and related data. This includes data centres in Europe, US and the UK. This choice is made upon provisioning the Analytics Instance(s).

The product(s) can include data from the following systems

<table>
<thead>
<tr>
<th>Student Management Systems</th>
<th>VLEs</th>
<th>Library &amp; Repositories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banner</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Agresso</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>U4SM</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Quercus</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th>VLEs</th>
<th>Access Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS Dynamics</td>
<td>x</td>
<td>Sentry</td>
</tr>
<tr>
<td>Module Manager</td>
<td>x</td>
<td>2CQR</td>
</tr>
<tr>
<td>CORAL Supplier Mgt.</td>
<td>x</td>
<td>Salto Systems</td>
</tr>
<tr>
<td>MS Office365</td>
<td>x</td>
<td>C-Cure</td>
</tr>
<tr>
<td>MS Active Directory</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Drupal</td>
<td>x</td>
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</tr>
</tbody>
</table>

Oracle products can leverage all the above systems/libraries/VLEs. How this is achieved will depend on the data structures available and how you may wish that data to be consumed.

For example, an Oracle ETL tool would be used to extract from some systems directly and load to a target that would be hosted in the Oracle cloud. Oracle Data Integration Platform Cloud (DIPC) is an ELT cloud Platform as a Service offering from Oracle that would be used in this case. If direct access to the systems/libraries is not supported via DIPC, Vertice have various other methods of extracting data from such systems. If the systems can export to a shared folder such as an SFTP share, DIPC can be used to extract from this shared location. Flat file exports from any of the above can also be taken and loaded to the Cloud database and used for analysis in OAC.
Key features of the product’s service level agreement

Oracle works to meet the Target Service Uptime of 99.95% for Oracle Analytics Cloud. Customer facing SLA document can be provided upon request.

Implementation process, duration and institutional resources

Vertice offer several Fixed Scope Offerings (FSO) for Oracle Analytics Cloud. A Fixed Scope Offering (FSO) is a professional service offering for the implementation and support of Oracle Analytics Cloud (OAC). These Offerings come in Silver, Gold, Platinum and Platinum Plus packages. By mapping to your requirements, we can rapidly define the duration and cost of service for Vertice to deliver to your business needs. The durations of implementation are as follows:

- Silver = 14 weeks
- Gold = 20 Weeks
- Platinum = 26 Weeks
- Platinum Plus = 32+ Weeks

The difference between each package other than the duration includes the number of data sources that we will extract from, the number of data models which we will build for analysis, the number of environments that will be provisioned, the number of KPIs we will create, the duration of post implementation support, the frequency of data loads etc.

The FSOs can be shared upon request for more detail and a better understanding of what is offered.

Pricing Structure

Please note pricing depends entirely on the features of any requirement, numbers of users, types of users, amount of data, what data is being consumed etc. When working our costs, customers can also estimate the number of working days in a week and the number of working hours in a day.

Pricing are monthly amounts and are based on selected Cloud Services, configurations and dependent services. Pay as you go is billed on actual usage, prepayment is not required. Monthly flex is a fixed commitment, has a minimum monthly charge, and requires a minimum 1 year agreement - additional discounts may be applied based on commitment amount and term.

The cost of Enterprise Analytics is currently:

PAYG €5.2513 per hour or Monthly Flex €3.5009 per hour
For the purposes of this document examples of pricing can also be found here:

Further information on pricing is available on request from lee.ofarrell@teachingandlearning.ie

**Reporting Features/Apps for Students**

Students can use the self-service analytics aspects of Oracle Analytics Cloud to quickly upload their own flat files and perform analytics and data discovery to uncover patterns and trends.

Students can also leverage the mobile functionality of Oracle Analytics so they can use the tool anywhere on the campus or even at home. This would make projects and group learning much more intuitive and could make the experience more enjoyable for a student meaning they would spend more time at it and enhance their own grades.

**Enterprise Reporting Features**

**Build Enterprise Business Intelligence Reports and Dashboards**
You can build and employ highly-formatted reporting content and comprehensive interactions for analytical dashboards at the enterprise level.

**Publish Pixel-Perfect Reports**
You can design pixel-perfect reports to publish analytical content at the enterprise level.

**Analyse Business Analytics Anywhere**
You can use the Day by Day mobile app. An innovative app that infuses personalized analytics on the go, at the right time, and place. Day by Day learns what users are interested in, when and where they are interested in it and who they collaborate with.

**Self Service Data Analysis**
You can connect to specific data sources, perform data preparation activities, analyse data, discover insights, and tell data stories.
For example, you might create rough models and content, or projects to return to for monitoring and further analysis. Your primary focus here is on data preparation and interactive analytics of information.

**Distribute and Share Analytic Content**
You can collaborate and share content. This can be static content, such as PDFs and images that are shared with passive users, or interactive content shared with other analysts. Interactive content can vary based on the specific business scenario, such as sharing an interactive story, collaborating in the creation of a story or a scenario for analysis, or sharing an application.
Perform Data Collection and Consolidation
You can collect data, adjust the data as necessary, collaborate with other analysts, and submit the results for approval.

Access Data from a Mobile Device
You can access, analyse, and share analytic content from mobile devices.

Build Business Intelligence Data Models
You can create data models at the enterprise level, as a single, consistent source of data.

How many HEIs are currently using the product?
How many of these are in Ireland/the UK?

6 HEIs across Ireland and the UK have purchased Oracle’s Analytics cloud solutions.

Examples of current users
We cannot share any customer contact details at this stage, however, we can arrange references at a later stage in the process if successful.

Data infrastructure
The proposed solution is cloud based.

Oracle provide Infrastructure as a Service with a number of different available options to choose from. There are Bare Metal instances, GPU instances, VM Instances and Operating Systems to choose from.

Vertice will work closely with HeaNet to ensure the correct option is picked to fit the business requirements and needs just like we have done with customers who have had award winning analytics implementations working with Vertice.
GDPR & Security

This depends on the solution that is designed. There are various methods of ensuring data integrity and security. The data would be stored in a database which has its own set of security mechanisms. Then the integration tool has its own security to ensure that data is processed and stored in a secure manner. All of which can be researched at the time a solution is being architected. Vertice always ensure that every solution is secure and is not breaking GDPR regulations.

There are currently 4 data centres to choose from upon provisioning an Oracle Autonomous Analytics Cloud instance. These are:

- Ashburn — US
- Phoenix — US
- Frankfurt — Germany
- London — UK

Oracle will be announcing new data centres shortly following their annual conference called Oracle OpenWorld in San Francisco that takes place in October each year.

Account management structure

With any analytics implementation, Vertice strive to maintain a close relationship with every customer. Vertice CEO — Tony Cassidy, is the Account Manager and is involved from the initial stages of any analytics implementation. Alistair McDonald, Vertice BDM ensures all license aspects of any implementation are correct and reports this to Tony. This means no customer needs to interact with Oracle directly as Vertice will do so. The Delivery team, led by Vertice CTO — Christine Curley, will then step in to implement the services based on the agreed scope and chosen FSO. Tony is available throughout this implementation if needed. In the rare event escalations need to be made, this can be done via Christine who reports directly into Tony daily.

At the end of an implementation Tony looks to meet with every customer to ensure they are happy with what was implemented, although Christine ensures this throughout the implementation process by taking every business requirement into consideration. Vertice work their Account Team structures to fit into the way of working within the process of our customers.

Currently supported federated access technologies

Oracle Identity Cloud Service (IDCS) provides identity management, single sign-on (SSO), and identity governance for applications on-premise, in the cloud, or for mobile devices. Employees and business partners can access applications at any time, from anywhere, and on any device in a secure manner.
IDCS supports the following access technologies:

**Security Assertion Markup Language (SAML)** supports both authentication and authorization and is an open framework for sharing security information on the internet through XML documents. SAML includes three parts:

- **SAML Assertion**: How you define authentication and authorization information.
- **SAML Protocol**: How you ask (SAML Request) and get (SAML Response) the assertions you need.
- **SAML Bindings and Profiles**: How SAML assertions ride on (Bindings) and in (Profiles) industry-standard transport and messaging frameworks.

The **OAuth 2.0** token service provided by the Oracle Cloud identity infrastructure provides secure access to the Representational State Transfer (REST) endpoints of cloud services by other cloud services and user applications.

OAuth 2.0 provides the following benefits:

- It increases security by eliminating the use of passwords in service-to-service REST interactions.
- It reduces the lifecycle costs by centralizing trust management between clients and servers. OAuth reduces the number of configuration steps to secure service-to-service communication.

Oracle Identity Cloud Service leverages the power of OpenID Connect and OAuth to deliver a highly-scalable, multi-tenant token service for securing programmatic access to custom applications by other custom applications, and for federated SSO and authorization integration with these applications:

- **Use OAuth 2.0** to define authorization in Oracle Identity Cloud Service for your custom applications. OAuth 2.0 has an authorization framework, commonly used for third-party authorization requests with consent. Custom applications can implement both two-legged and three-legged OAuth flows.
- **Use OpenID Connect** to externalize authentication to Oracle Identity Cloud Service for your custom applications. OpenID Connect has an authentication protocol that provides Federated SSO, leveraging the OAuth 2.0 authorization framework as a way to federate identities in the cloud. Custom applications participate in an OpenID Connect flow.
- **Using the OAuth 2.0 and OpenID Connect standards** provides the following benefits:
  - **Federated SSO** between the custom application and Oracle Identity Cloud Service. Resource owners (users accessing the custom application) need a single login to access Oracle Identity Cloud Service plus all applications integrated. Oracle Identity Cloud Service handles the authentication and credentials itself, insulating custom applications. This capability is provided by OpenID Connect with OAuth 2.0.
  - **Authorization** to perform operations on third-party servers with consent. Resource owners can decide at runtime whether the custom applications should have authorization to access data or perform tasks for them. This capability is provided by OAuth 2.0.
API support

Oracle Analytics Cloud supports the REST API

Data Integration Platform Cloud DIPC can integrate and work with various API requests.

The Oracle Identity Cloud Service REST API enables you to securely manage your resources, including identities and configuration data. Support for OpenID Connect enables compliant Apps to integrate with Oracle Identity Cloud Service as an Identity Provider. The OAuth2 service provides an API infrastructure for authorization that supports a range of token grant types that enable you to securely connect clients to services. For more information see: https://docs.oracle.com/en/cloud/paas/identity-cloud/rest-api/index.html

We provide REST APIs that allow you to monitor and manage the Oracle cloud services externally.
OPPORTUNITIES FOR SECTORAL APPROACH

Given the fact that many Irish institutions are in the early stages of exploring the potential for enhancing their analytical capacity, there are a number of decisions that they will have to make about their development of analytics and the underlying IT systems. There is, however, also an opportunity at this point to collaboratively consider, as a sector, the future of learning analytics at a national level.

The first choice institutions need to consider is whether they wish to embark on developing their analytics capabilities independently as an institution or collectively as a sector. Either approach could entail investing in a commercial analytics product or developing a bespoke facility, tailored to institutions’ specific needs and resources.

A wholly independent approach would require each HEI to follow their own course, either through bespoke development or through licensing a commercial product directly from a vendor, such as those listed in this guide. This approach is characterised by institutional autonomy and independence but would almost certainly require a greater commitment of resources, particularly in terms of time, personnel and financial commitment, than adopting a shared approach.

A shared approach, where institutions work together to identify and define the most suitable solution, could take a range of forms. In its most basic form, a collective approach could entail grouping together as a single, larger client, thereby potentially enabling the negotiation of preferential rates with a particular vendor or vendors. At the more collective end of the scale, institutions could opt to take a shared services approach, such as that currently employed with EduCampus and a number of IT systems such as Banner and Koha, which would mean licensing or developing a single system, with responsibility for the operational support of that system resting with a centralised body. In addition to being consistent with the Irish Government’s drive for the use of shared services among public bodies, such an approach would also potentially allow for the sharing of good practice and the benefits of the economies of scale of merging aspects such as support and training. Finally, this approach could allow for the creation of shared datasets that would maximise the insights available to each institution and to the sector as a whole.

The second choice that will drive any approach at either institutional or sectoral level offers the alternatives of licensing an existing, commercial system or developing bespoke software, tailored specifically to the needs and context of the institution or the sector. The latter option may involve either the development of the software in-house by the institution’s IT department or by an external IT provider. It is noteworthy that each of these three approaches (commercial product, in-house development and external development) are already in play in support of student success in a number of Irish HEIs.
Bespoke development gives institutions greater control over the scale, functionality and interface of the software and potentially means a more responsive, agile approach to issue resolution and the system’s evolution. Commercially-available products, however, are likely to prove more cost effective (at least in the short term) and reduce the institution’s vulnerability to a changing environment typified by, for example, infrastructure upgrades or the loss of key staff.

There is currently considerable interest in the potential value of analytics as a tool for supporting student success but, at the time of publication of this report, very few institutions in the Irish sector are committed to one approach or another. This makes both institutional and sectoral conversations about the future of analytics in Irish higher education extremely timely and full of possibilities, particularly given the relatively small size of the Irish HE sector and the willingness of institutions to collaborate. The National Forum plans to facilitate such conversations in the coming year, if they are of interest to the sector.

References
