

# Maintaining Moodle systems at scale

## Recipes for success

Moodle Moot

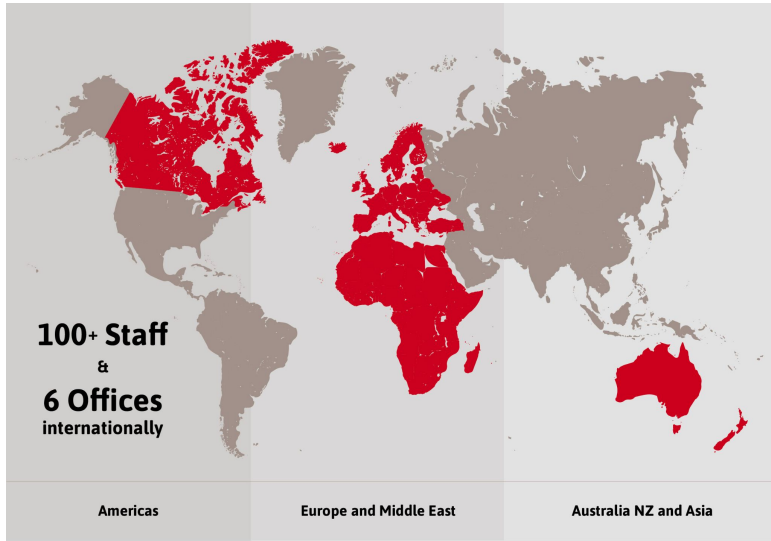
Finland - May 2024

Michiel Dethmers

Information Technology Manager Catalyst IT Europe, EMEA region



# The Catalyst journey to today

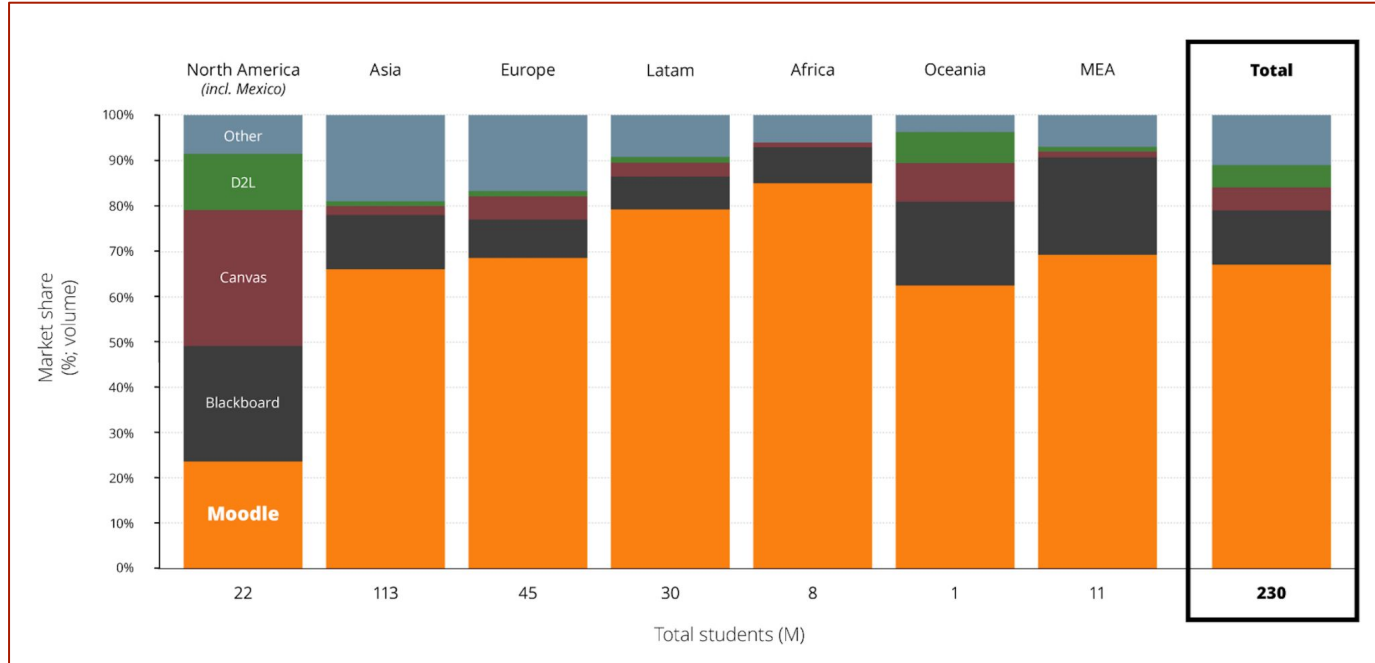


- 25 years in operation - 15 years internationally
- Ireland and Canada investment has supported our global coverage.
- Specialised to the Education sector's requirements



HM Government  
**G-Cloud 13**  
Supplier

# Moodle in the education sector



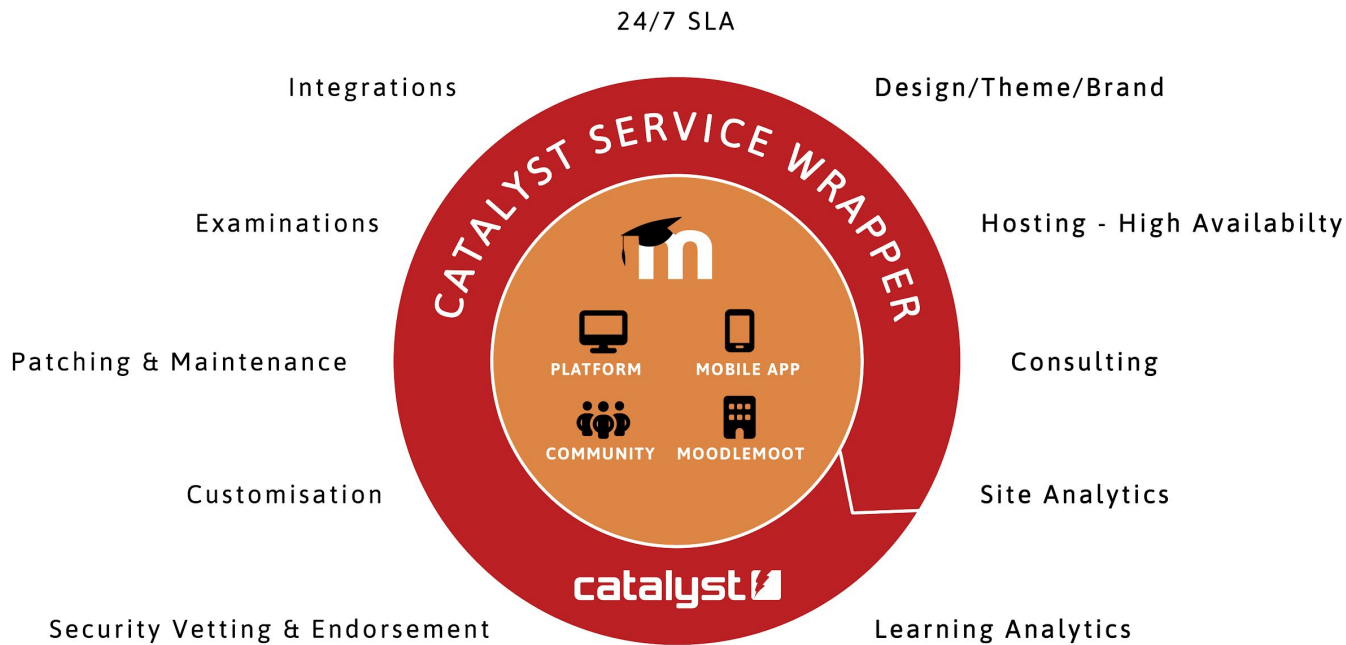
# A selection of our partners



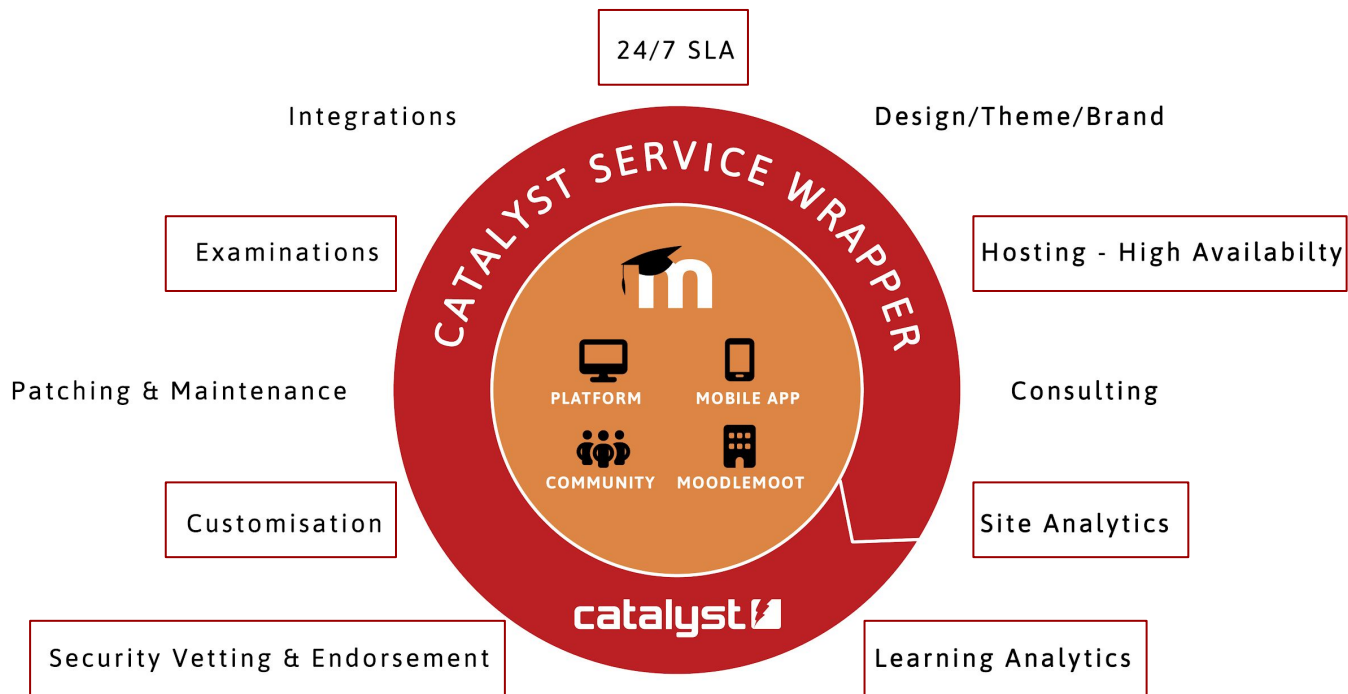
# Key partners for our delivery



# Wrap around services



# Items to discuss today



# Security vetting and endorsement





# Security vetting and endorsement

- The system and the data held within the system requires due care and protection
- Moodle is an extendable/modular system - which is a key strength and a risk
- Software developers, even when well intentioned, can and do make mistakes
- Vetting of security considerations in custom code is key to running a production system
- Performance analysis and verification is also a major concern in adding plugins - especially when operating high scale/load/concurrency
- We believe your Moodle is **your system**, containing **your data**

# Basic pillars of security

## Software and code security

- Peer review required for all code written and deployed by Catalyst
- Code review and performance review for plugins added to site
- Prompt and robust patching workflows and decision matrices

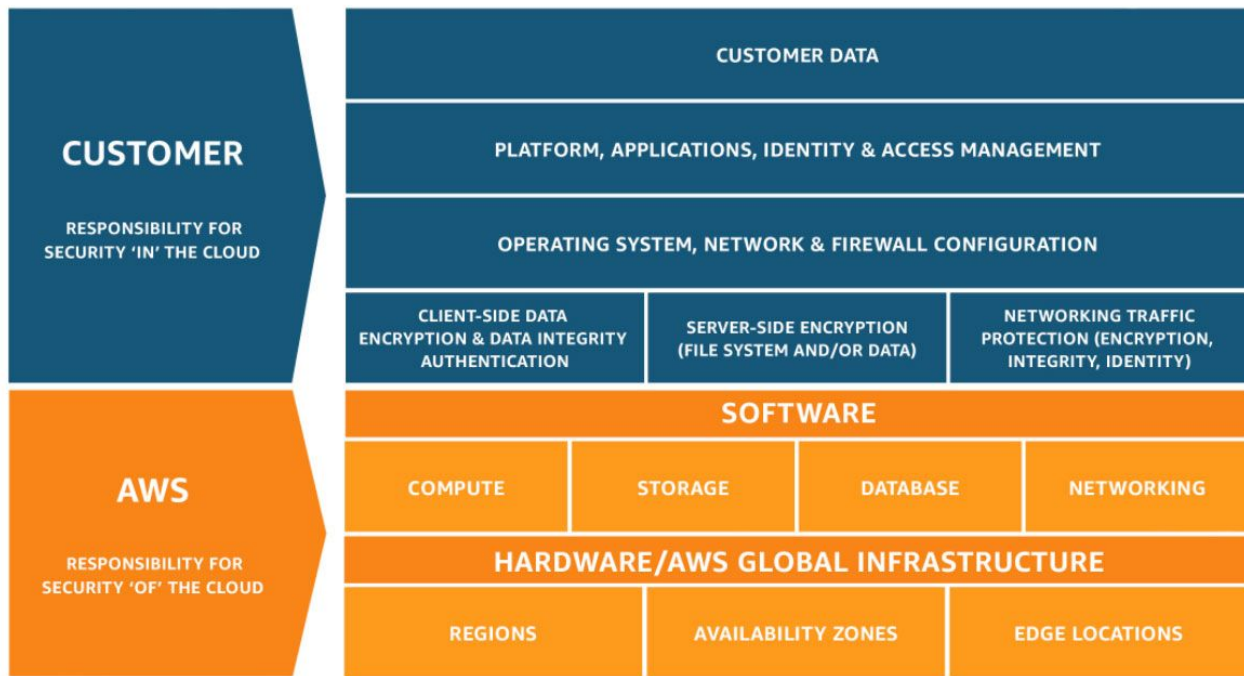
## Infrastructure security

- Industry standard security behaviours and upkeep
- Use of IAM roles and policies replacing of keys and tokens
- Fully isolated (DMZ) approach to infrastructure architecture - no direct access

## People and process security

- Multi-factor authentication by default
- Strong use of cryptography and ciphering such as SSH requirements for all access
- Intense focus on people training and implementation of ISO standards to processes

# AWS Shared Security Model



# Customisation



# Customisation

- Ensuring the Moodle system maintains a clean core codebase and upgrade path
- Ensuring that customisation is modularised into plugins/submodules
- Promoting the use of coding standards to ensure code is readable and well maintained
- Trying to maintain a healthy balance between custom and core for both user and institute requirements
- Sustainability now and into the future with understanding of future burden to maintain  
*- beyond this initial Cap-ex spend, will the Op-ex exist to maintain the customisation*

*“With great power comes great responsibility” - A quote by????*

# The five S test

- **Simplified**

*Is the requirement being explored over complicated or unlikely to add the value expected*

- **Standardised**

*Is the requirement being explored able to be move to a more standard approach - can the requirement be changed to meet a more standard approach*

- **Scalable**

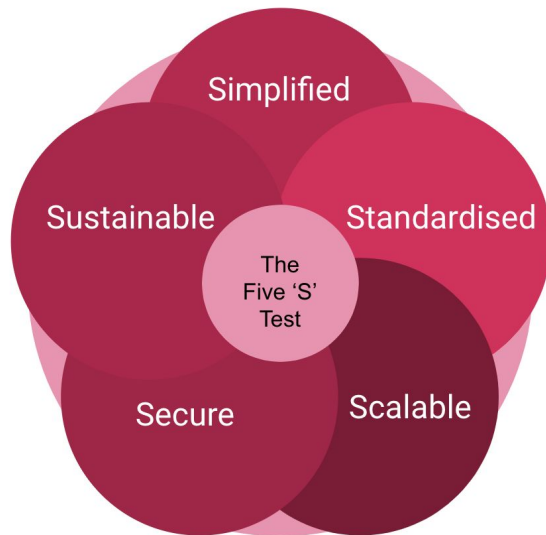
*Will the feature or functionality scale effectively - are we considering the full lifecycle of the product or platform*

- **Secure**

*Is the approach secure and performant - as outlined in coming slides*

- **Sustainable**

*Is the full lifecycle of the platform, product or feature being suitably considered.*



*24/7 follow-the-sun SLA*



# 24 / 7 follow-the-sun SLA

- When an incident or issue arises a prompt and effective response is key to resolution
- Awake and ready to work engineers who have context and knowledge work best
- Outsourced helplines and first line support layers only add to the annoyance or stress
- Maintaining the security and restricted access to the system is paramount
- High availability and fast response times are expected for high stakes Moodle implementations





# High Performance and Availability



# Cloud native by design

- Currently moving to Generation 4.0 of our infrastructure roadmap - infrastructure as code
- Fully scalable both horizontally and vertically with no downtime required
- Auto-scaling and scheduled scaling built in by design - with no human intervention
- High Availability with Disaster Recovery mitigations through self-healing design
- Continuous innovation and investment to further the infrastructure roadmap



CONSULTING PARTNER



HashiCorp

**Terraform**



**ICINGA**



ANSIBLE

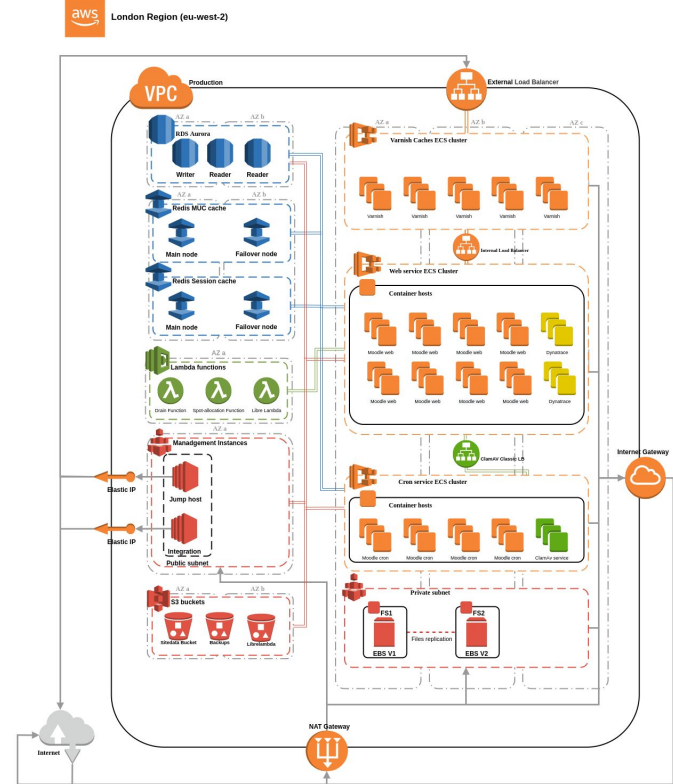


**puppet**

# Architecture

AWS Services in use to support the delivery required;

- Load balancer services
- Varnish caching
- Elastic Container Services - Docker (for “Cattle”)
- RDS Aurora Database services
- Redis Caching services
- Elastic Block Storage
- EC2 machines (for “pets”)
- S3 Object Storage
- Lambda compute services
- Route 53 and Certificate Managers
- SES email services

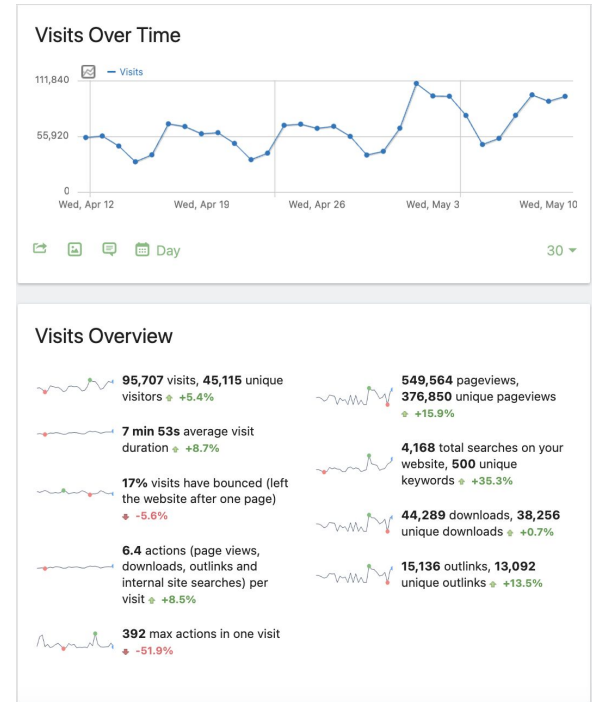


# Analytics



# Using analytics to inform action

- Use of Matomo/Piwik service to define the scaling and resources strategy
- Use of the Moodle Analytics system to support partners in developing engaging and useful content
- Additional reporting and analytics features to identify when exams or *crunch* periods are scheduled - **Assessment frequency plugin**
- Roadmap features underway to automate schedule infrastructure scaling from insights available within the Moodle system



# High stakes examination



# Examination delivered via Moodle

- Examination is a high stakes period for any Moodle system and education provider
- For any online system - the high concurrent nature of examination can be challenging
- User behaviours under exams change - and this needs to be factored in
- Additional requirements add complexity (proctoring and device requirements)
- *Ultimately - IT MUST NOT FAIL*

# National Open University of Nigeria

## NOUN At A Glance

Nigeria's flagship single mode Open and Distance Learning institution.

Expired



**600,000**  
Enrolled Students



**150,000**  
Active Students



**8**  
Faculties



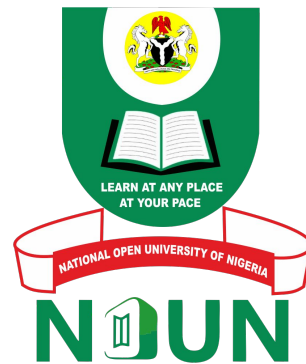
**120**  
Programmes



**2,100**  
Courses



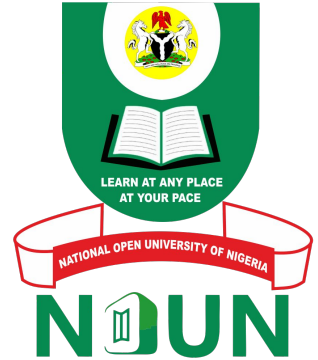
**103**  
Study Centres





# National Open University of Nigeria

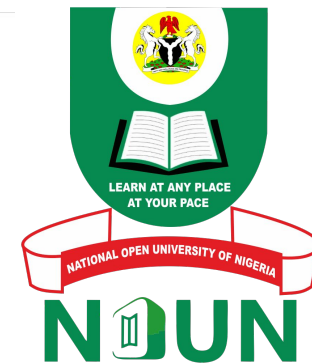
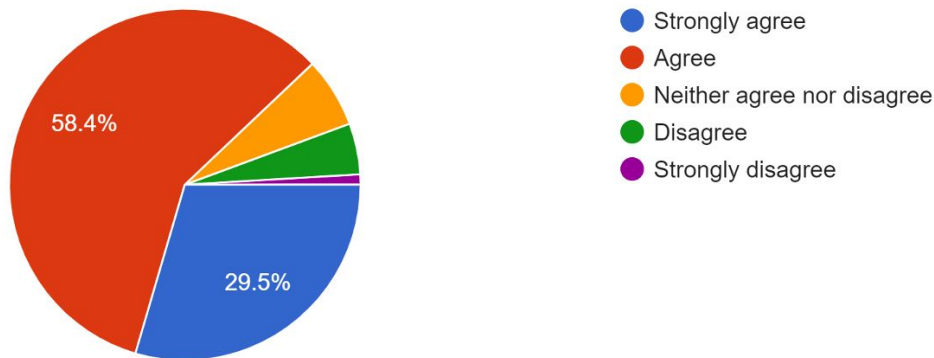
- 144,000 users are active upon this site (have logged in recently)
- Frequently the site sees 1.5million page loads per day
- Up to 10,000 concurrent users during exams  
*(running right now in May)*
- Use of the Moodle assignment to receive many thousands of student submissions to deadlines
- Wider use of Moodle resources to support assessment and examination



# National Open University of Nigeria

The online learning platform is user-friendly and easy to navigate

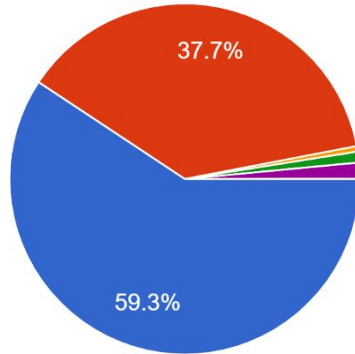
*Student responses*



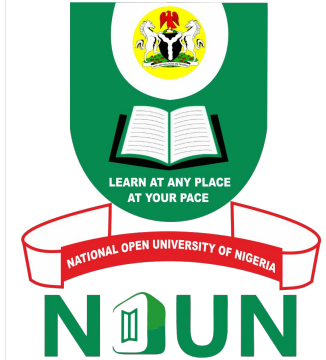
# National Open University of Nigeria

The online learning platform is user-friendly and easy to navigate

*Staff responses*



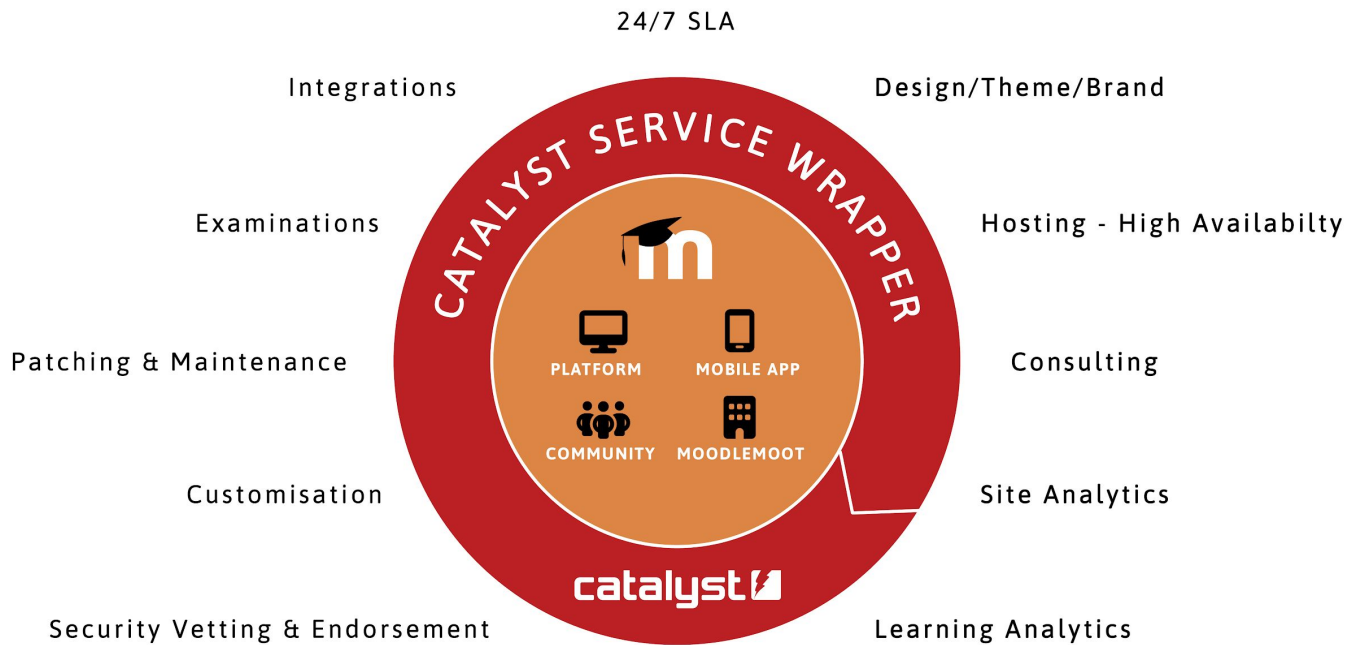
- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree



# Summary



# Requirements for robust delivery



# Questions and answers

Come discuss these ideas and many more at our stand.

Contact me and Catalyst for further discussions at;

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- [linkedin.com/in/michieldethmers/](https://www.linkedin.com/in/michieldethmers/)

