

*Scaling
application
from 0 to 10K
users in 10 mins!*

**Here is how
Codelattice did it.**



Codelattice

• connecting dots •

Medilattice- Learning Management Solution for Healthcare, comes in handy for the continued medical education of doctors in unprecedented times.

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Introduction

Amid COVID-19 national lockdown, all the medical conferences, workshops, etc., got postponed or canceled. The electronic education platforms proved instrumental in continuing the medical education(CME) of doctors. With its prebuilt solution framework called 'Medilattice,' Codelattice was ready to conduct a healthcare professionals' e-learning program. The client is a prominent market leader being amongst the top 5 pharmaceutical companies in India.

Business Requirement

The client wanted to educate the gynecologists and IVF specialists on controversial topics in their practice. They collaborated with Codelattice to implement an engaging platform for delivering online webinars and pre-recorded lectures. The program was devised for about 10,000 doctors in India and 28 countries spread across five continents. Codelattice was also to help the client with their SMS and email marketing and reminders.

User Related Challenges

Challenge: Most doctors we encountered- including the presenting and the attending doctors were not tech-savvy users.

Our Solution:

- 1 We designed the platform to be extremely simple and intuitive. The doctors could easily navigate through the application and complete their certification.
- 2 We trained every presenting doctor on how to use the application through our mock training sessions.

Challenge: The participants used different devices and browsers to attend the sessions. Some users were even using deprecated browsers.

Our Solution:

- 1 We optimized a responsive application for multiple devices & made it browser friendly. Our team did rigorous testing to ensure the quality was optimum regardless of device or browser. We performed many automated and manual tests using several simulators and emulators for thorough testing.
- 2 We made customer care available through chat and call for immediate support whenever required.

Challenge: We had to design the application to make participants feel motivated to complete all ten courses required for certification.

Our Solution:

We displayed visual analytics on every doctor's course progress to explain how far they have completed the certification.

Challenge: The presenters (Doctors who were taking lectures) needed course wise, user engagement & feedback analytics for the respective courses they delivered.

Our Solution:

We implemented visually appealing, elaborate, and easy to understand analytics as per the requirement in a record time.

Functional Requirements

Codelattice has a prebuilt learning management solution framework that can be customized based on its clients' requirements. Following are a few of the additional features to be built on the available solution.

T

o know more about the prebuilt solution features, visit www.medilattice.com.

- ◆ We had to implement Question and answer sessions (communication channel) between 1. Moderator and presenter, and 2. Moderator and attending doctors.

Access to the channel was to be controlled by the admin.

- ◆ Timezone implementation- Since attended globally, the application was to run in different timezones.
- ◆ Suppose a participant attended only about 40 % of the webinar in live mode. When he resumed the recorded video from the platform later, the video should begin from where he stopped. Although it sounds complicated, our team was able to deliver this requirement with ease.
- ◆ We had to implement all these features and additional custom-built features such as analytics in LMS quickly.

DevOps

Challenges

Hotfixes and user behavioral defects implied that the user's predefined software behavior and expectations were not congruent.

Our Solution

CI/CD Pipeline - Build & Rebuild with automation.

For the integration of hotfixes, Codelattice adopted a CI/CD pipeline to build code, run tests, and safely deploy a new version of the application allowing the developers to integrate changes in the applications without performing manual actions to write custom scripts. With CI, each shift in code triggers an automated build-and-test sequence and provides feedback to the developer who made the change. Automated pipelines removed manual errors, provided standardized feedback loops to developers, and enabled fast iterations in the Learning Management Solution(LMS).

Infrastructure as Code - Create reproducible Infrastructure

We leveraged Infrastructure as code(IaC) to quickly set up our complete LMS infrastructure by running a script. With IaC, the Infrastructure details are codified into a configuration file to provide us a single source of truth for all our resources. Codifying our Infrastructure eliminated the discrepancies commonly encountered with manual management. The Infrastructure could be modified and destroyed, enabling configuration compliance and rapid troubleshooting with the configuration files. We codified database infrastructure with Terraform. We used AWS CloudFormation for one-click network and vpc configuration. Infrastructure as code gives you the luxury of version-controlling the network. Seamless network duplication for on-demand development and staging environments were made possible with IaC.

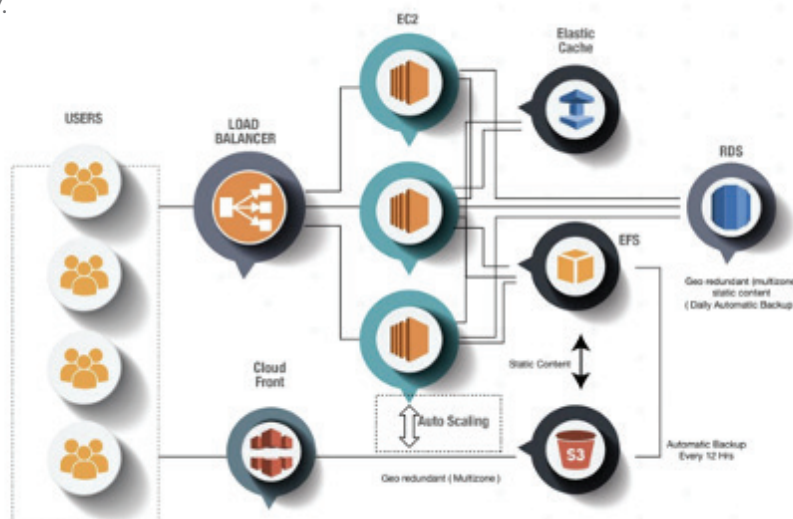
Infrastructure

Challenges

- ◆ The system should take a concurrent load of 10000+ enrolled participants and additional 3000+ anticipated spot registrations from 28 countries spread across five continents.
- ◆ At a given point in time, the system should be scalable and stable to handle live webinars, concurrent spot registrations, and pre-recorded videos on the platform. Seamless streaming of live webinars.
- ◆ Should adjust the quality of the video as per the internet bandwidth of the participant.
- ◆ Security as the content was confidential and public access and registration was not allowed.
- ◆ There was a possible threat to information security from another competitor pharmaceutical company.
- ◆ Optimum server resource usage- The peak usage was during live webinars. Right-sizing resources during steady-state and idle state were crucial to making the application more cost-effective to clients.

Our Solution

Codelattice is one of the best AWS Select partners in Kerala, India. We offer reliable, secure, cost-effective, well-Architected, hybrid, and scalable solutions for enterprises with AWS partnership. Architecting a cloud solution with the right AWS infrastructure components needs expertise. Many variables come from application requirements, and there are a lot of components provided in AWS. Considering all variables together, we face an overwhelming number of options. Codelattice AWS architects expertly handle and deploy AWS routinely.



AWS Autoscaling

As the learning management solution would experience an influx of about 10,000 to 15,000 in a matter of minutes, we configured AWS Auto Scaling. It automatically adjusted the capacity to maintain steady, predictable performance at a reasonable cost. We set up the application scaling for multiple resources across multiple services. With AWS Auto Scaling, we made sure that our applications always had the right resources at the right time. With Amazon EC2 Auto Scaling, we provided the correct number of Amazon EC2 instances to handle the application load. We configured dynamic scaling and scaling on a schedule as well.

AWS Elastic Load Balancer

The application had to handle the spot registrations and visitors of pre-recorded LMS videos at maximum influx during live webinars. We automatically distributed the incoming traffic across multiple targets, such as EC2 instances, containers, and IP addresses, in one or more Availability Zones using AWS Elastic Load Balancer. Elastic Load Balancer scaled as the incoming traffic changed over time.

CDN - CloudFront

Leveraging Amazon CloudFront's global content delivery network service, we delivered data, videos, and applications to the doctors with low latency and high information transfer rates. CloudFront provided us automated protections of AWS shield standard at no further cost. We integrated CloudFront with AWS WAF and AWS Shield Advanced to protect the application from advanced threats and DDoS attacks.

Multi-zone availability

The e-learning program was to be attended by doctors in 28 countries in different time zones. By providing multi-availability zones to the client, we ensured that LMS applications could withstand isolated zone failures.

Information Security

We provided all the participating doctors a unique code for their registration, apart from the conventional email and OTP verification. The data in the application is automatically encrypted at the physical layer through AWS. Additional encryption layers exist, such as all VPC cross-region peering traffic and customer or service-to-service TLS connections.

Optimize and Monitor using AWS Cloud Watch

Amazon CloudWatch Events detect and react to changes for AWS Health. To get an overview of operational health, Codelattice made use of AWS CloudWatch. It provides information and actionable steps to monitor applications, respond to system-wide performance changes, and optimize resource utilization. Then, based on the rules created, CloudWatch Events invokes one or more target actions. Depending on the type of event, it captures information and notifies the DevOps engineers to take the required action.

The Maintenance Imperative

Here is a maintenance checklist that we followed religiously to ensure the AWS resource availability and performance.

EC2 Daily Checks	RDS Daily Checks
Disc Usage check	Disc usage check
CPU Utilization History	CPU Utilization History
Memory Utilization History	Memory Utilization History
Check Network status	Database Connections
Check All Services	Backup File Checks
Backup File Checks	
Check and Clear the logs.	
Check EFS File system.	
Check Elastic Beanstalk	
EC2 Weekly Checks	RDS Weekly Checks
Remove old/unwanted backups.	Remove old/unwanted backups.
Check Backup Tasks in Task Scheduler	Check Backup Tasks in Task Scheduler

Performance testing

We were expecting about 10,000 users to hit the site in a span of 10 to 15 mins. Therefore it was imperative to perform load-testing of the system. The load test was done with 1x (expected traffic) to load 4x to stress the system. We ensured that the system performance was not deteriorating for even four times the predicted load.

We monitored the system for the following parameters:

1. CPU and Memory Utilisation
2. Thread Count & Locks
3. Response Time & Throughput

Mock Drills

Mock drills were conducted once a week to check the reaction of the server and the team. In case of discrepancy during the drill and testing process, the remedial measures were taken as quickly as possible. Proactive drills helped to patch several security vulnerabilities and optimize our resource utilization.

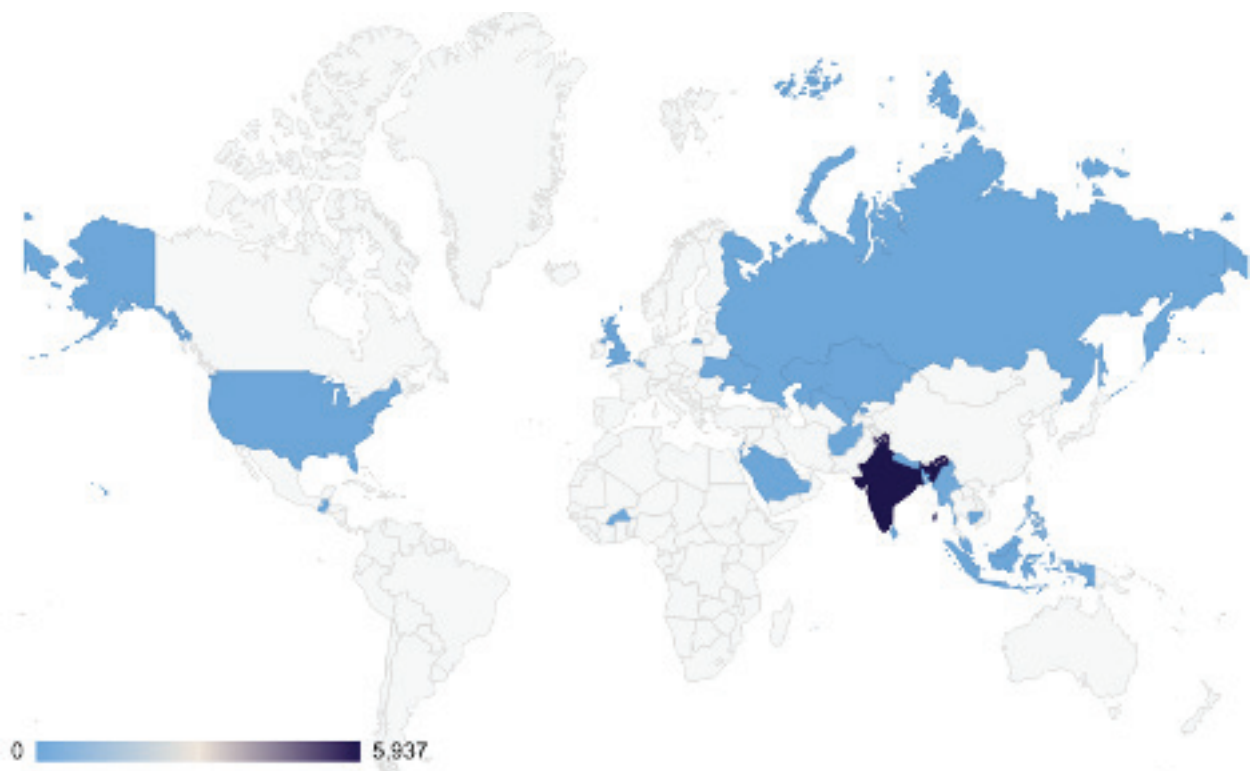
Marketing Activities by Codelattice

Apart from implementing Medilattice, developing new features, and maintaining the application, we helped the client with their branding and marketing. Enumerated below are some of the marketing activities by Codelattice.

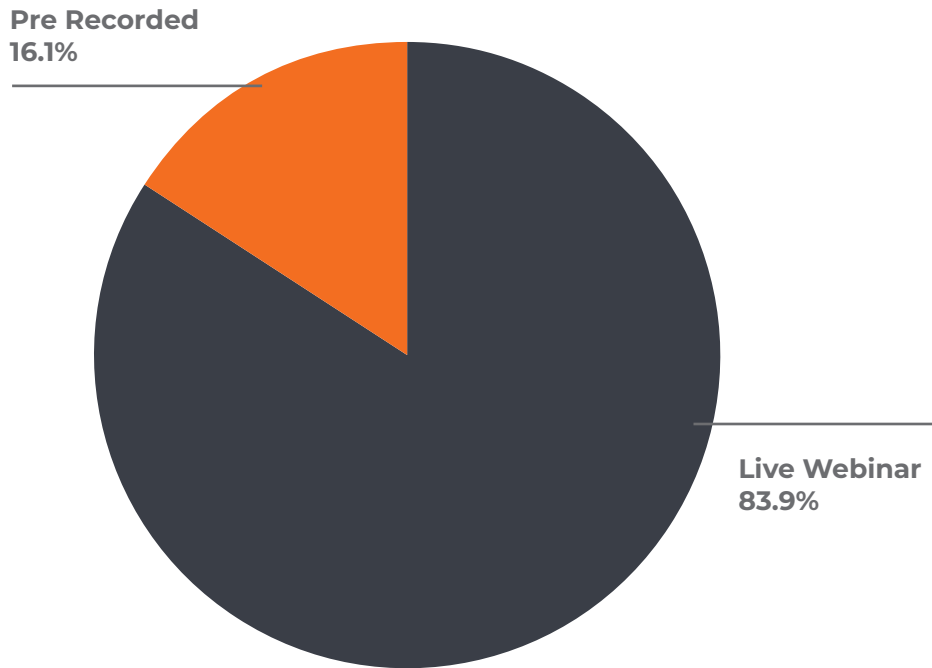
- ◆ Branding of the event
- ◆ Brochure and handout designs
- ◆ Subtle and powerful personalized, targeted marketing
- ◆ Timely reminders for upcoming webinars, course progress updates, request feedback for improvement.
- ◆ Thank you for your messages on the completion of the course and live webinar.
- ◆ The medium of marketing used was email, WhatsApp, calls, SMS.

The Outcome

Participants attended from 28 countries spanning five continents.



Live webinars had more attendance than the pre-recorded videos



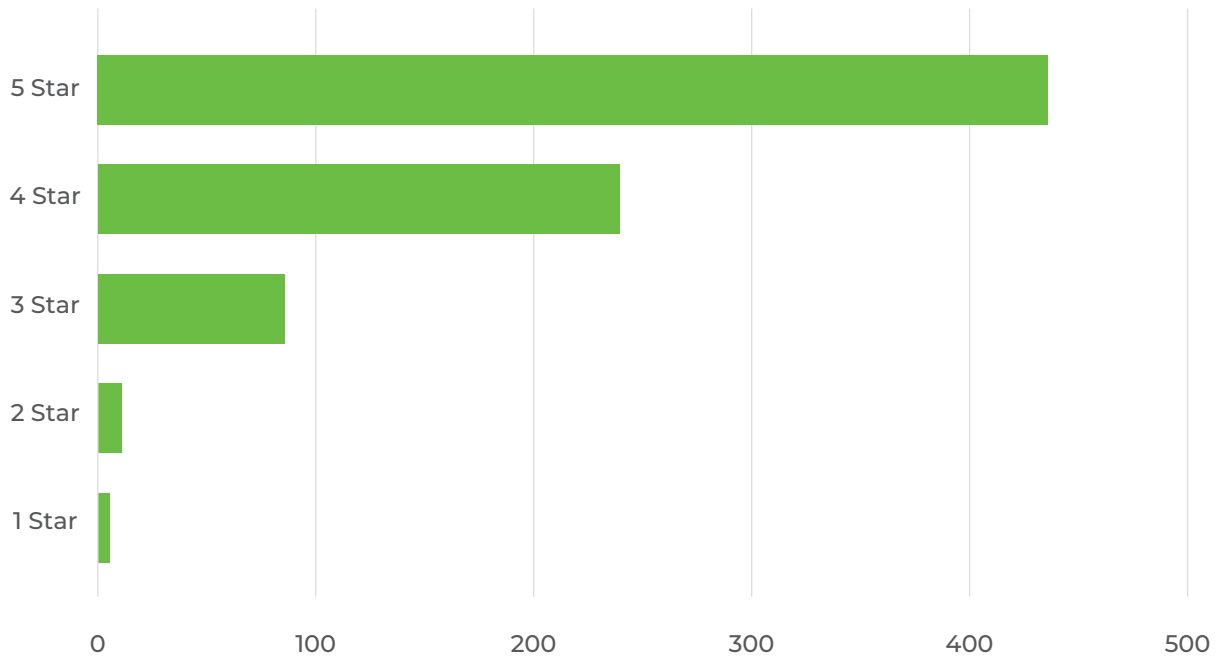
Steady engagement of users in all the sessions

Pre Registration and Spot Registration

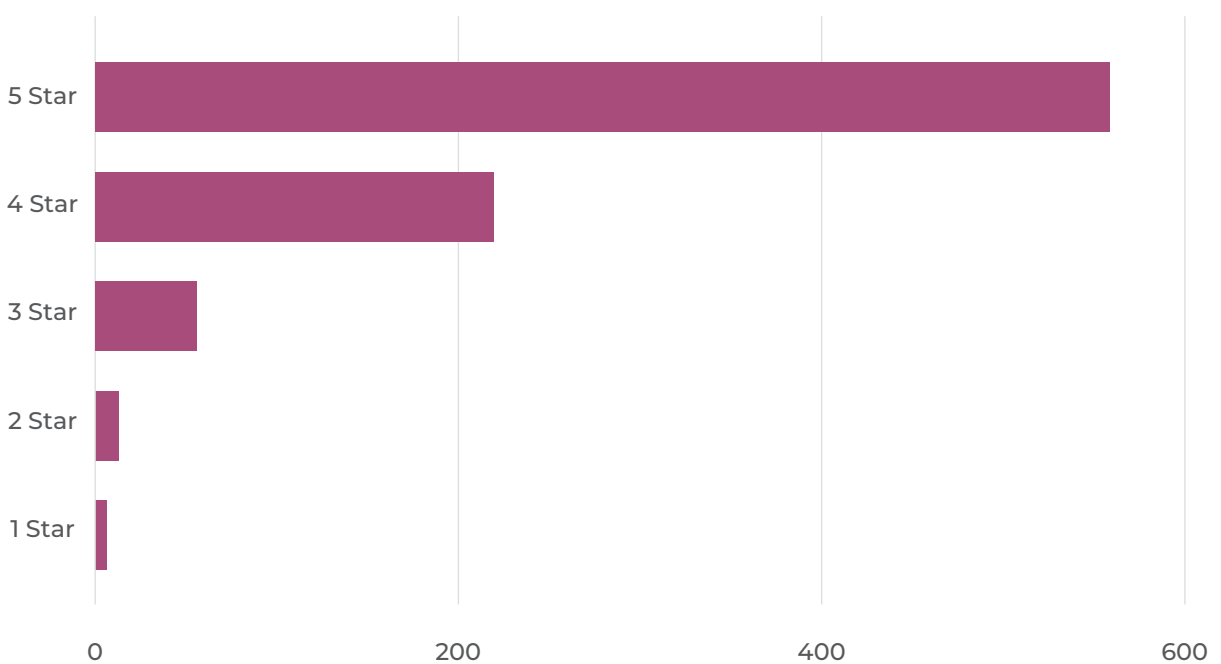


Participant Feedback

Content Delivery Clarity

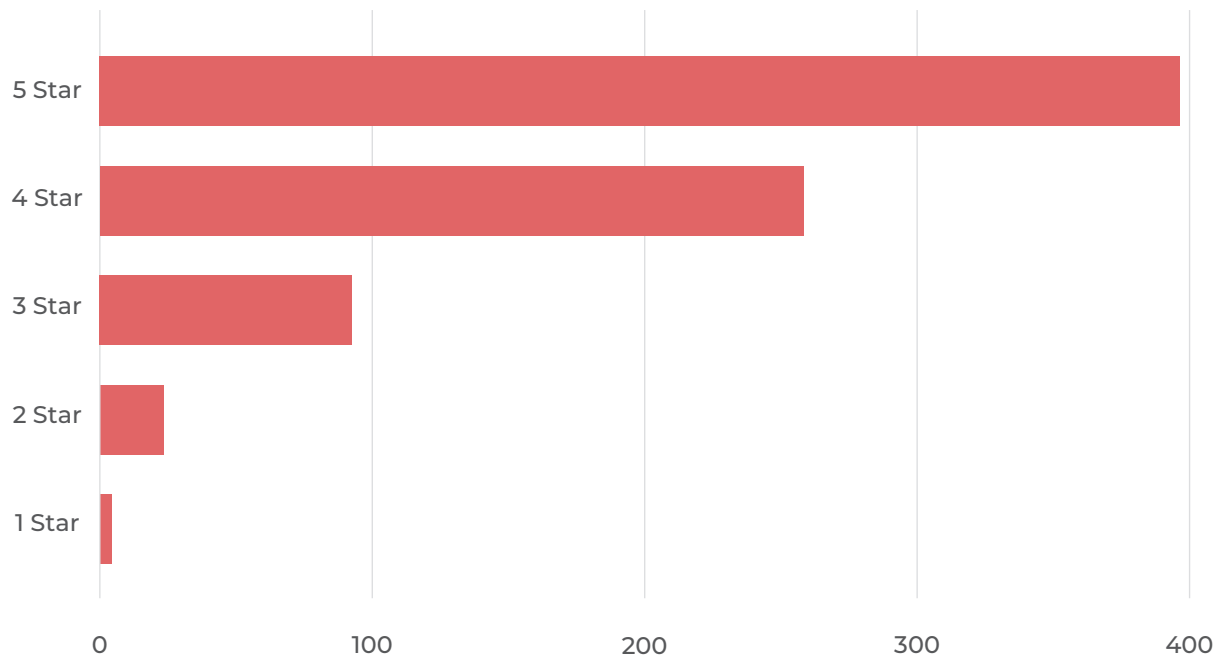


Medical Content

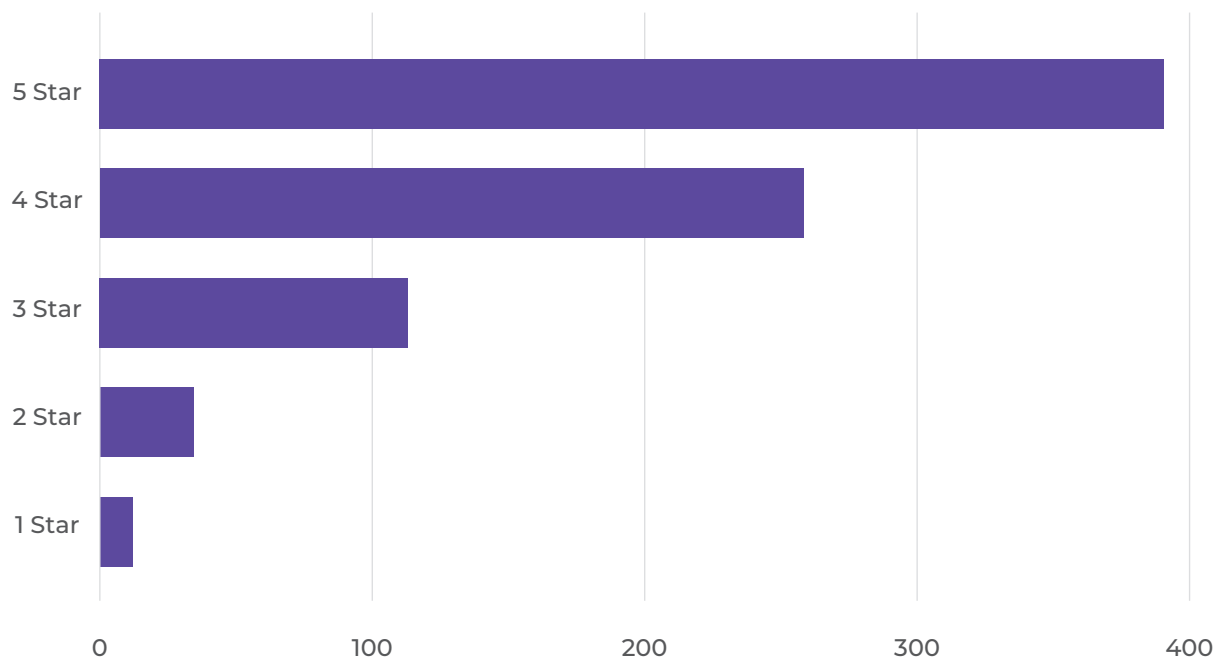


Participant Feedback

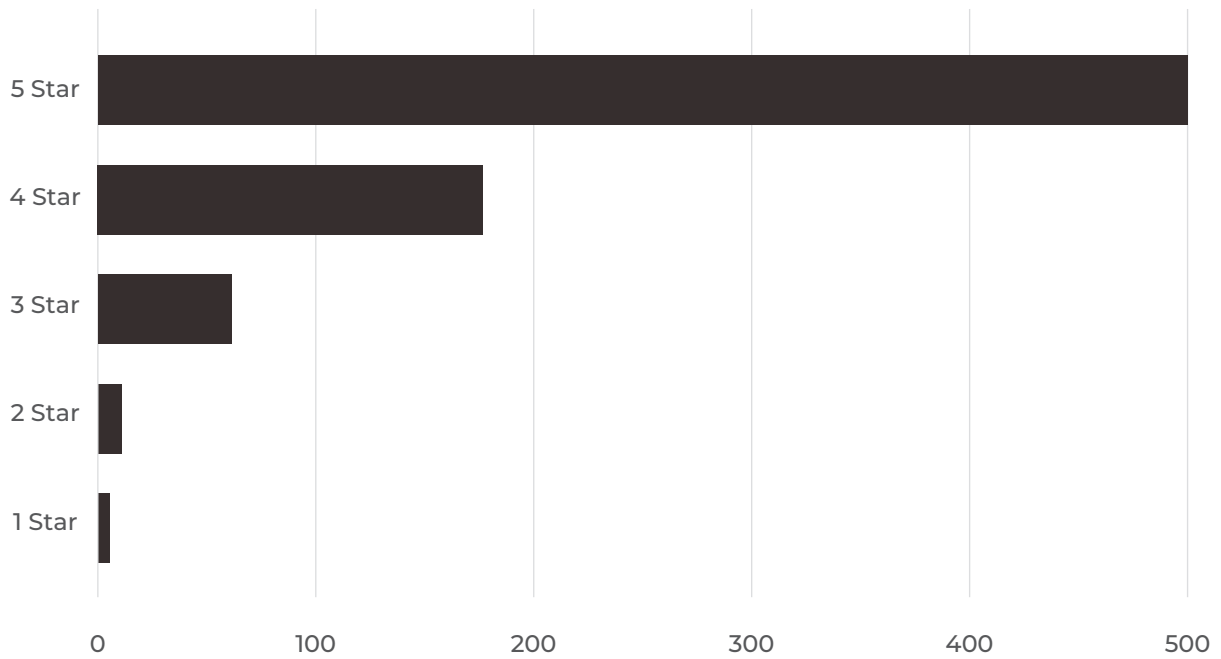
Meeting Information & Materials



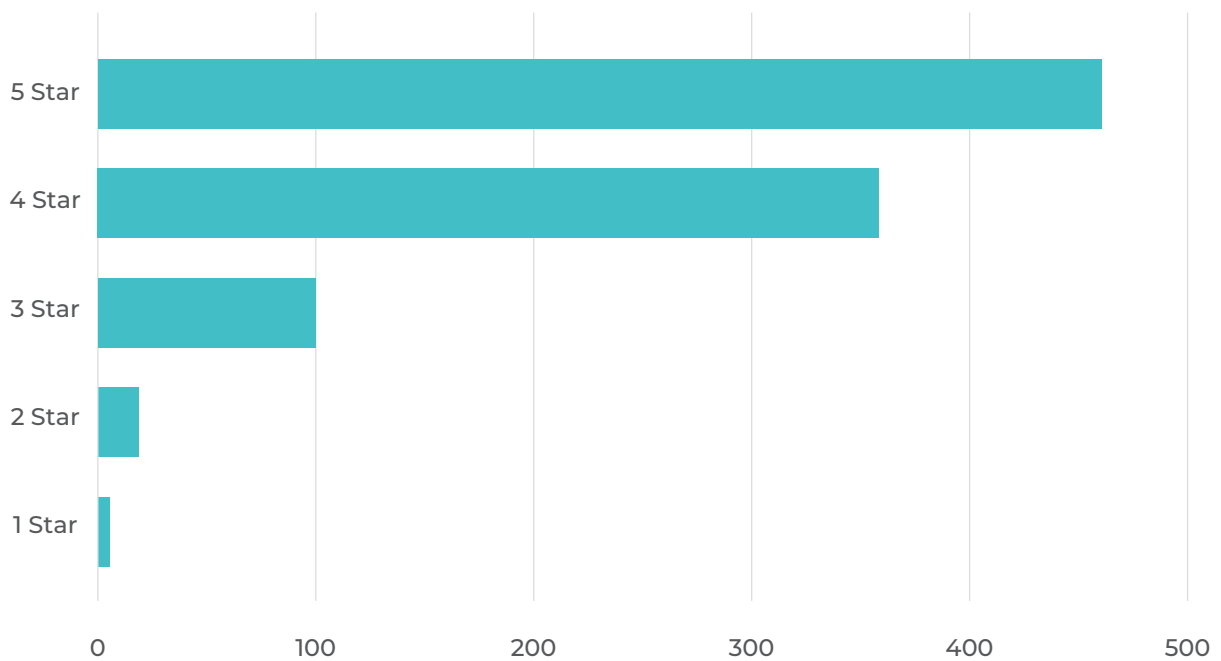
Opportunity for Clarification



Recommendation for the Program



Session Pace & Length



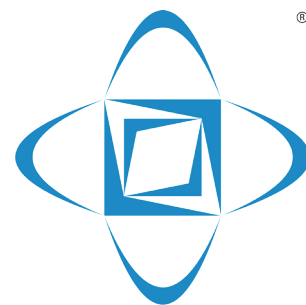
The e-learning program was a huge success. Per session, more than 8000 enrolled doctors, and 2500+ spot registrations were handled successfully. Our client seemed pleased about the seamless delivery of the training content. Our team successfully maintained a steady rate of registration and viewer engagement over the entire duration of the program. We were happy to see that most of the presenting and attending doctors gave us five-star ratings in their feedback. The whole project brought us the satisfaction of a job well done.

Thank You

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Codelattice is a technology solution provider established in 2009. We are a team of 200+ technocrats spanning across 8 countries. We help our clients to Activate, Elevate and Accelerate their endeavors. Guided by a decade of experience, Codelattice offers customizable Digital Solutions, off-shelf Software Products, and bespoke IT Services. By partnering with industry pioneers such as Google Cloud, GoDaddy & AWS we provide the imperative digital edge.

We Make You Digitally Immortal ®



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