**Analysis and Recommendations for TA Scheduling System Optimization**

**Introduction:**  
Our team has completed an extensive analysis of the current teaching assistant (TA)  
scheduling system at Kelley School of Business, with the aim to address identified  
inefficiencies and propose viable solutions. This analysis is based on data gathered from our  
existing system and insights derived from newly implemented visual analytics in our  
dashboard.

**Key Findings from Data Analysis:**  
**Analysis of Appointment Availability and Utilization:**  
Tuesday Peak and Project Due Dates:  
Through our analysis of the visualization, our team discovered a significant pattern: a  
notable increase in available appointments on Tuesdays. This could imply intentional  
overstaffing to anticipate high demand or lower student engagement on that day,  
which contrasts with project deadlines typically falling on Sundays as it does not align  
with expected student demand. Theoretical considerations suggest students may  
prefer seeking help closer to deadlines, indicating a potential need to adjust Teaching  
Assistant availability.

**TA Utilization Disparities:**  
From analysing Kevin Malone's schedule, we can see a notable surplus of open  
appointments compared to booked ones, suggesting either a lack of student demand  
for his availability or a potential mismatch between TA expertise and student  
requirements. A theoretical consideration proposes investigating a feedback loop  
system where students can specify preferred TAs and time slots, enabling dynamic  
scheduling adjustments for better alignment with student needs.

**Time Slot Popularity and Scheduling Patterns:**  
**Evening Slots Dominance:**  
After examining the Time Slot Efficiency graph, we found a significant trend: the  
highest combined count of open and booked appointments occurs during the late  
evening hours, particularly between 2:30 PM and 4:00 PM. This suggests that students  
tend to seek assistance during this time, possibly when they are most alert and  
engaged. In light of this finding, it's worth exploring whether the distribution of  
academic workload throughout the day influences these preferences. If there is a  
correlation, adjusting Teaching Assistant (TA) schedules accordingly could better meet  
students' needs and optimize efficiency.

**Lead Time for Bookings:**  
Based on our analysis of the visualisation bar plot: "Distribution of Appointment Lead  
Times" graph, it's evident that there's a wide variation in booking lead times. Some  
appointments are scheduled more than a week in advance (max lead days is 13 days),  
which could potentially prevent other students from booking closer to due dates when  
they need help the most. To address this issue, we propose implementing a rolling  
booking system which in turn would limit the availability of slots to a certain number  
of days in advance, ensuring a balance between planning and accessibility.  
Bob Slydell exhibits the highest average lead time of 5.33 days, which could indicate  
less flexibility or higher demand for his hours.

**Cancellation Rate and Lead Times:**  
From the "Cancellation Rate by Time Slot" chart, it's evident that afternoon times have  
higher cancellation rates, specifically around 2:00 PM and 4:00 PM. This could be due  
to students initially booking these slots well in advance (as seen from the lead time  
analysis) and canceling them as their schedules change closer to the date. The lead  
days in cancellations chart shows a high incidence of bookings made a week in  
advance, with a significant portion being canceled, suggesting that students might  
benefit from more flexible, shorter-term booking options.

**Appointment Distribution and Inefficiencies:**

**Inefficient Allocation of TA Resources:**  
In analysing our appointment status by day bar plot, we observed a concerning trend  
regarding the allocation of our TA resources. The data revealed that a significant  
portion of appointments, amounting to 70.64% overall, remained open across all days.  
This high open rate indicates potential inefficiencies that could be leading to resource  
wastage and budgetary concerns.

To address this issue, we propose a theoretical consideration: implementing a  
resource utilization metric. This metric would enable us to track and optimize TA  
allocation more effectively based on real-time data insights. By leveraging this metric,  
we could identify and potentially cancel unnecessary time slots, ensuring a more  
efficient and cost-effective use of our team's resources. This proactive approach aims  
to enhance our operational efficiency and address the challenges posed by  
open appointments.

**Conclusions and Theoretical Framework for Recommendations:**  
**Adaptive Scheduling:** Our findings suggest a need for an adaptive scheduling  
framework that dynamically matches TA availability with real-time demand. This  
approach could leverage predictive analytics based on historical data to anticipate  
peak appointment times and allocate resources accordingly.  
**Demand-Driven Allocation:** Implementing a demand-driven allocation model would  
ensure that TAs are scheduled during periods of high student demand, especially just  
before major due dates or exam periods. This proactive strategy aims to maximize TA  
availability when students need assistance the most.  
**Feedback Mechanisms:** Integrating feedback mechanisms into our scheduling system  
is crucial. By allowing students to indicate their scheduling preferences and provide  
feedback on TA support, we can gather valuable insights to continuously refine and  
improve the scheduling process.

**Recommendations Based on Analysis:**  
**Rescheduling Peak TA Availability:** Move more TA availability to Thursday, Friday, and  
Saturday to align better with student work patterns as they approach project due  
dates on Sunday evenings.  
**Revise Advance Booking Policies:** Limit how far in advance appointments can be  
booked and implement standby or waiting list features to maximize TA utilization.  
**Enhanced Scheduling System:** Develop an enhanced scheduling platform that  
incorporates flexible, demand-driven scheduling to adapt to fluctuations in student  
needs.  
**Implement a Flexible Walk-In Clinic Model:** Transition to a model that incorporates  
both scheduled appointments and walk-in hours to provide flexibility and reduce the  
number of unused time slots. Reserve specific high-demand times for walk-in  
appointments only to ensure efficient use of TA time.

**Conclusion:**  
Leveraging the insights from our data-driven analysis, we believe the recommended  
strategies will significantly enhance the efficiency and effectiveness of the TA scheduling  
system. These improvements are aimed at better alignment of TA resources with student  
needs, thus enhancing academic support and optimizing operational efficiency at Kelley.