

# A Statistical Analysis of Suggested and Accepted Times for Meetings and Events

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For the past two years the WhenIsGood service has helped co-ordinate many thousands of meetings and events. During that time, alongside the private data held on the WhenIsGood servers, a huge quantity of generic *metadata* has also been amassed. This study examines this metadata in an attempt to discover interesting underlying trends. While looking at the relative popularity all the possible suggested times in the working week, we develop a measure of 'respondent flexibility'. We find no evidence that any particular day of the week has significantly more appeal to event respondents. We also note that Tuesday at 3PM is the point in the working week that people are most likely to be available for a meeting.

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**KEY WORDS:** events, meetings, availability, web application

## BACKGROUND

WhenIsGood.net is a Rich Internet Application<sup>1</sup> that helps groups of people select the best time for a meeting or other event. Basic use of the system is free and requires no account registration or log-in. An event can be created by any visitor to the site. This user starts by suggesting a broad range of times or dates. The system then generates a unique URL for the event and the co-ordinator is free to circulate this 'invitation link' via email, or any other method, to all the potential participants. Each invitee visits the event page, sees the suggested times and gets to specify the subset which fit their own availability. As this feedback comes in, the co-ordinator can see the sum effect of the responses and find a time which is good for all.

The service is owned and developed by a small UK based software consultancy<sup>2</sup>.

WhenIsGood was established in November 2007. Across the lifetime of the application hundreds of thousands of event invitations have been made through the system and the resulting availability data gathered. The vast majority of events have an active life - from initial proposal, through the feedback stage, up to the selection of the resulting time - of just a few days (with a significant number of events being resolved in this way within a few minutes or hours of creation). But, the information for each event remains in the users account indefinitely. Furthermore, a very large body of metadata has become available.

## PRIVACY ISSUES

As with any web based application providing a public service, privacy of user data is of huge importance to WhenIsGood. To match our comprehensive privacy statement<sup>3</sup>, we implement a wide range of rigorous best-practice strategies for making and keeping our user's data private and secure. Besides password and code protected accounts, events, response and results pages, we maintain strict logging and monitoring solutions and secure our server architecture with industrial strength encryption.

At the beginning of this study we needed to make sure none of these standards would be compromised by our analysis. To achieve this goal, we developed a multi-step process to separate the personal and private data from the structural metadata which would be the focus of our study. Here, in summary are some of those steps:

- A separate copy of the main production database was set up in the study environment.
- All titles and descriptive text were removed from the events.
- All names and comments were removed from the responses.
- All users entered key fields (custom URLs and email addresses) were irreversibly scrambled via a double SHA-1<sup>4</sup> hash algorithm.
- All date information, beyond the day-of-the-week, was deleted (effectively folding the entire dataset into a single working week).

1 <http://www.insideria.com/2008/06/when-is-good-gets-better.html>

2 <http://whenisgood.net/About>

3 <http://whenisgood.net/Privacy>

4 <http://csrc.nist.gov/publications/fips/fips180-2/fips180-2withchangenotice.pdf>

By the end of this process we were confident that study database contained no trace of our users' private data, merely the silhouette of the compound of many anonymous interactions. Only at this point did the analysis stage begin.

## METHODOLOGY

The feature set of the WhenIsGood.net site is very broad and to simplify the scope of our study a number of categories of event were excluded. Many users organise events across multiple timezones - these were deleted from the study. Also, those events that were configured to work without specific times (i.e. just full day/dates, in a simple *calendar* view) were identified and removed from the study.

Right from the start, even with rudimentary definitions of 'flexibility' (see below) it became clear that another very large set of events needed to be excluded. All our early profiling and graphs showed a very significant bias towards evenings and weekends. On reflection, it is not surprising that invitees tend to be more flexible when responding to social activities. We did not want to make this the focus of our study so we tried a couple of tactics to exclude these events. The first was too simplistic: we simply cropped the events and their responses to weekday office hours. Obviously the bias was still there building through the afternoon to a maximum at the end of the day (a kind of pollution of the office working schedule by social events that began in the early evening - a statistical fingerprint for 'sloping off to the pub early'). We soon hit on a better mechanism and excluded all those events which had *any* suggested times outside normal office hours (for the purposes of this study, defined as 9AM to 6PM). With this new definition for the scope of our study, we had a useable set of data (and a number of interesting avenues for future inquiry into work vs. social events).

At this stage we took a random sample of just over one hundred thousand responses to conduct the final processing. This table shows the size of the remaining study dataset.

Events	34,325
Responses	100,003

## A MEASURE OF FLEXIBILITY

Profiling simply *when* people have events appeared to have limited value. Clearly, busy people fill their week with appointments, while those with less demanding schedules will simply need to work around their busier colleagues. Limited resources of time become allocated and, in the end, meetings happen all week.

More interesting to us was to develop a measure of flexibility. Because our dataset contained such a broad set of suggested, and either accepted or rejected times, we could produce a score for each fifteen minute period of the working week to show how successful each slot could be.

An initial definition of flexibility might be to simply aggregate the information from all the events for each time period - count the responses that accepted the given time and divide by the number of

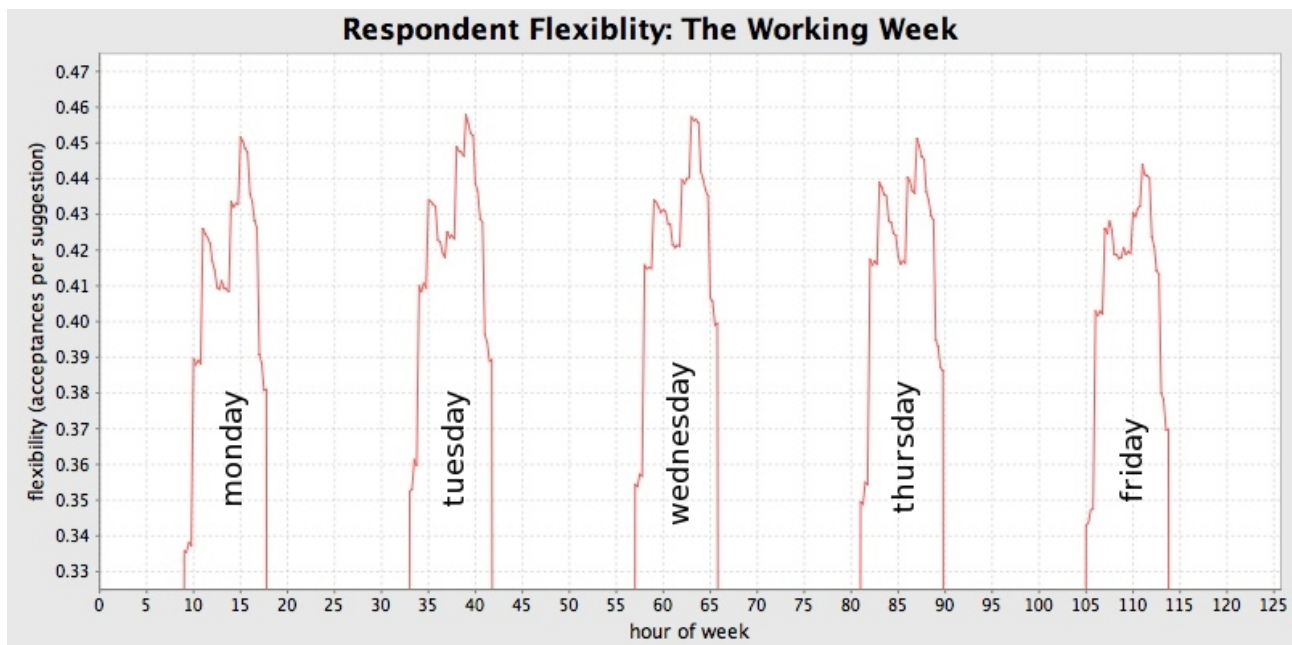
suggestions. The problem with this is that it doesn't take full account of the information we have about rejections. Data about events with higher numbers of respondents will drown out those about smaller gatherings (10 people agreeing to meet at noon may look successful, but not if 100 were invited).

The calculation we used for the study has a subtly definition of 'a suggestion' - not one per proposed time, rather as many as there are respondents. The event co-ordinator might suggest three times for the meeting, but if they then go on to invite five people, this counts as fifteen individual suggestions. Now when we sum positive responses and divide by the number of suggestions, we reach a more informative measure of flexibility - unaffected by neither popular times to suggest meetings, nor the number of people invited.

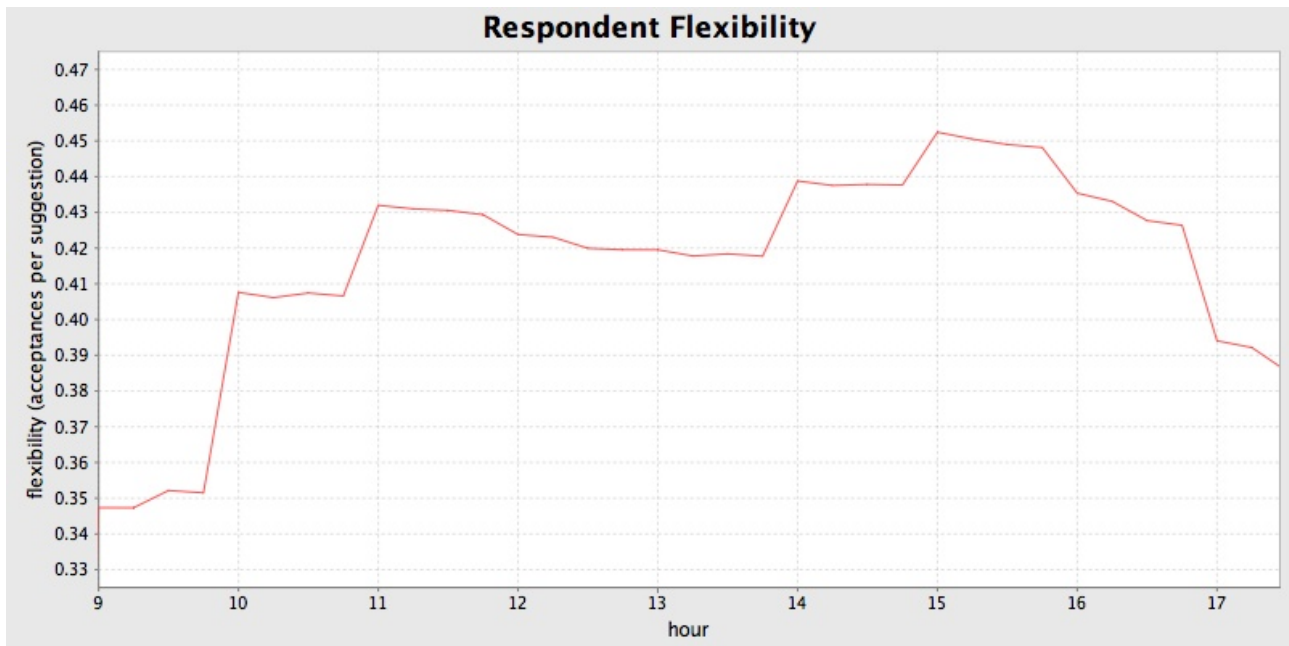
The figure that this calculation creates can be best understood as a simple probability. For example, looking at the working week as a whole, we found Monday at 9AM to have a flexibility score of 0.334. This equates to a roughly one in three chance of your invitees being available - suggest that time to three people and you can expect just one of them to be free.

## RESULTS

We ran our calculations to generate two sets of data. The first generated a flexibility score for every quarter hour in the working week. The scores ranged from 0.334 (Monday 9.15AM) to 0.458 (Tuesday at 3PM). The following graph shows these findings.



The second calculation just considered the time information - folding the whole week onto a single day. The score ranged from 0.347 (9AM) to 0.452 (3PM). The following graph shows these findings.



## CONCLUSIONS

A number of observations stand out from the results:

- Event invitations are most likely to be accepted for a Tuesday at 3pm.
- Very little variation exists between the days of the week. We found no evidence that people tend to be any more flexible in the middle, or at either end, of the week.
- While individual respondents - or particular events - may feature much greater or lesser degrees of flexibility, on average only three or four people out of ten will be available at any given time.
- Unsurprisingly, the worst hour to suggest is right at the start of the day.
- Flexibility jumps up at 10 and 11 in the morning.
- At lunch time flexibility drops back down, but not by a significant degree.
- The afternoon appears to have most availability, with the 3PM peak falling off rapidly towards the end of the day.

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