How Did the Timesheet Catch the Spy?

Joke or the downfall of the insider threat

Ben Lovley | Network Forensics - Ministry of Defence (MoD)

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Our Speakers

BEN LOVLEY

Network Forensics, Incident Response and Enterprise Threat Hunt

ANDREW ‘MAC’ MCALLISTER

Customer Success - UK Public Sector

MODERATED BY GREEN TRACKSUIT

Ben Lovely

MoD Network Forensics & Hunt analyst

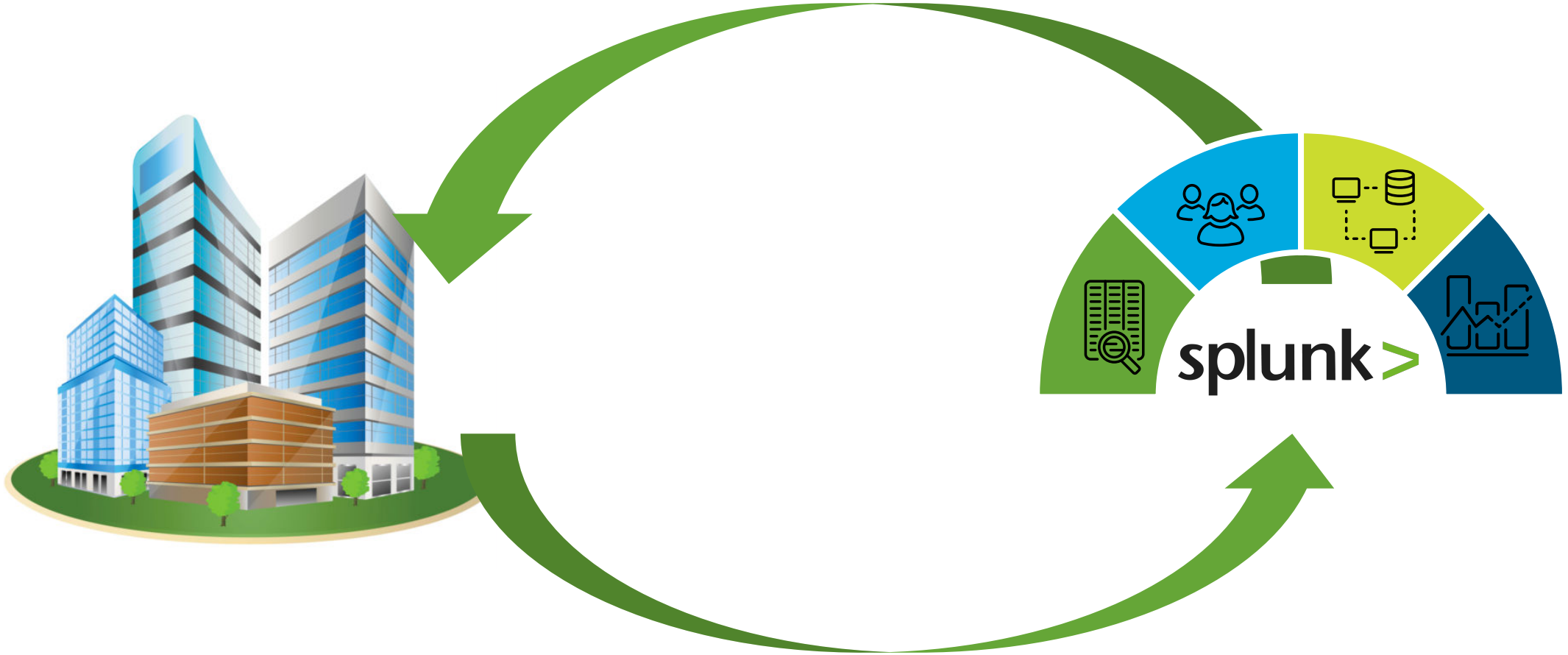
- 2,5 Years lead Forensic analyst
  - Covering Network, Mobile forensics as well as Enterprise Threat Hunt
- 10+ Years working in MoD cyber
- 3 Years active Splunk use from analysis through to Architecture
- IoT nnthusiast
- Keen motorcyclist!

Andrew ‘Mac’ McAllister

- Splunk Customer Success
  - Management - UK Public Sector
- 10+ years in the UK military
- Weapons Engineering
- TOGAF-Certified Enterprise Architect
- Chartered Engineer

Slide in the middle

Centre of Excellence and Innovation



Slide in the middle

Centre of Excellence and Innovation

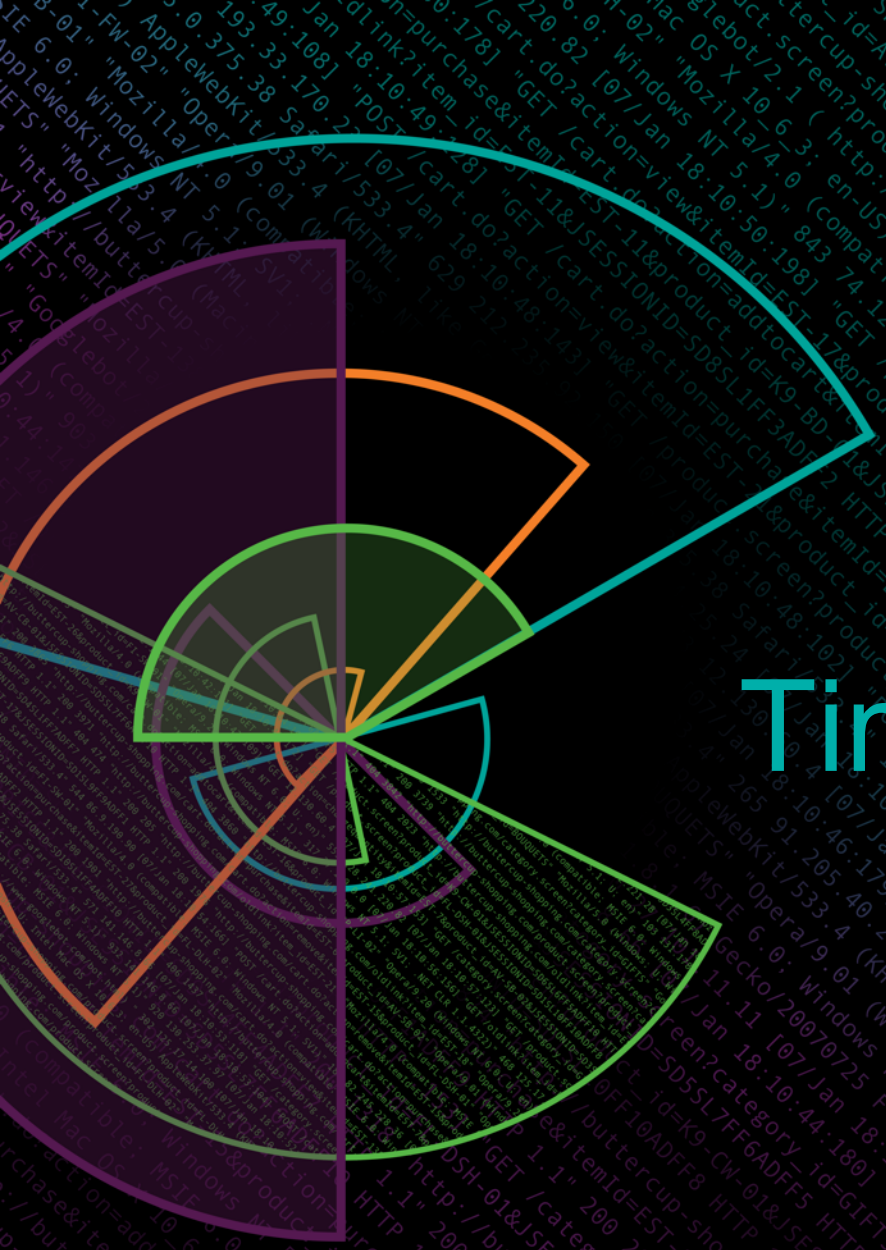
- Shorten the Feedback Loop
- Decrease Wasted Cycles
- Increase Innovation
- Increase Trust
- Become a hero!

…Which Has Enabled New Thinking

Within a single customer

- The next iteration: cross-correlation with timesheets, logins

- Redundant network ports
- Cooling Fan Failures
- Enterprise Power and Environmental Analytics
- Splunk in Your Pocket
- Raspberry Pi Desk Utilization



Time Recording & Security

The basic setup

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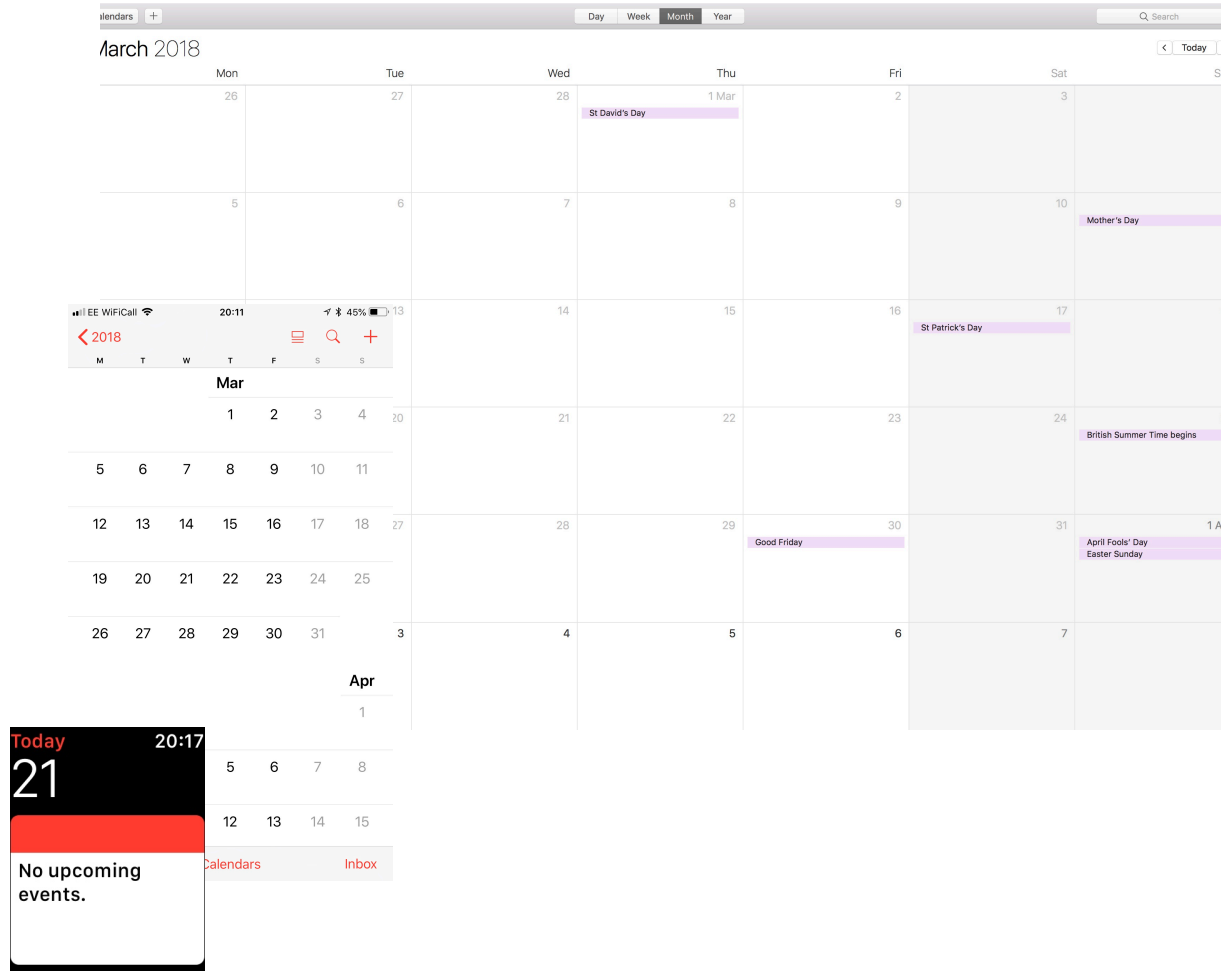
How Did the Timesheet Catch the Spy?

Joke or the downfall of the insider threat

- Nearly all enterprises from big to small require employees to account for their time for a magnitude of reasons
- The objective is to utilise current hardware deployments (CYOD/BYOD) to capture this information, push it to Splunk and transform it into intelligence
- Meaning no more filling in time sheets manually!



The Big Idea

Using hardware the user already has

Capture data from deployed hardware

Push the data to Splunk

Splunk Enterprise indexes data and generates intelligence

Intelligence used to capture the inside threat. Operations can continue

Why This…

Unlike other projects, its “not just because I can”

- Personnel Security
  - Real-time geo-fencing data is ideal to aid in protection of personnel and the threat towards them
  - E-privacy
- Time Management
  - Overtime, annual leave, sickness etc. these can all be calculated without the user interacting with time sheets
  - Anomalies in behaviour can be examined deeper
- Money Saving
  - See what rooms are being used and where the power can be saved

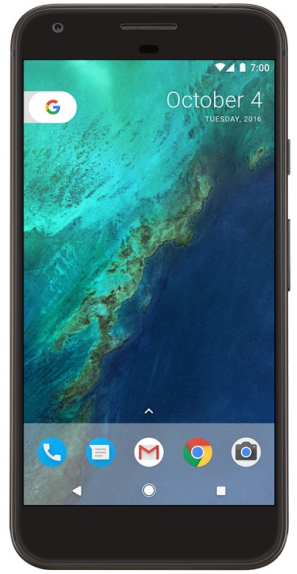
A Royal Navy submariner who was disgruntled after being denied a promotion has admitted gathering military secrets to pass to the Russians.

Hardware and Software

The basic setup

Hardware

Smartwatches
Smartphones
Tablets



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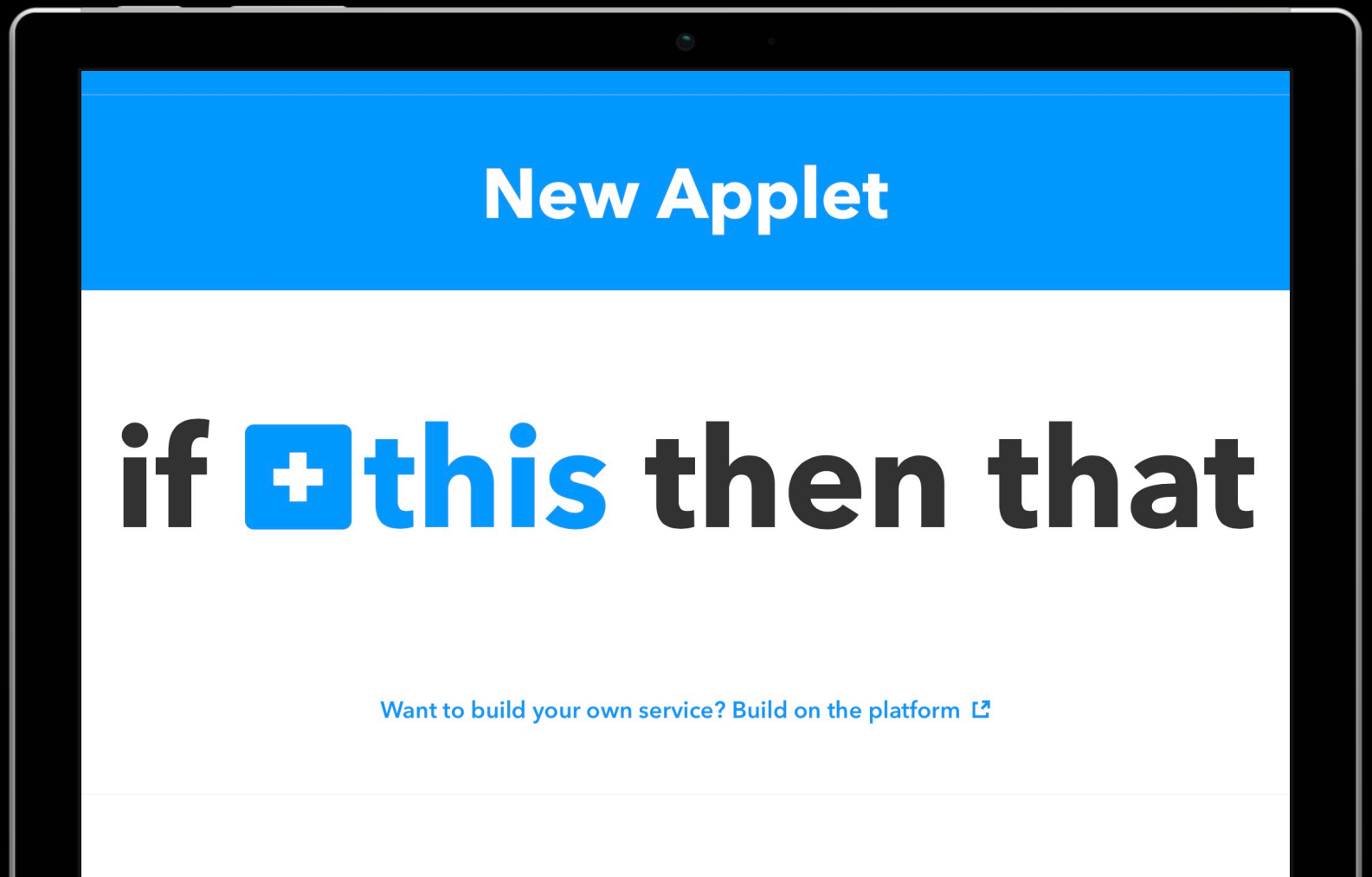
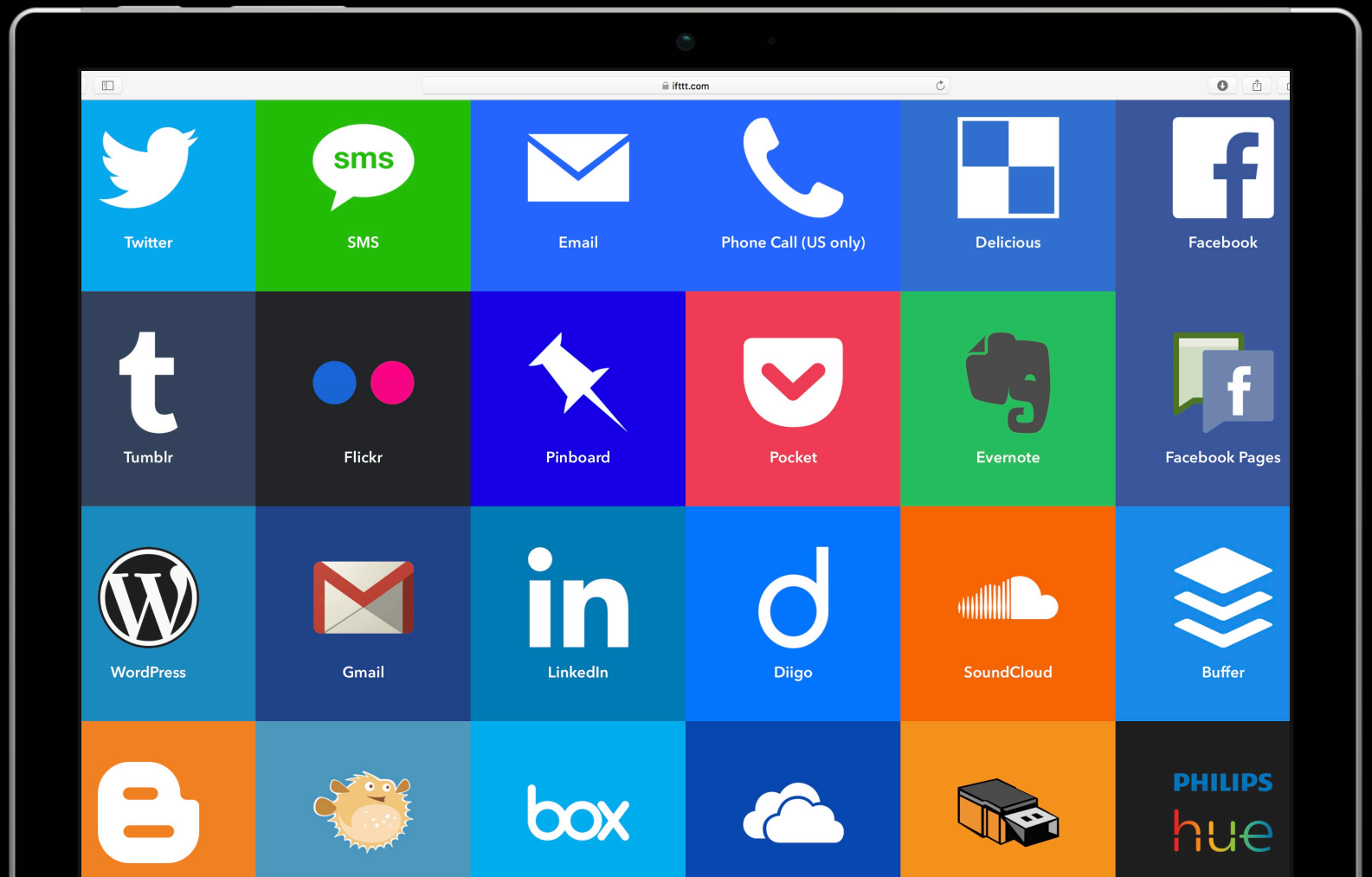
Software / Application

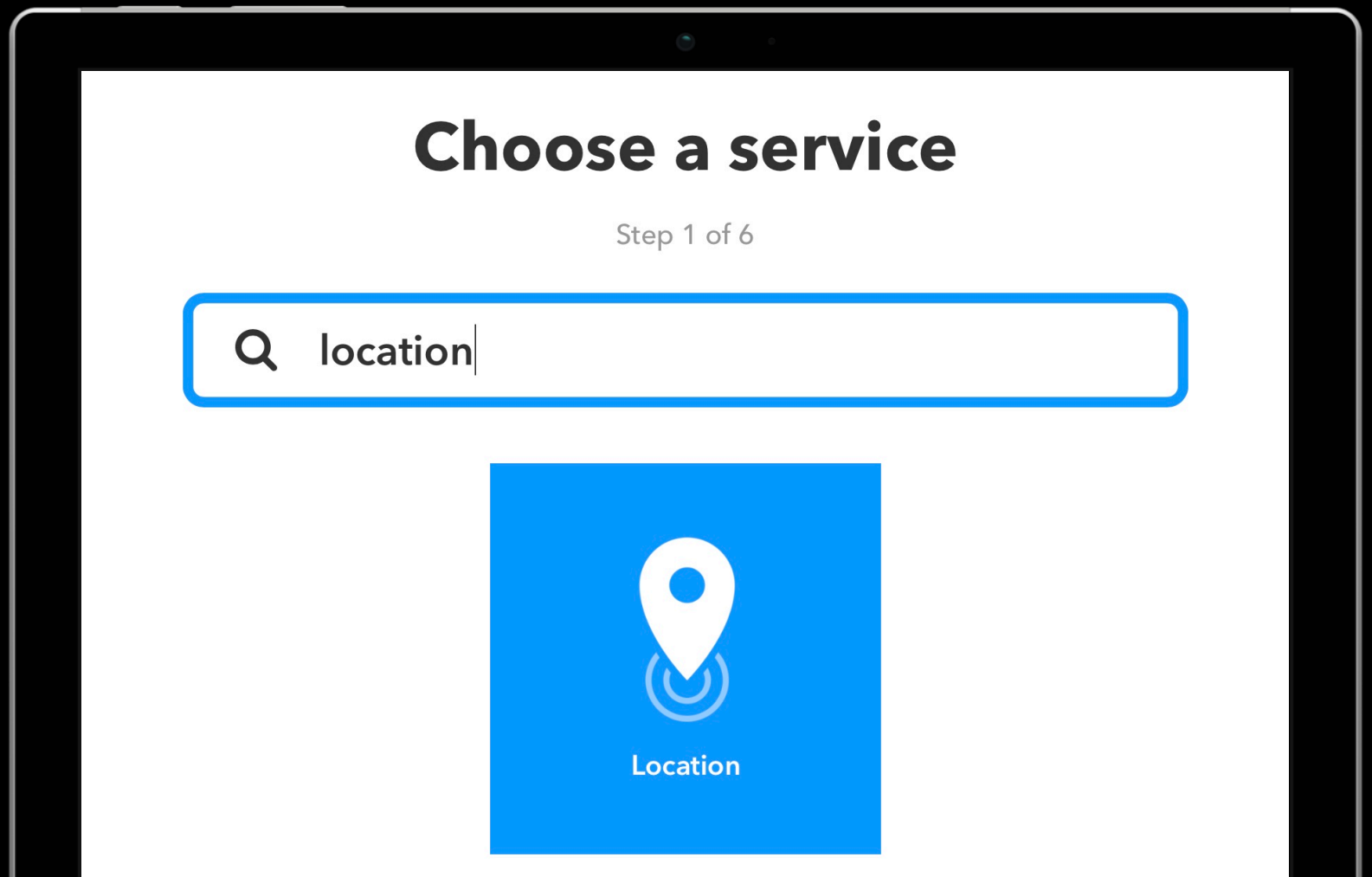
The smart part



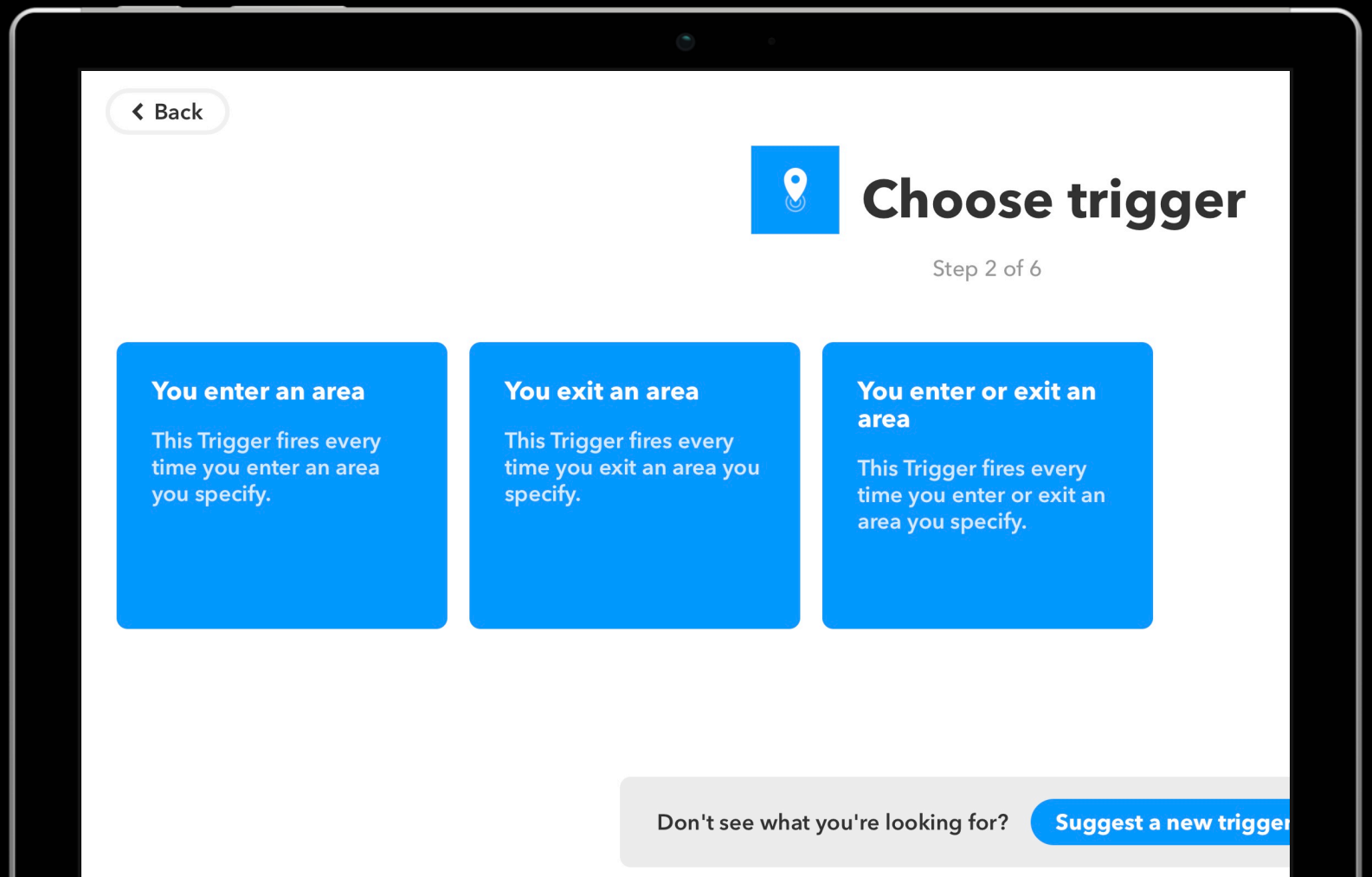
- Not strictly Software, IFTTT is an app
  - If This Then That
- Create custom chains of conditional statements
  - Automate tasks
    - Such as Geo fence locations
- First thing to do is choose If This



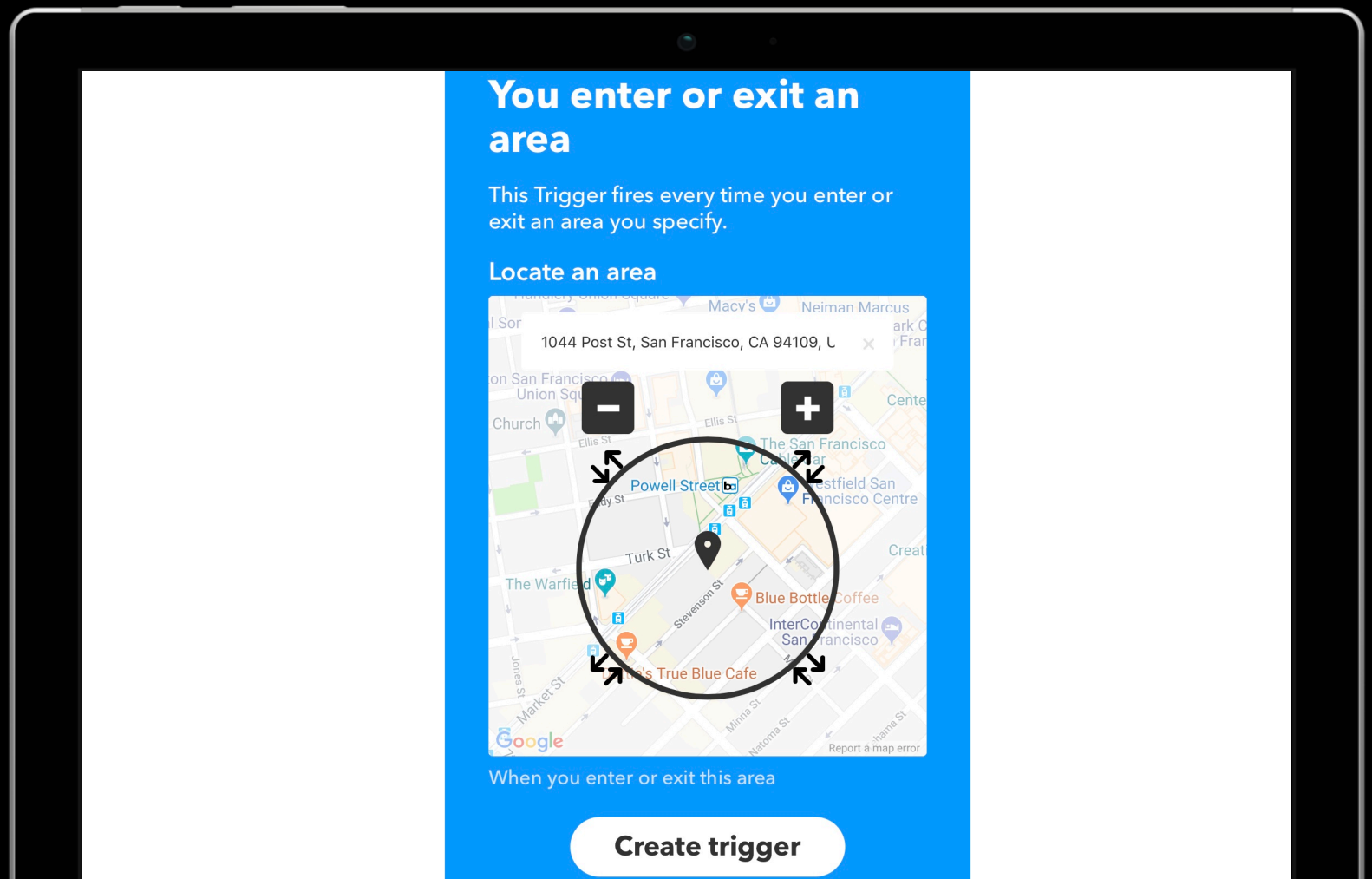
- Many apps to choose from
- Can use device functions
  - Location, SMS etc



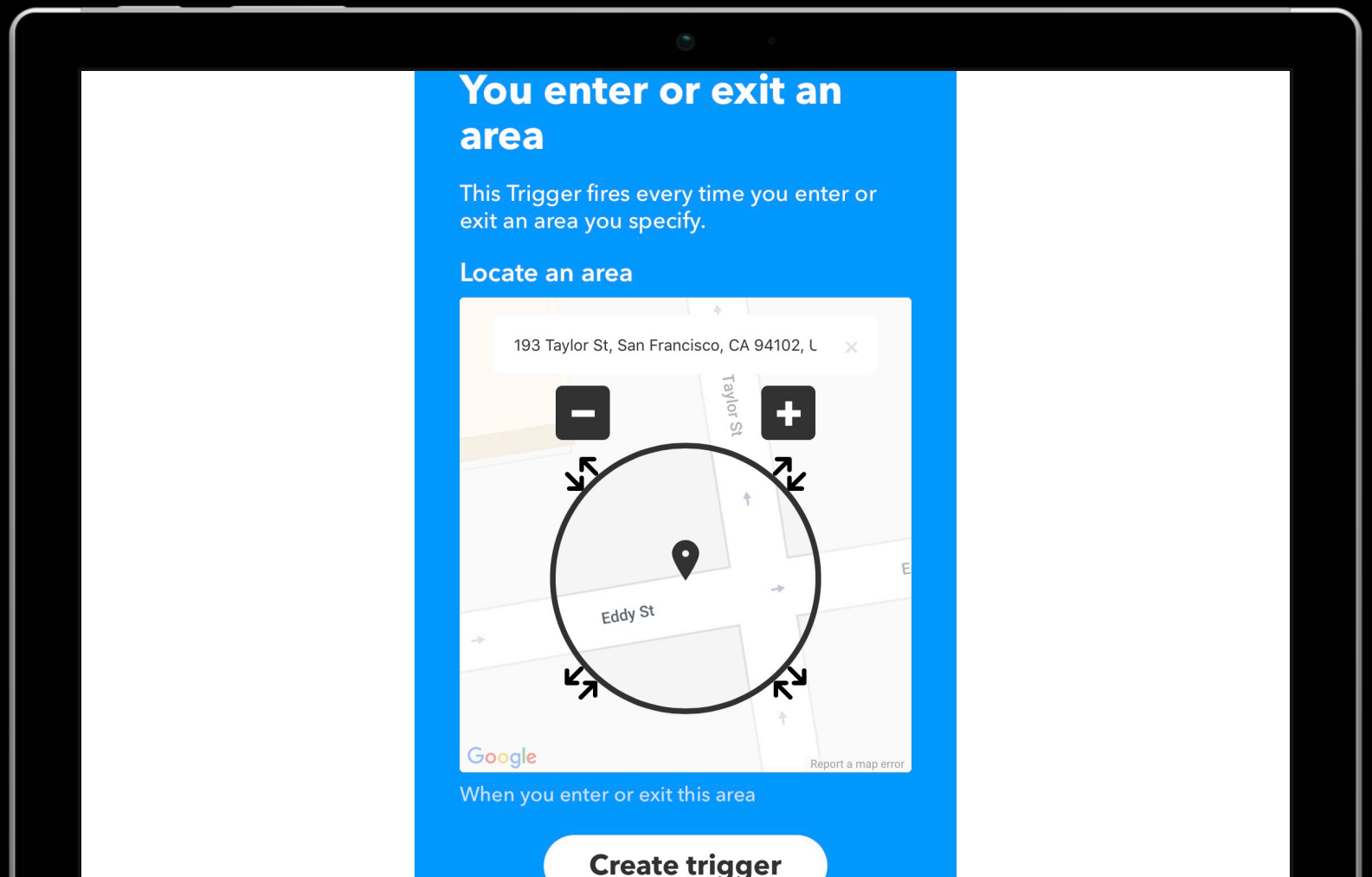
- Choose location



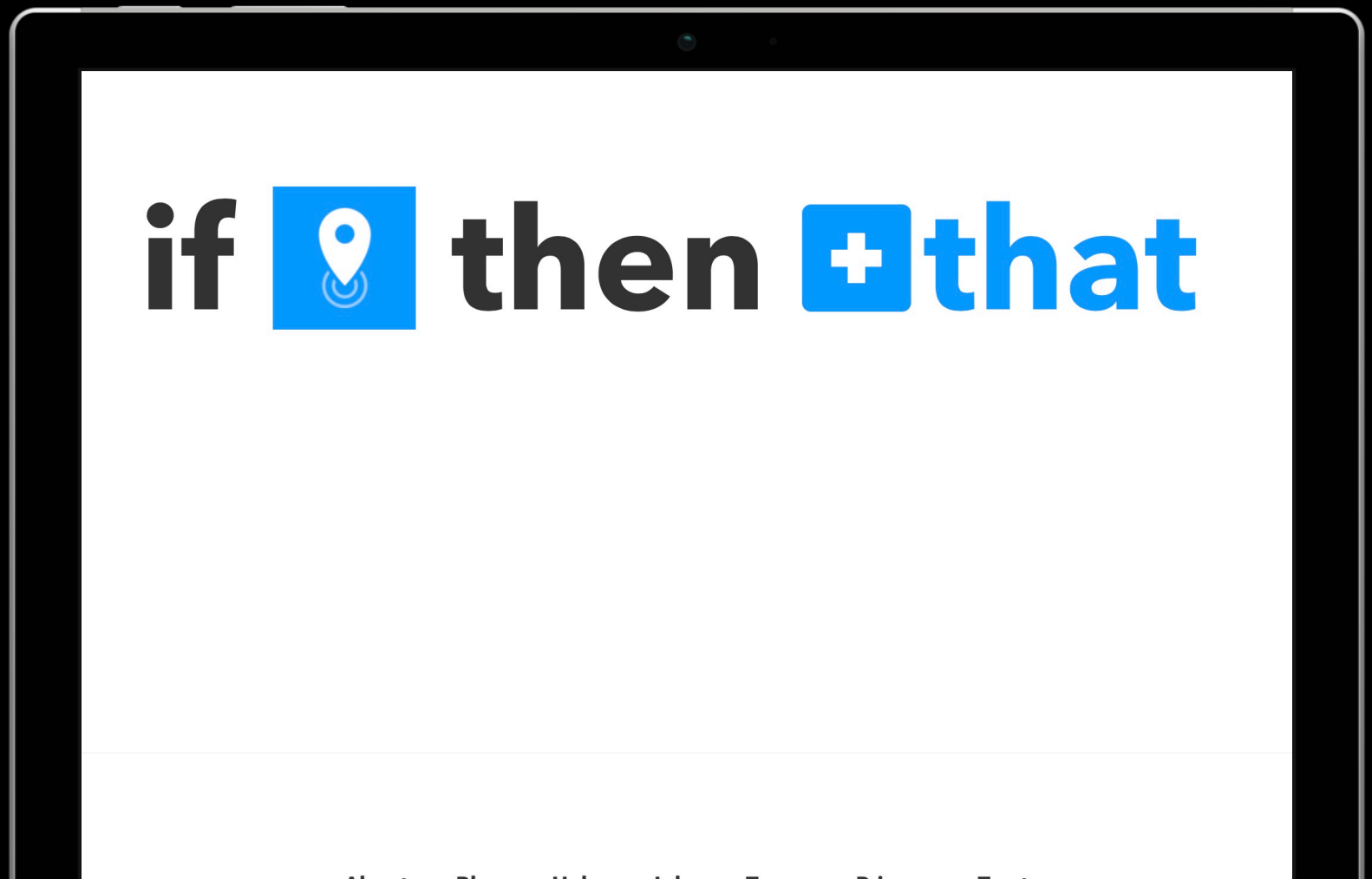
- 3 options
  - Enter
  - Exit
  - Enter or Exit



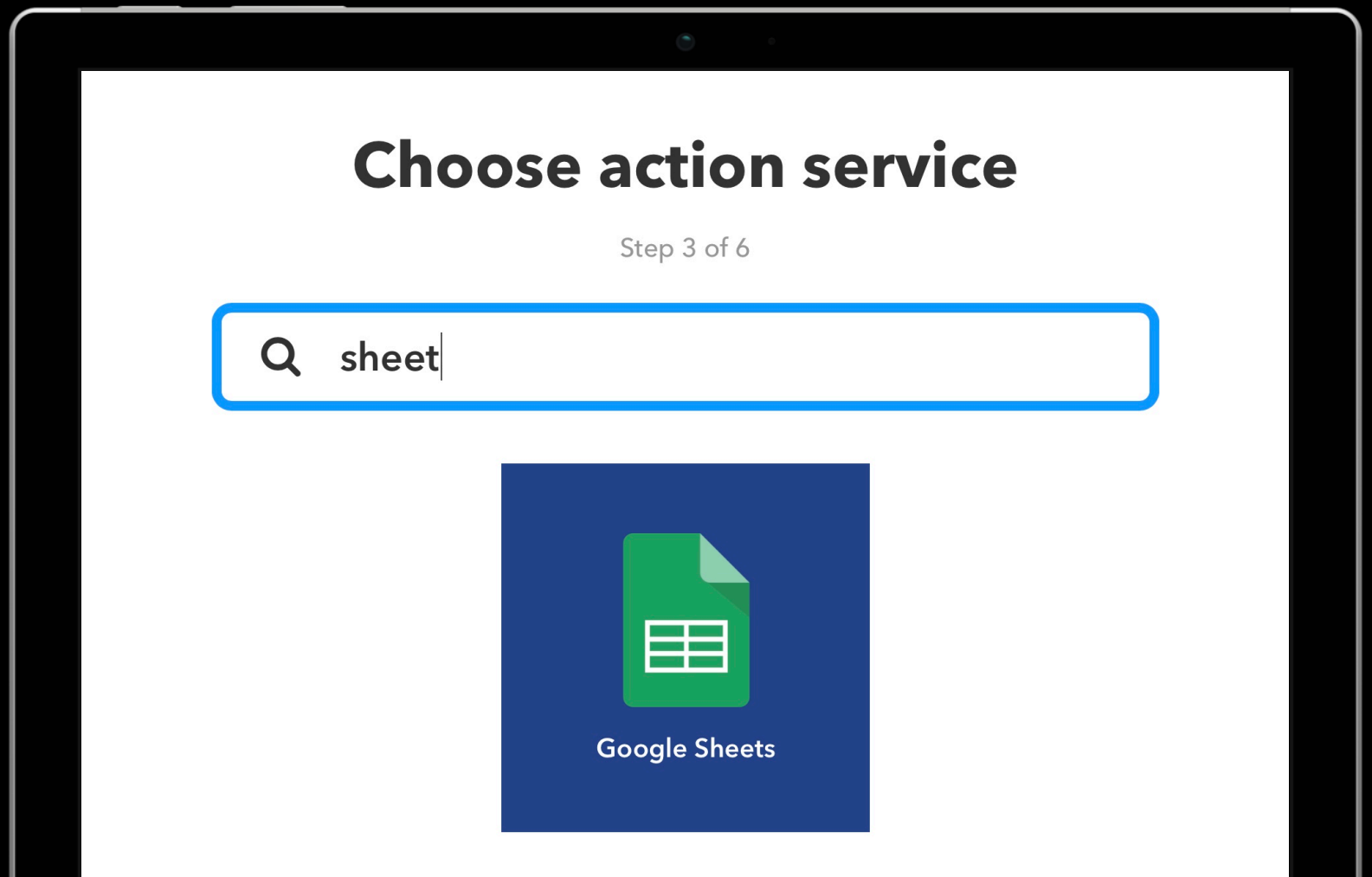
- Select area to use as geo fence



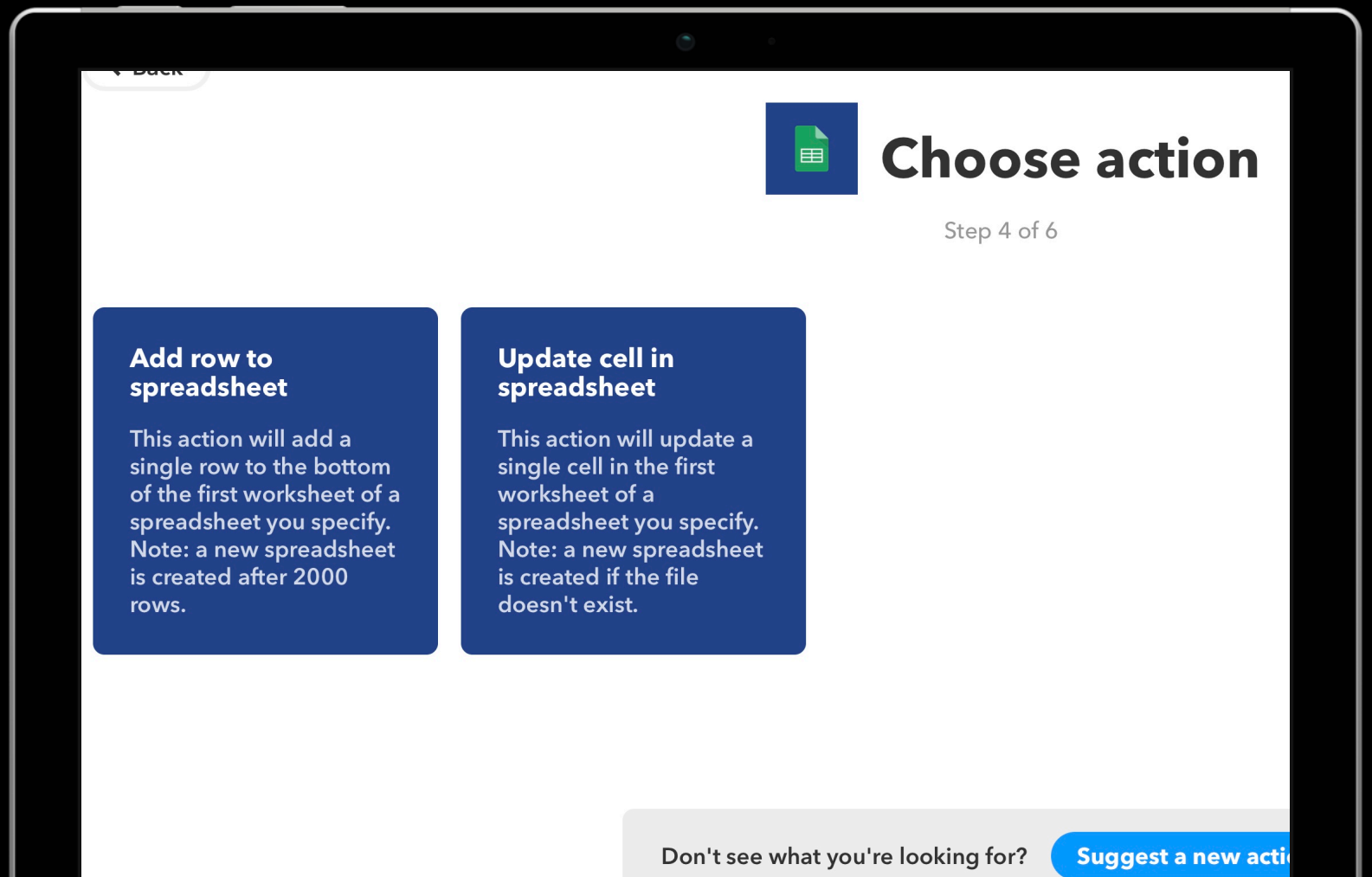
- Can zoom to good scale for finer area



- Now this is done its time to choose that
  - The action for IFTTT to take



- Choose Google Sheet
  - Details of Google drive need to be entered

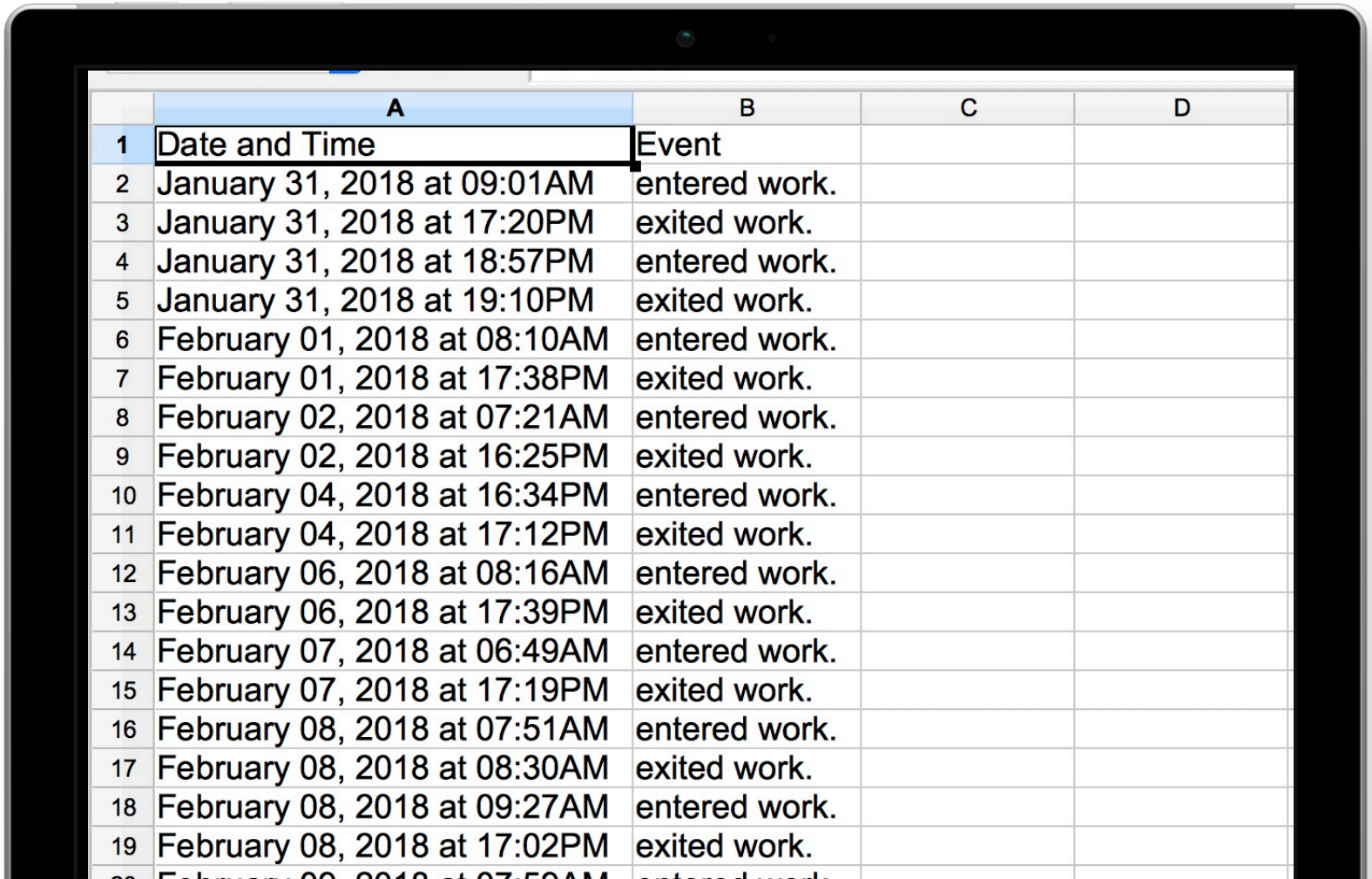


- 2 options
  - Add row
  - Update cell

- Customise the Google sheet
  - Name of document
  - Details to be entered by IFTTT
  - Location of document

The Output

CSV with the chosen data



	A	B	C	D
1	Date and Time	Event		
2	January 31, 2018 at 09:01AM	entered work.		
3	January 31, 2018 at 17:20PM	exited work.		
4	January 31, 2018 at 18:57PM	entered work.		
5	January 31, 2018 at 19:10PM	exited work.		
6	February 01, 2018 at 08:10AM	entered work.		
7	February 01, 2018 at 17:38PM	exited work.		
8	February 02, 2018 at 07:21AM	entered work.		
9	February 02, 2018 at 16:25PM	exited work.		
10	February 04, 2018 at 16:34PM	entered work.		
11	February 04, 2018 at 17:12PM	exited work.		
12	February 06, 2018 at 08:16AM	entered work.		
13	February 06, 2018 at 17:39PM	exited work.		
14	February 07, 2018 at 06:49AM	entered work.		
15	February 07, 2018 at 17:19PM	exited work.		
16	February 08, 2018 at 07:51AM	entered work.		
17	February 08, 2018 at 08:30AM	exited work.		
18	February 08, 2018 at 09:27AM	entered work.		
19	February 08, 2018 at 17:02PM	exited work.		

- Using the settings previously, this is what you would get
  - 2 columns
    - Date and Time
    - Event

Now the Splunk magic

Indexing, Formating and Analysing

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The Splunk Part

All sorts of intelligence can be generated with the simple CSV generated

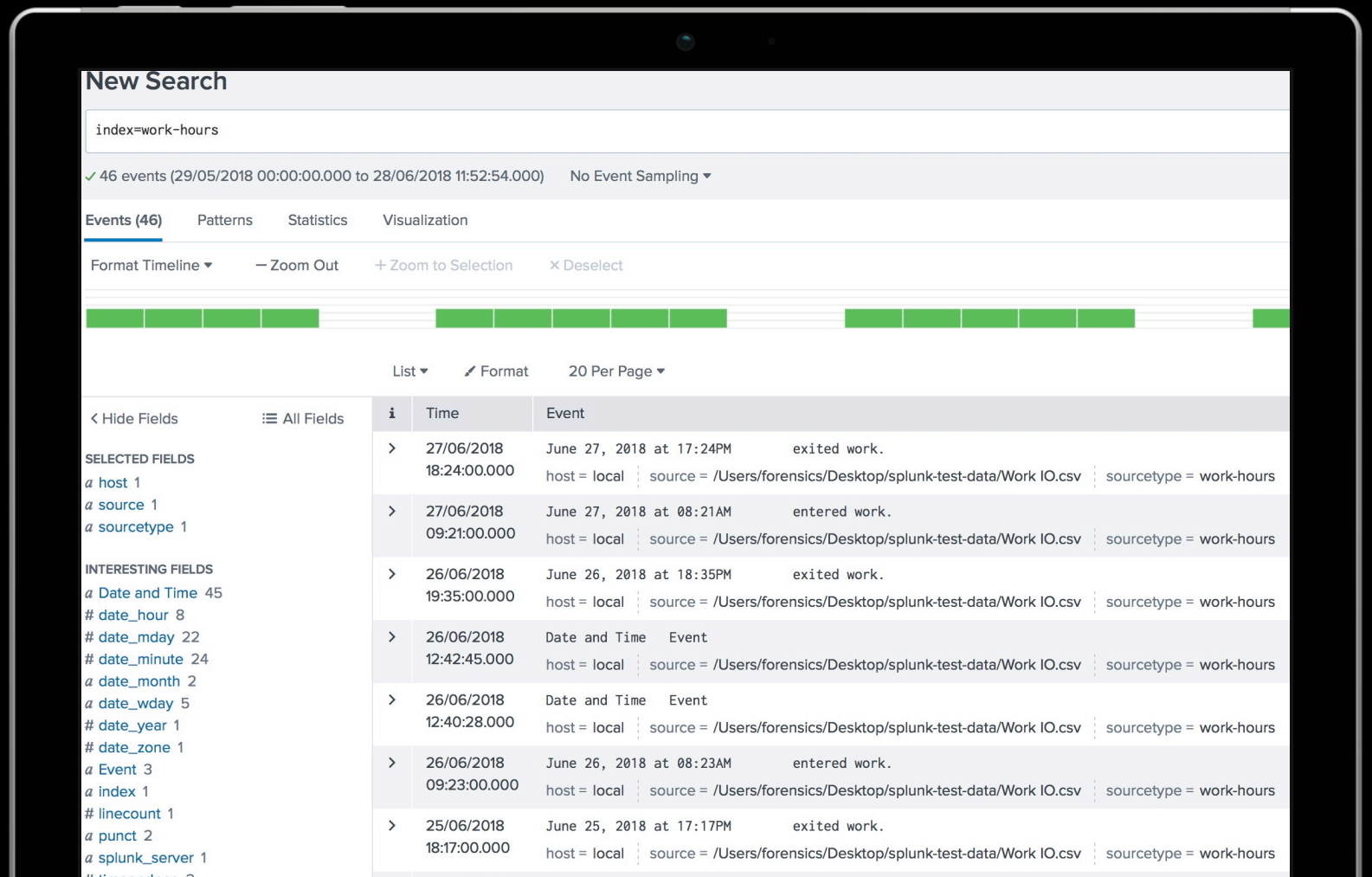
- The data from the CSV can be manipulated to give you so much detailed data, such as:
  - Entry time
  - Exit time
  - Overtime calculations
  - Average working hours
  - Unusual work times
  - Visually stunning graphics for the hierarchy

The main point is….Unusual working hours!

I will show you how this simple CSV can highlight unusual behaviour and can be alerted on for further analysis

The Basics

Google sheet is indexed as CSV



- Data added as CSV using standard ‘add data’
- Simple 2 columns

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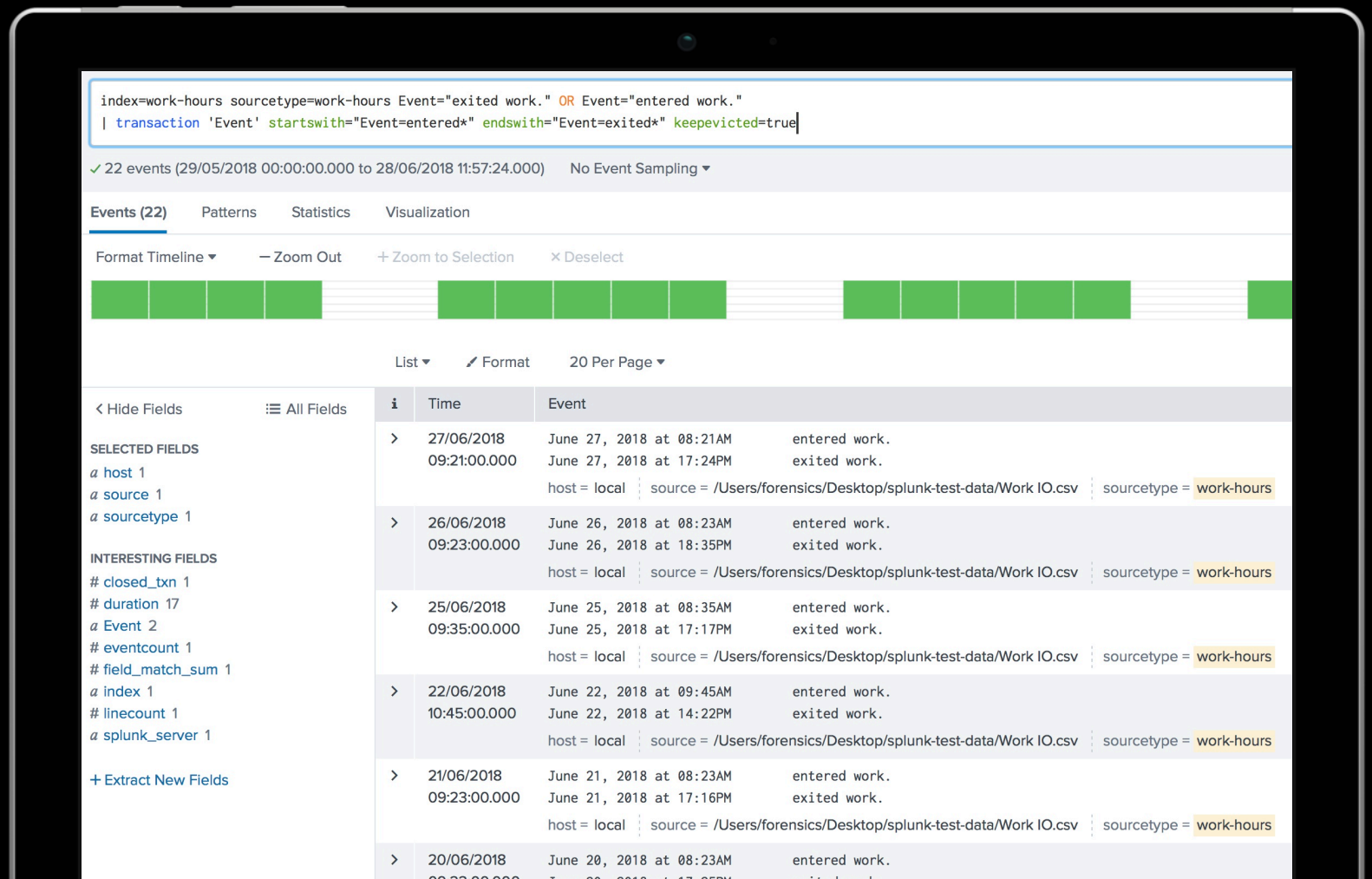
Step 1



- First thing to do is transaction the events
  - Enter work
  - Exit work
  - = one transaction

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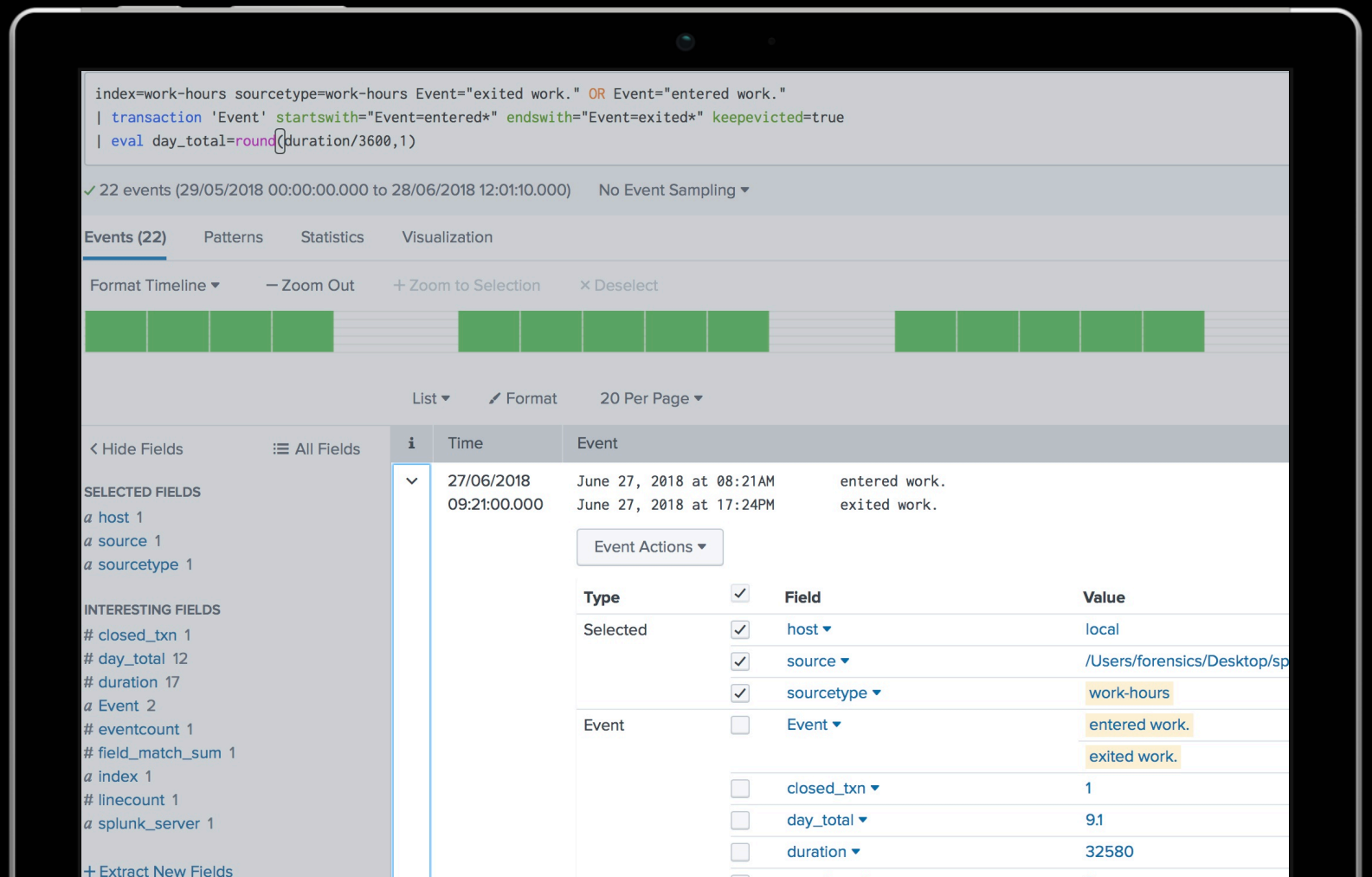
Step 2



- Work out total hours per transaction
  - Create new field of day_total
  - Uses duration divided by seconds in a day

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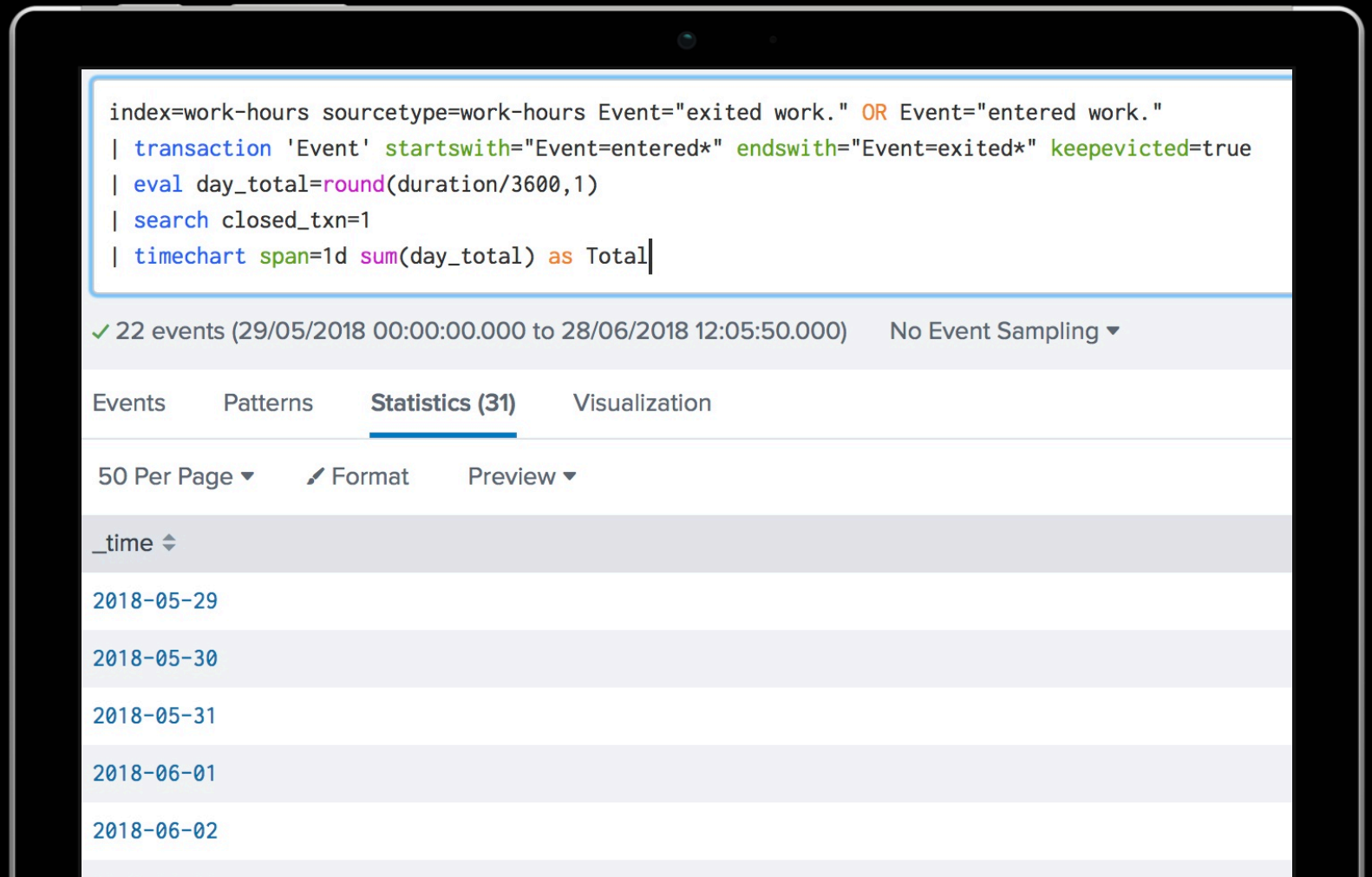
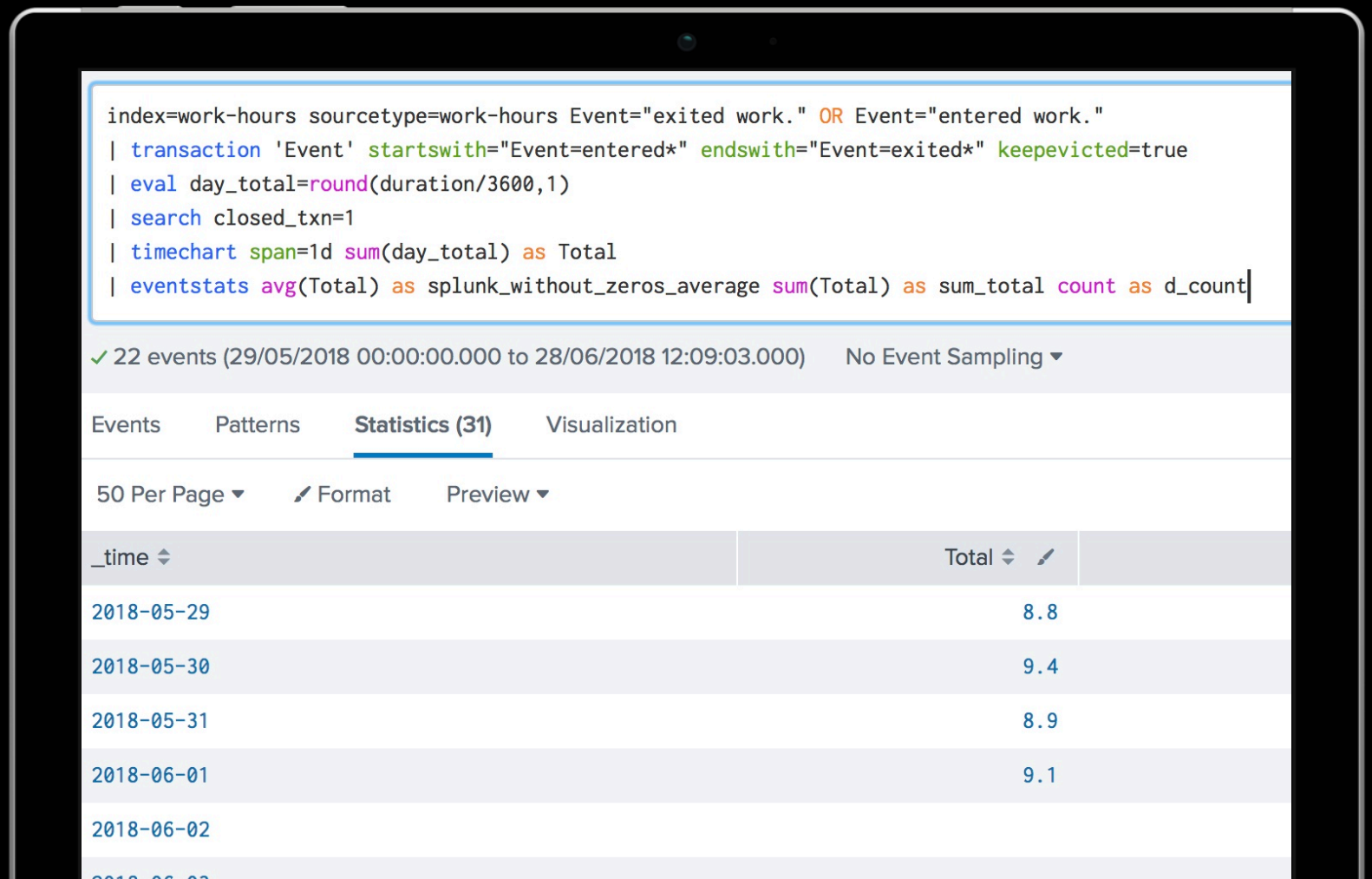
Step 3



- Ensure good transactions are shown
  - closed_txn=1
- 1 day = sum of day_total and renamed to Total

Step 4



```
index=work-hours sourcetype=work-hours Event="exited work." OR Event="entered work."
| transaction 'Event' startswith="Event=entered*" endswith="Event=exited*" keepevicted=true
| eval day_total=round(duration/3600,1)
| search closed_txn=1
| timechart span=1d sum(day_total) as Total
| eventstats avg(Total) as splunk_without_zeros_average sum(Total) as sum_total count as d_count
```

✓ 22 events (29/05/2018 00:00:00.000 to 28/06/2018 12:09:03.000) No Event Sampling

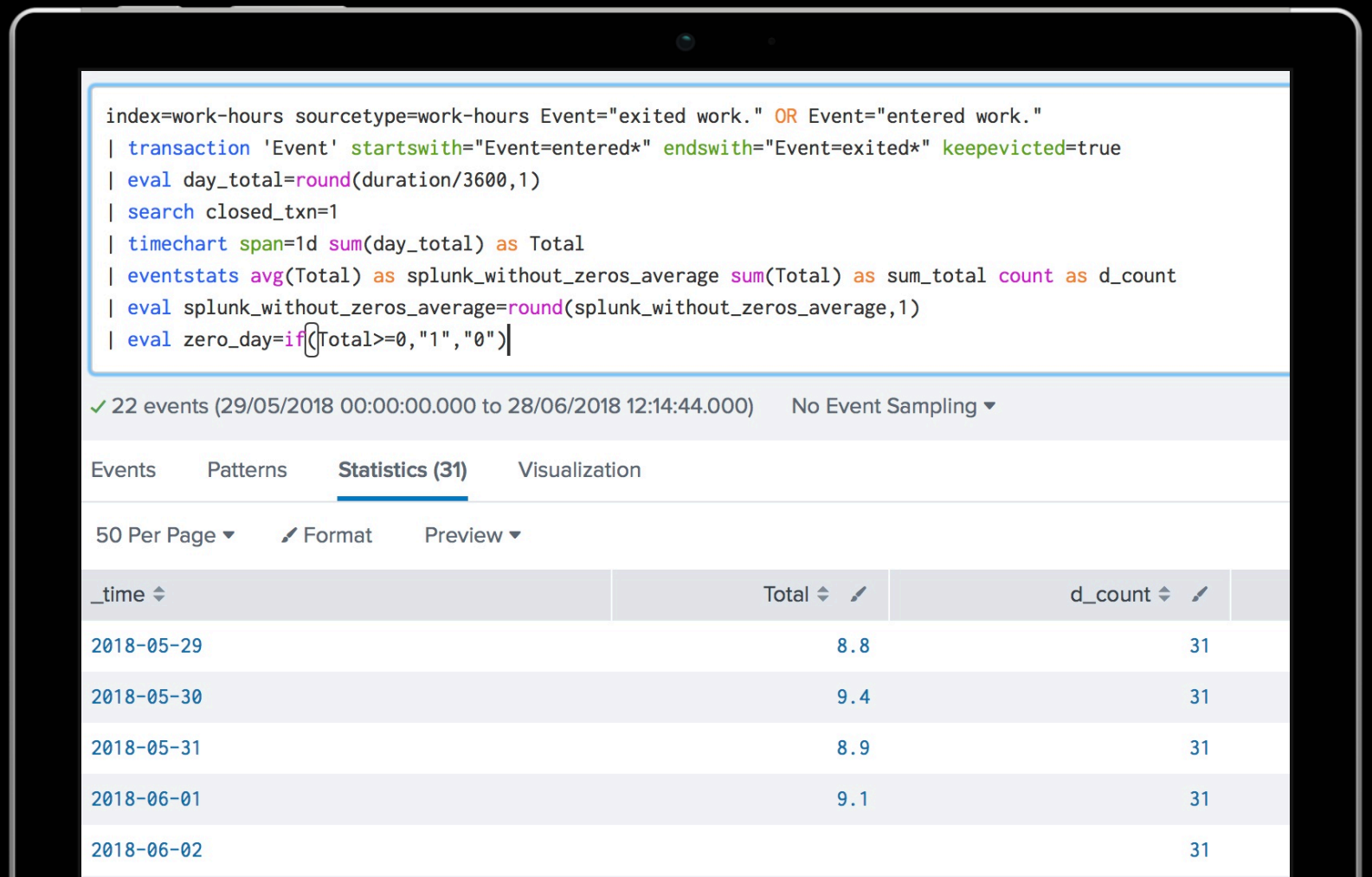
Events Patterns **Statistics (31)** Visualization

50 Per Page Format Preview

_time	Total	
2018-05-29	8.8	
2018-05-30	9.4	
2018-05-31	8.9	
2018-06-01	9.1	
2018-06-02		

- Calculate the last 30 days total
- Work out average amount of hours
  - Average can be used to get overall view of time present in a set period

Step 5



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index=work-hours sourcetype=work-hours Event="exited work." OR Event="entered work."
| transaction 'Event' startswith="Event=entered*" endswith="Event=exited*" keepevicted=true
| eval day_total=round(duration/3600,1)
| search closed_txn=1
| timechart span=1d sum(day_total) as Total
| eventstats avg(Total) as splunk_without_zeros_average sum(Total) as sum_total count as d_count
| eval splunk_without_zeros_average=round(splunk_without_zeros_average,1)
| eval zero_day=if(Total>=0,"1","0")
```

✓ 22 events (29/05/2018 00:00:00.000 to 28/06/2018 12:14:44.000) No Event Sampling

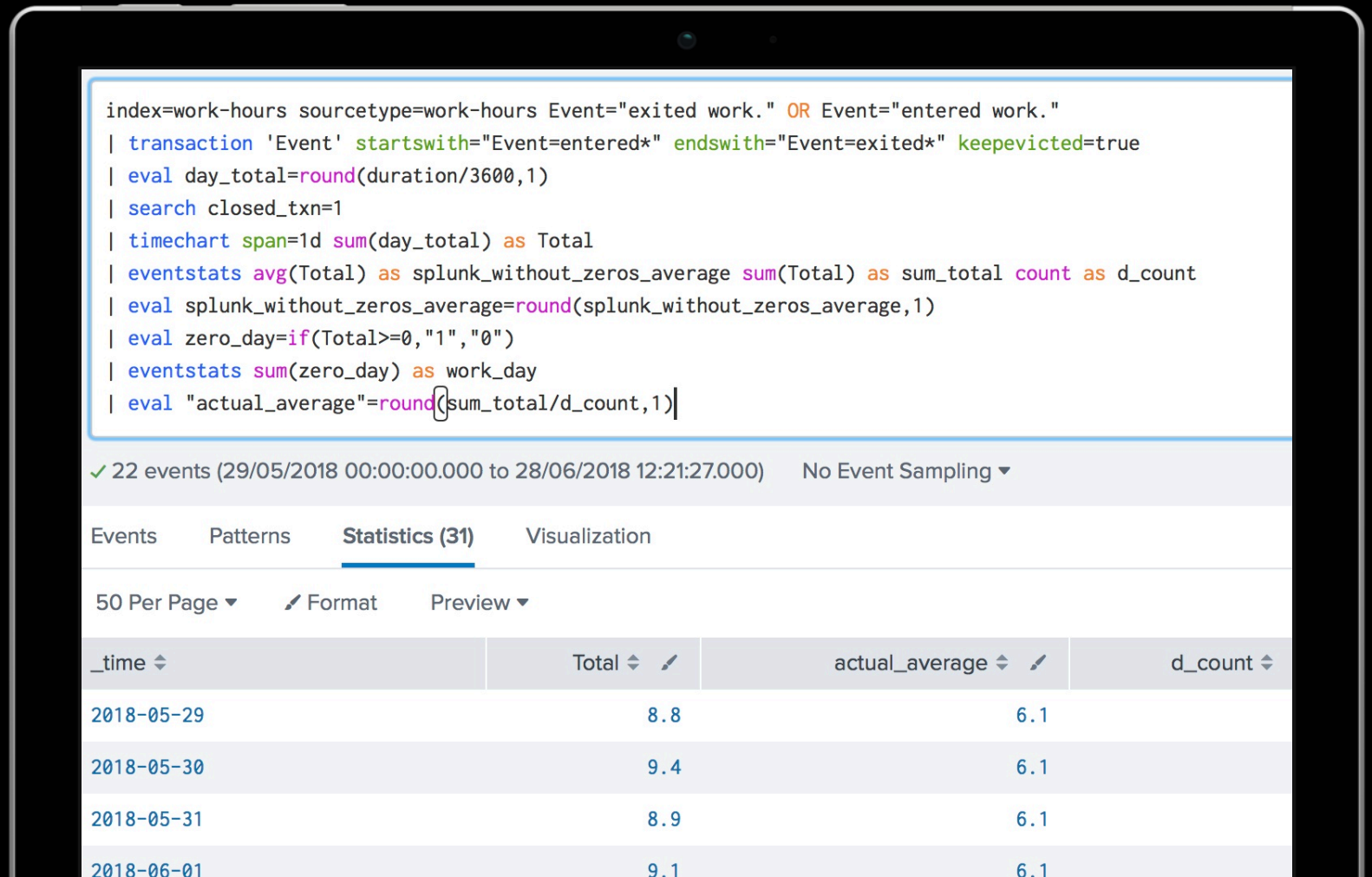
Events Patterns **Statistics (31)** Visualization

50 Per Page Format Preview

_time	Total	d_count
2018-05-29	8.8	31
2018-05-30	9.4	31
2018-05-31	8.9	31
2018-06-01	9.1	31
2018-06-02		31

- Tidy up by rounding the numbers
- Work out if they have been in or not (weekends)

Step 6



```
index=work-hours sourcetype=work-hours Event="exited work." OR Event="entered work."
| transaction 'Event' startswith="Event=entered*" endswith="Event=exited*" keepevicted=true
| eval day_total=round(duration/3600,1)
| search closed_txn=1
| timechart span=1d sum(day_total) as Total
| eventstats avg(Total) as splunk_without_zeros_average sum(Total) as sum_total count as d_count
| eval splunk_without_zeros_average=round(splunk_without_zeros_average,1)
| eval zero_day=if(Total>=0,"1","0")
| eventstats sum(zero_day) as work_day
| eval "actual_average"=round(sum_total/d_count,1)
```

✓ 22 events (29/05/2018 00:00:00.000 to 28/06/2018 12:21:27.000) No Event Sampling

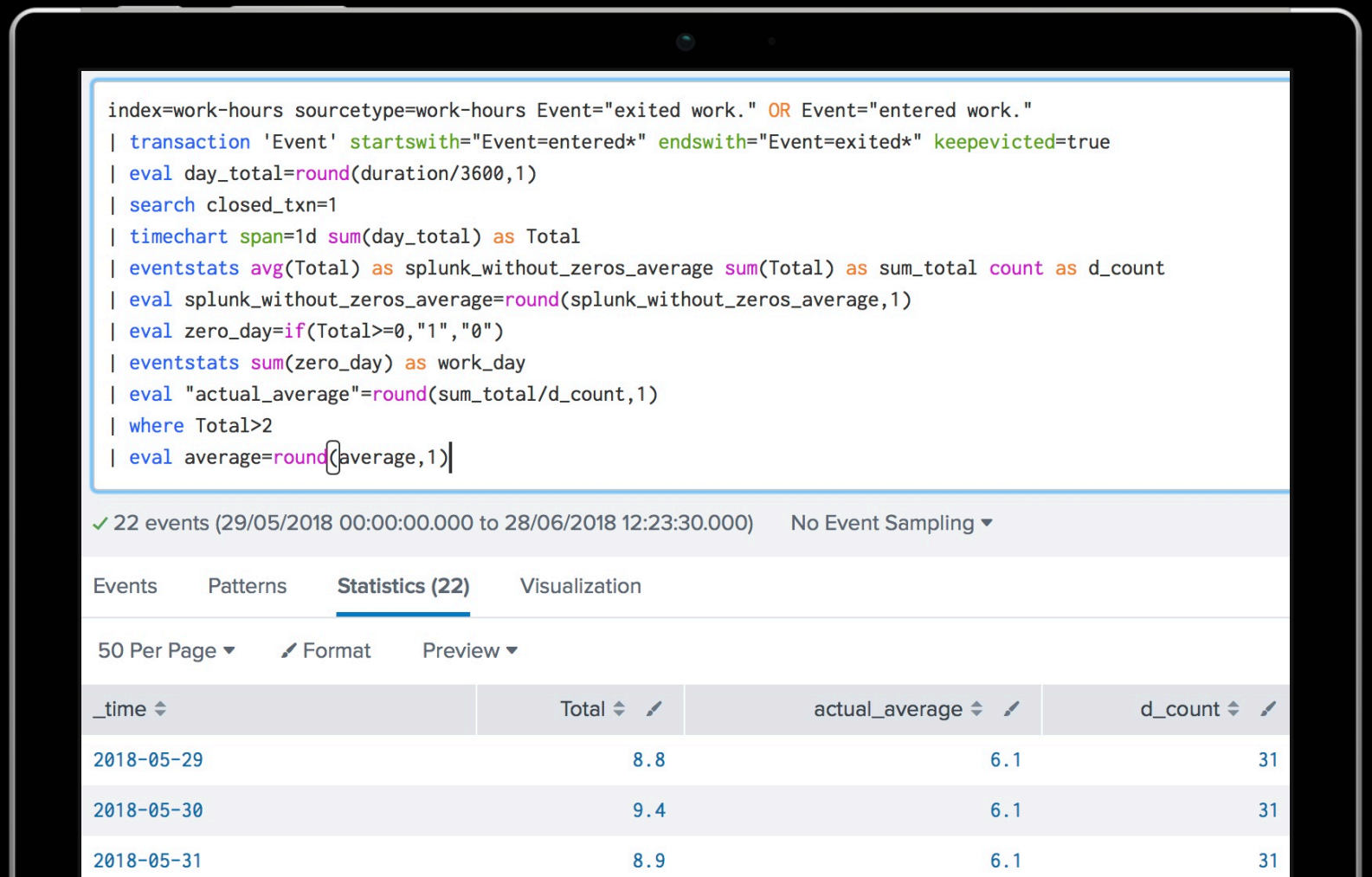
Events Patterns **Statistics (31)** Visualization

50 Per Page Format Preview

_time	Total	actual_average	d_count
2018-05-29	8.8	6.1	
2018-05-30	9.4	6.1	
2018-05-31	8.9	6.1	
2018-06-01	9.1	6.1	

- Calculate average of of worked time
  - Not including weekends and leave etc

Step 7



```
index=work-hours sourcetype=work-hours Event="exited work." OR Event="entered work."
| transaction 'Event' startswith="Event=entered*" endswith="Event=exited*" keepevicted=true
| eval day_total=round(duration/3600,1)
| search closed_txn=1
| timechart span=1d sum(day_total) as Total
| eventstats avg(Total) as splunk_without_zeros_average sum(Total) as sum_total count as d_count
| eval splunk_without_zeros_average=round(splunk_without_zeros_average,1)
| eval zero_day=if(Total>=0,"1","0")
| eventstats sum(zero_day) as work_day
| eval "actual_average"=round(sum_total/d_count,1)
| where Total>2
| eval average=round(average,1)
```

✓ 22 events (29/05/2018 00:00:00.000 to 28/06/2018 12:23:30.000) No Event Sampling

Events Patterns **Statistics (22)** Visualization

50 Per Page Format Preview

_time	Total	actual_average	d_count
2018-05-29	8.8	6.1	31
2018-05-30	9.4	6.1	31
2018-05-31	8.9	6.1	31

- Add condition to only class a work day as more than two hours
  - Personal setting for my time but can be changed to anything
- Then round the average to a useable number

Step 8

```
index=work-hours sourcetype=work-hours Event="exited work." OR Event="entered work."
| transaction 'Event' startswith="Event=entered*" endswith="Event=exited*" keepevicted=true
| eval day_total=round(duration/3600,1)
| search closed_txn=1
| timechart span=1d sum(day_total) as Total
| eventstats avg(Total) as splunk_without_zeros_average sum(Total) as sum_total count as d_count
| eval splunk_without_zeros_average=round(splunk_without_zeros_average,1)
| eval zero_day=if(Total>=0,"1","0")
| eventstats sum(zero_day) as work_day
| eval "actual_average"=round(sum_total/d_count,1)
| where Total>2
| eval average=round(average,1)
| fillnull value=0
| rename _time as date actual_average as "Average/All days" d_count as "Number of Days" splunk_without
    "Total Hours Worked per Day"
```

✓ 22 events (29/05/2018 00:00:00.000 to 28/06/2018 12:30:01.000) No Event Sampling ▾

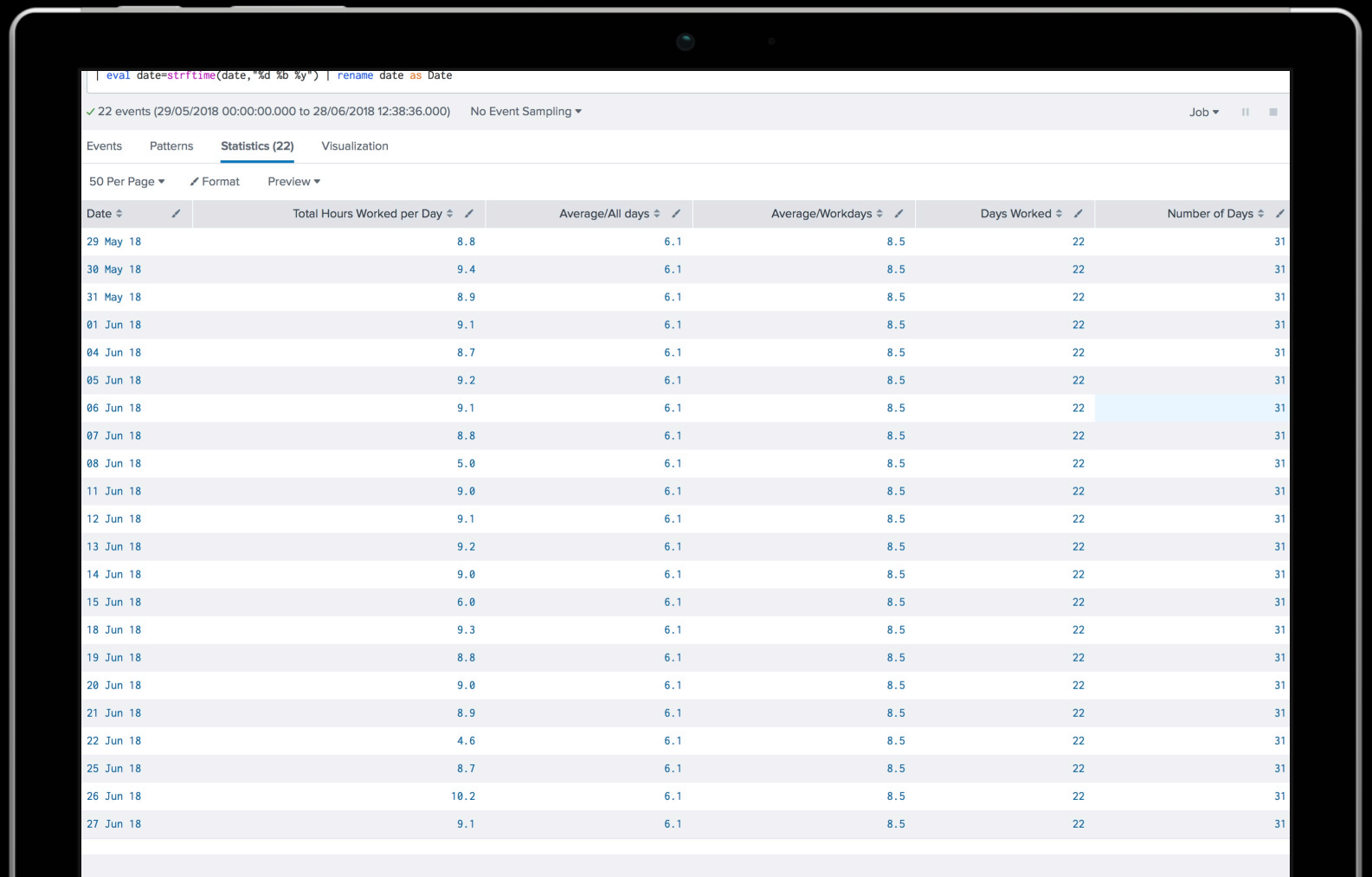
Events Patterns **Statistics (22)** Visualization

50 Per Page ▾ Format Preview ▾

date	Total Hours Worked per Day	Average/All days	Ave

- Beautify the results with some renames

Results



```
| eval date=strftime(date,"%d %b %y") | rename date as Date
```

✓ 22 events (29/05/2018 00:00:00.000 to 28/06/2018 12:38:36.000) No Event Sampling ▾ Job ▾

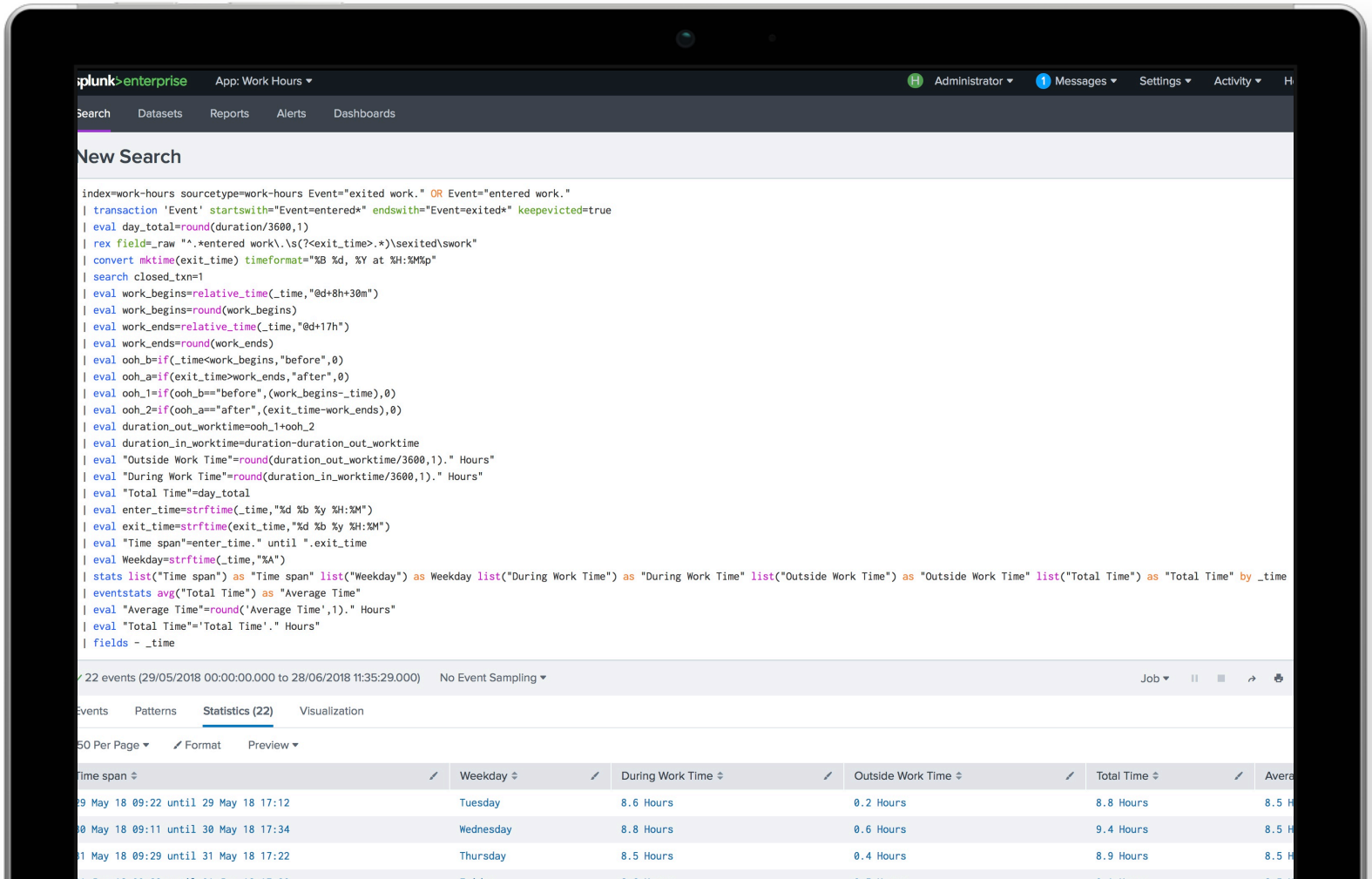
Events Patterns **Statistics (22)** Visualization

50 Per Page ▾ Format Preview ▾

Date	Total Hours Worked per Day	Average/All days	Average/Workdays	Days Worked	Number of Days
29 May 18	8.8	6.1	8.5	22	31
30 May 18	9.4	6.1	8.5	22	31
31 May 18	8.9	6.1	8.5	22	31
01 Jun 18	9.1	6.1	8.5	22	31
04 Jun 18	8.7	6.1	8.5	22	31
05 Jun 18	9.2	6.1	8.5	22	31
06 Jun 18	9.1	6.1	8.5	22	31
07 Jun 18	8.8	6.1	8.5	22	31
08 Jun 18	5.0	6.1	8.5	22	31
11 Jun 18	9.0	6.1	8.5	22	31
12 Jun 18	9.1	6.1	8.5	22	31
13 Jun 18	9.2	6.1	8.5	22	31
14 Jun 18	9.0	6.1	8.5	22	31
15 Jun 18	6.0	6.1	8.5	22	31
18 Jun 18	9.3	6.1	8.5	22	31
19 Jun 18	8.8	6.1	8.5	22	31
20 Jun 18	9.0	6.1	8.5	22	31
21 Jun 18	8.9	6.1	8.5	22	31
22 Jun 18	4.6	6.1	8.5	22	31
25 Jun 18	8.7	6.1	8.5	22	31
26 Jun 18	10.2	6.1	8.5	22	31
27 Jun 18	9.1	6.1	8.5	22	31

- Now we have useable data for working stats

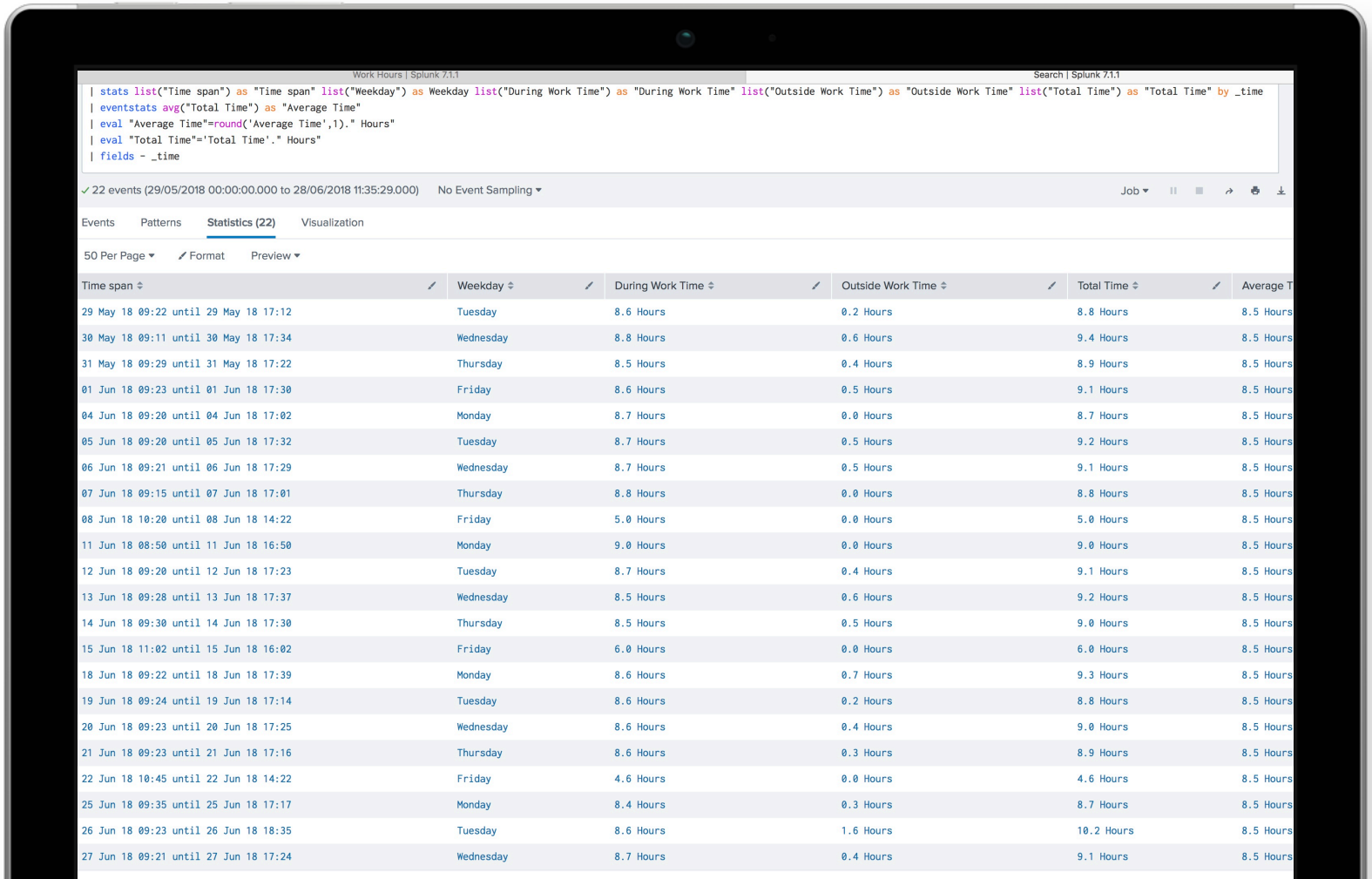
Why Stop There!



- Using the same data and a mix of other Splunk commands
  - If functions
  - Time formatting
  - Avg
  - list
- A more detailed view can be achieved

splunk> .conf18

More Detail…



Time span	Weekday	During Work Time	Outside Work Time	Total Time	Average T
29 May 18 09:22 until 29 May 18 17:12	Tuesday	8.6 Hours	0.2 Hours	8.8 Hours	8.5 Hours
30 May 18 09:11 until 30 May 18 17:34	Wednesday	8.8 Hours	0.6 Hours	9.4 Hours	8.5 Hours
31 May 18 09:29 until 31 May 18 17:22	Thursday	8.5 Hours	0.4 Hours	8.9 Hours	8.5 Hours
01 Jun 18 09:23 until 01 Jun 18 17:30	Friday	8.6 Hours	0.5 Hours	9.1 Hours	8.5 Hours
04 Jun 18 09:20 until 04 Jun 18 17:02	Monday	8.7 Hours	0.0 Hours	8.7 Hours	8.5 Hours
05 Jun 18 09:20 until 05 Jun 18 17:32	Tuesday	8.7 Hours	0.5 Hours	9.2 Hours	8.5 Hours
06 Jun 18 09:21 until 06 Jun 18 17:29	Wednesday	8.7 Hours	0.5 Hours	9.1 Hours	8.5 Hours
07 Jun 18 09:15 until 07 Jun 18 17:01	Thursday	8.8 Hours	0.0 Hours	8.8 Hours	8.5 Hours
08 Jun 18 10:20 until 08 Jun 18 14:22	Friday	5.0 Hours	0.0 Hours	5.0 Hours	8.5 Hours
11 Jun 18 08:50 until 11 Jun 18 16:50	Monday	9.0 Hours	0.0 Hours	9.0 Hours	8.5 Hours
12 Jun 18 09:20 until 12 Jun 18 17:23	Tuesday	8.7 Hours	0.4 Hours	9.1 Hours	8.5 Hours
13 Jun 18 09:28 until 13 Jun 18 17:37	Wednesday	8.5 Hours	0.6 Hours	9.2 Hours	8.5 Hours
14 Jun 18 09:30 until 14 Jun 18 17:30	Thursday	8.5 Hours	0.5 Hours	9.0 Hours	8.5 Hours
15 Jun 18 11:02 until 15 Jun 18 16:02	Friday	6.0 Hours	0.0 Hours	6.0 Hours	8.5 Hours
18 Jun 18 09:22 until 18 Jun 18 17:39	Monday	8.6 Hours	0.7 Hours	9.3 Hours	8.5 Hours
19 Jun 18 09:24 until 19 Jun 18 17:14	Tuesday	8.6 Hours	0.2 Hours	8.8 Hours	8.5 Hours
20 Jun 18 09:23 until 20 Jun 18 17:25	Wednesday	8.6 Hours	0.4 Hours	9.0 Hours	8.5 Hours
21 Jun 18 09:23 until 21 Jun 18 17:16	Thursday	8.6 Hours	0.3 Hours	8.9 Hours	8.5 Hours
22 Jun 18 10:45 until 22 Jun 18 14:22	Friday	4.6 Hours	0.0 Hours	4.6 Hours	8.5 Hours
25 Jun 18 09:35 until 25 Jun 18 17:17	Monday	8.4 Hours	0.3 Hours	8.7 Hours	8.5 Hours
26 Jun 18 09:23 until 26 Jun 18 18:35	Tuesday	8.6 Hours	1.6 Hours	10.2 Hours	8.5 Hours
27 Jun 18 09:21 until 27 Jun 18 17:24	Wednesday	8.7 Hours	0.4 Hours	9.1 Hours	8.5 Hours

- A more detailed table can be created

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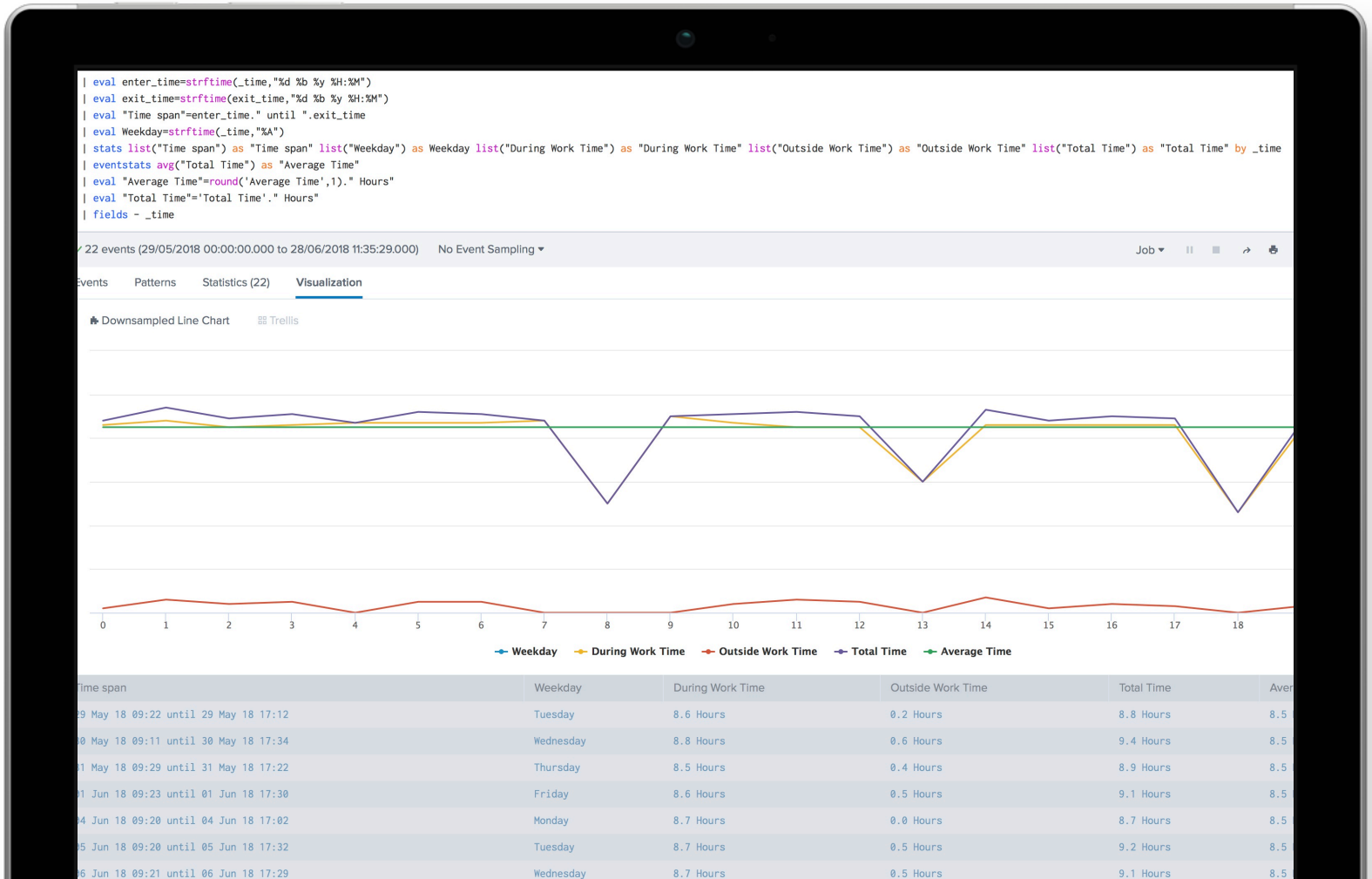
Visually Better



- Leading to a more visually pleasing chart of the users working hours

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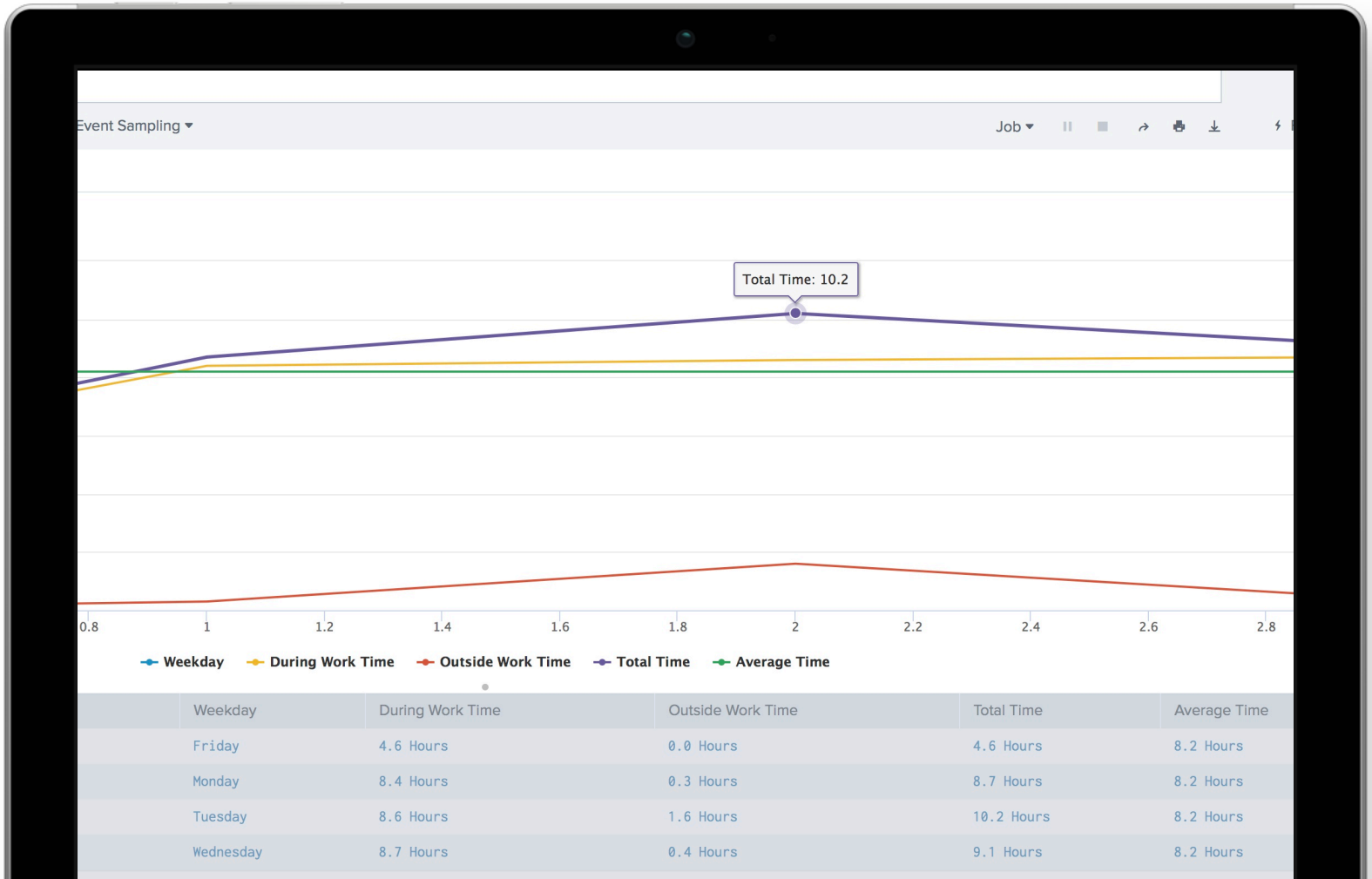
Easier To Understand



Weekday	During Work Time	Outside Work Time	Total Time	Average Time
Friday	4.6 Hours	0.0 Hours	4.6 Hours	8.2 Hours
Monday	8.4 Hours	0.3 Hours	8.7 Hours	8.2 Hours
Tuesday	8.6 Hours	1.6 Hours	10.2 Hours	8.2 Hours
Wednesday	8.7 Hours	0.4 Hours	9.1 Hours	8.2 Hours

- Not only is it visually better
- It can also be used to highlight data you may want to set alerts for
- For example, we have an above average time with a visible peak in out of hours presence

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The So What…

- This peak shows that the user was present in work out side of the times set for the users normal working day
  - What was the user doing
  - Should they be in at that time
  - Why are they in 2 hours longer than normal
  - Insider threat???
- How about:
  - Exfil
  - Log deletion
  - Implant

All is not lost! You can alert to this potential threat potentially before it happens

Alerts

Weekday	During Work Time	Outside Work Time	Total Time
Friday	4.6 Hours	0.0 Hours	4.6 Hours
Monday	8.4 Hours	0.3 Hours	8.7 Hours
Tuesday	8.6 Hours	1.6 Hours	10.2 Hours

- Looking at behaviour of their normal working hours
- Alerts can be generated for anything out of the norm

What About Way Points

- Using the IFTTT and the recording setup, its also possible to set way points of a route taken.
- Think about:
  - Personnel at risk of kidnap
  - Security vans
  - Routine movement of company property

Future Plans

Going forward with the project

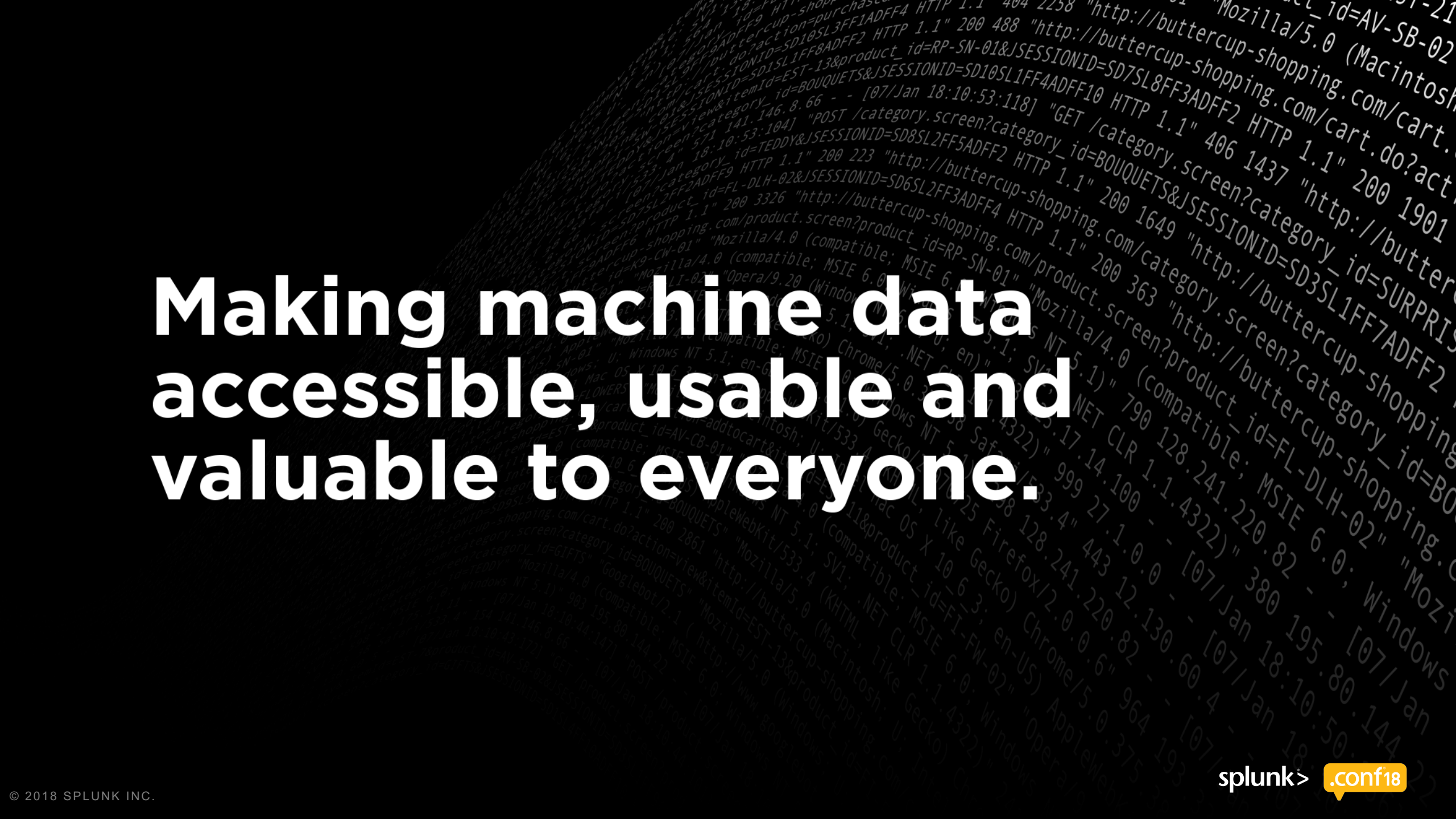
- In its current version, time recording is done with IFTTT, the plan to go forward is:
  - Create separate application for iOS and Android and place in App Stores
  - Feed data directly in to Splunk, not via CSV monitor
  - Link alerting to mail server
  - Manager app
    - See live data for manager perspective
    - Health and safety - Fire evacuation, who is where
- Create a TA for Splunk to partner with the App from the app store, the benefits of this would be:
  - Pre built dashboards displaying key information
  - Simple alerting so key security concerns can be received as soon as possible

Cross industry utility

Where else can this be used…

- The time recording app and TA would not only benefit security teams, but what about…
  - Automotive - Where are the vehicles = Where should new charging points be
  - Hours in hospital for surgeons - tired surgeon, error in surgery
  - Professional drivers - Leave the depot, are they resting?
  - Education - Are students attending lectures?
  - Staff of interest - Is kidnap a risk at your organisation
  - Basically anything with a GPS signal…..

The possibilities are endless for location based monitoring in Splunk, if it isn't normal behaviour, what is it??



Making machine data accessible, usable and valuable to everyone.

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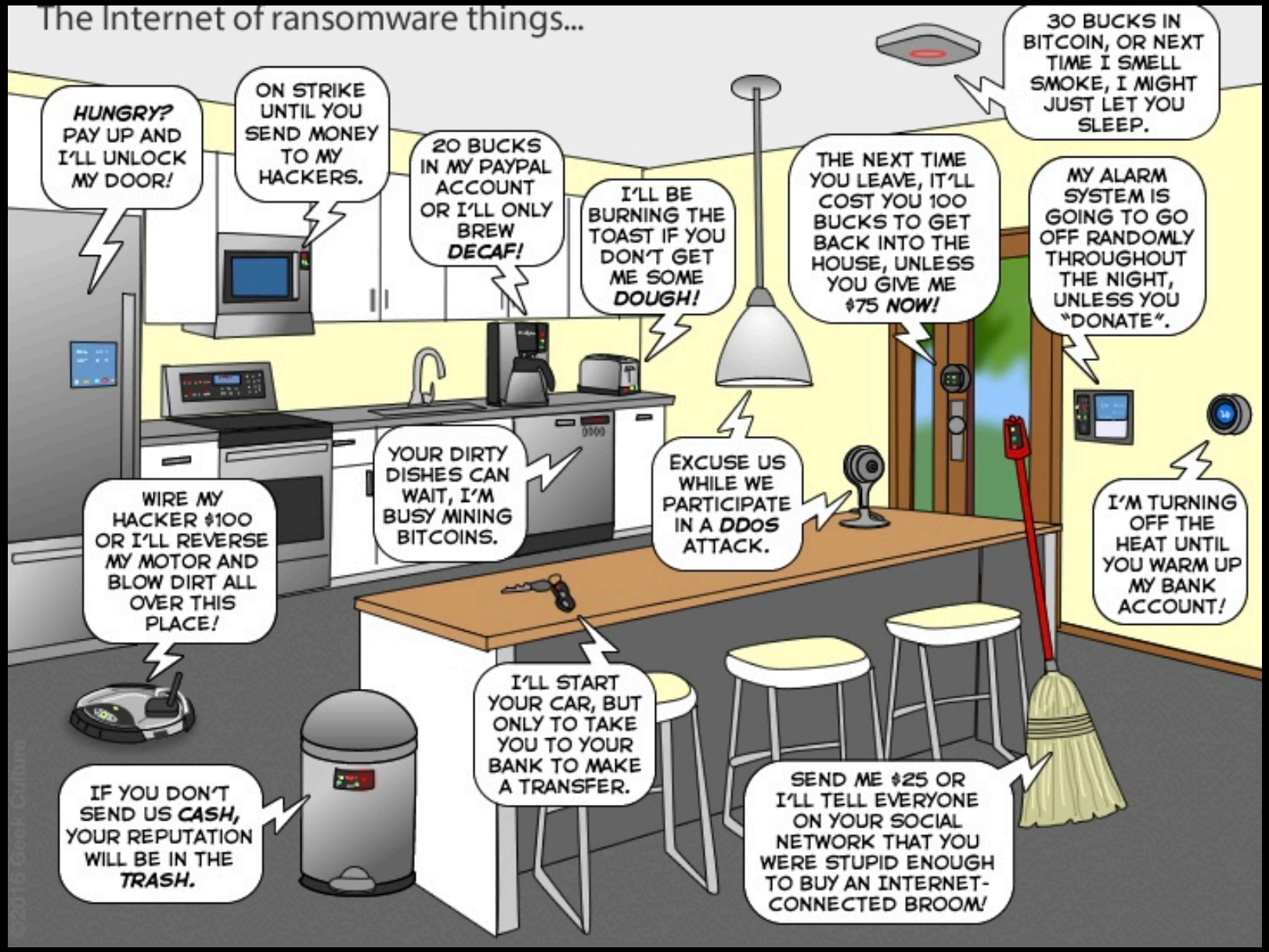
Any Questions?

Thank You



Thank You

Don't forget to rate this session in the .conf18 mobile app