Bringing standards into Zabbix visualization approach in a complex environment

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Introduction

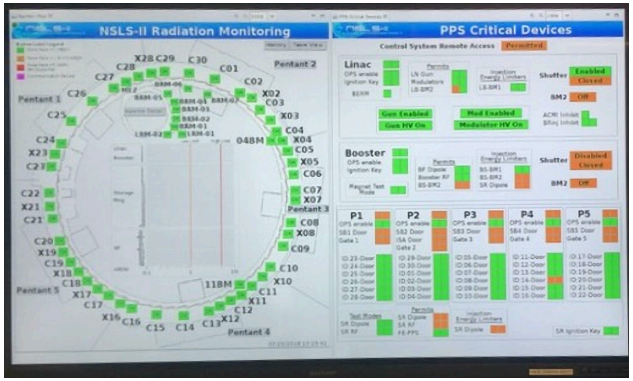
In this conference, it is generally understood that collecting and analysing telemetry data is valuable. The importance of creating alerts, escalation procedures, and response actions is also well recognised. This discussion will focus on standards for effective telemetry data visualization. While Zabbix and its extensive template-based widgets will be referenced, the aim is not to explain how to use Zabbix, but to outline key considerations and approaches for creating effective visualizations within its context.

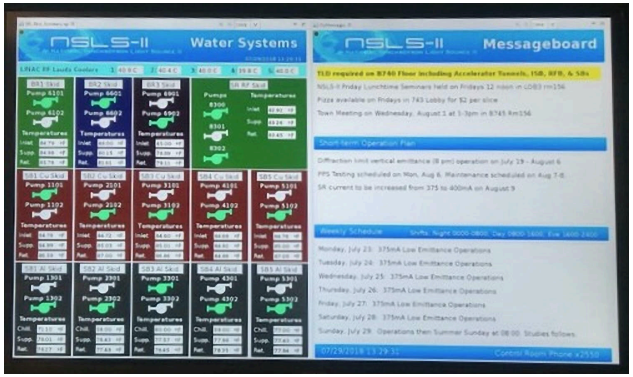
Understanding the Role of Observability Platforms for Non-Experts

For the majority of current and prospective users, observability platforms such as Zabbix function primarily as instrumental tools rather than domains of specialised knowledge. While these users are recognised professionals within their disciplines, they typically do not possess expert proficiency in monitoring or observability per se.

Cognitive Constraints in Real-Time Data Visualization

The capacity of individuals to process, analyze, and respond to data is generally constrained, and these cognitive functions are further diminished under conditions of stress.





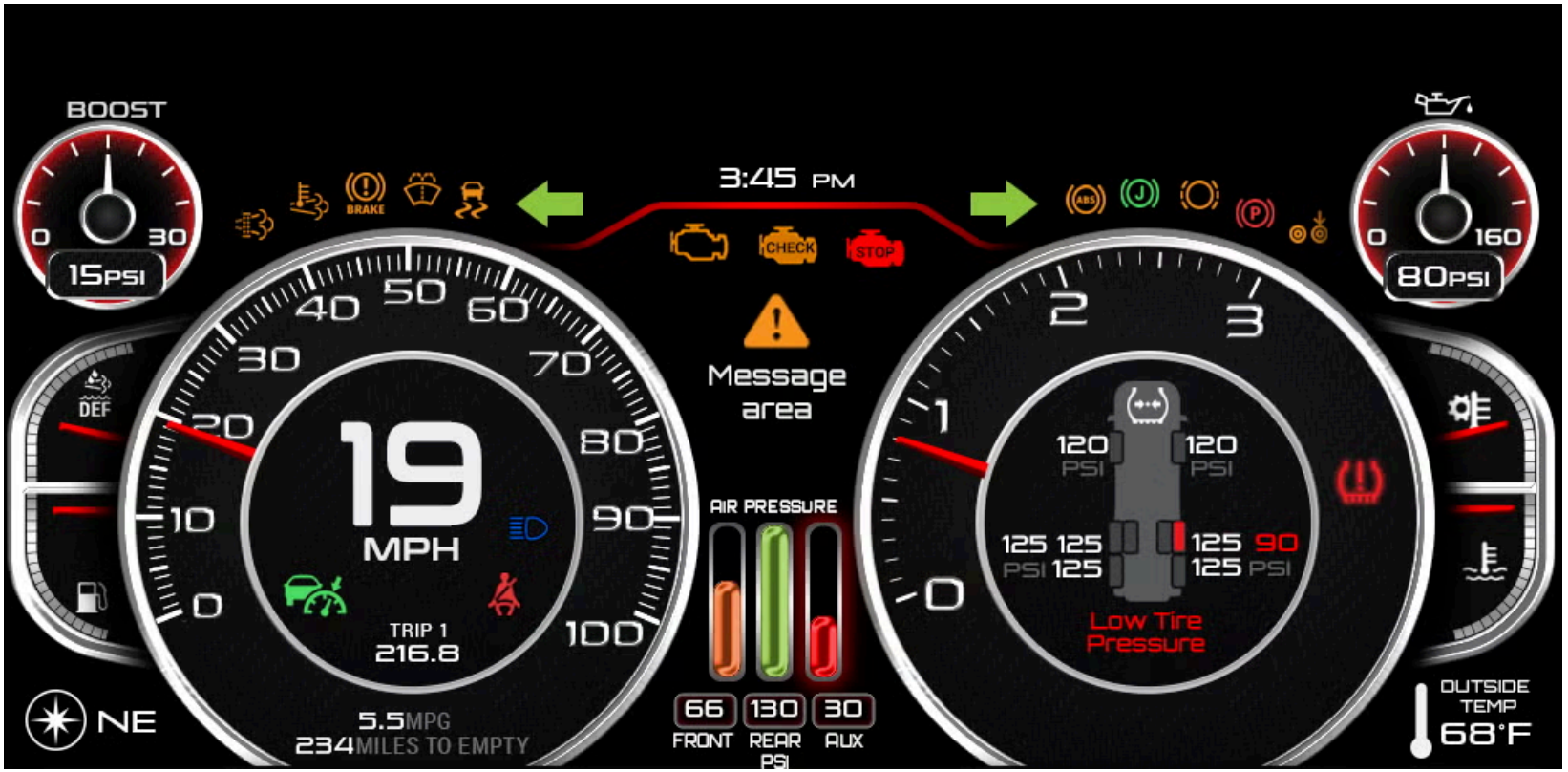
Effective Telemetry Visualization in Zabbix

A truly effective monitoring and observability platform should focus on solving users' real operational problems, not just offering lots of features or complex visualizations. The product must present information clearly and concisely, matching what users actually need. Therefore, telemetry visualization design and implementation should always work toward this main goal.

? Was that Zabbix screenshots?

No, I did not use screenshots from Zabbix to illustrate examples of "building the UI patterns." It's important to note that Zabbix alone does not guarantee flawless results. Establishing and maintaining effective visualization standards requires consistent effort, regardless of the tool selected.

This is a custom monitoring tool for the National Synchrotron Light Source II.


BOOST
0
30
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area
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MPH
TRIP 1
216.8
5.5MPG
234MILES TO EMPTY
NE
AIR PRESSURE
66
130
30
FRONT
REAR
AUX
PSI
1
2
3
0
120
PSI
120
PSI
125 125
PSI 125
125 90
125 PSI
Low Tire
Pressure
OUTSIDE
TEMP
68°F

The Importance of Visualization in Observability Platforms

The display of real-time telemetry data is a critical function within monitoring and observability platforms. Although advancements continue in data collection, analysis, and escalation procedures, selecting optimal visualization strategies remains a complex task. Establishing and enhancing robust visualization methods is as vital as configuring effective triggers and response protocols.

Meaningful vizualization

What categories of users can be identified for monitoring and observability purposes?

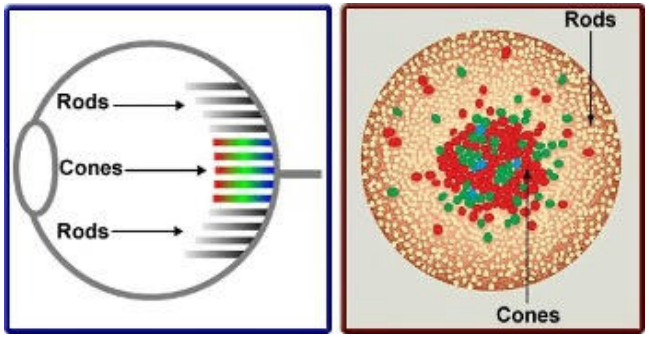
Operations personnel, often known as Network Operations Center (NOC) staff, are primarily responsible for the day-to-day management of infrastructure and application operations. They serve as organizational emergency responders, ensuring the stability and reliability of critical systems.

Analytical personnel refers to individuals who are not engaged in real-time emergency response. This group typically includes those responsible for analysis, tuning, and scheduled modifications of the infrastructure configuration.

There is an intermediate category of users who may assume roles within operations or analytics. This group includes Security Analysts, DevOps professionals, and general Site Reliability Engineering (SRE) personnel.

Category	Operational	Analytics
Responce	Near real-time	Non-realtime
Vizualization role	Secondary	Primary
Focus	Troubleshooting	Analysis
Expectations	Show me what is wrong	Show me relevant data
Goal	Keep system working	Optimize and tune environment

Something about human biology



Our eyes contain two main photoreceptor cells: rods, which detect light and support night vision (mainly in the eye's periphery), and cones, which interpret color by responding to red, green, or blue wavelengths. More rods improve low-light vision, while more cones enhance color perception. Blue cones are mostly peripheral, whereas red and green cones are more randomly spread.

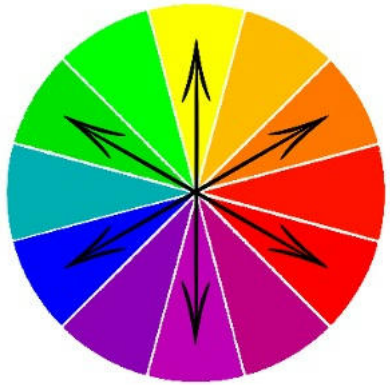
Something about human biology

Visual Cues and On-Screen Attention

When looking at a screen, it's essential to remember that our peripheral vision is better suited for detecting changes in lighting. This is because there are more rods, which are sensitive to light, in the peripheral region of the eye. However, when it comes to recognizing colors, the center of the eye is better equipped, particularly for colors in the red and green parts of the spectrum. If you want to draw attention to something on the screen, consider combining changes in the peripheral area with changes in lighting. A few blinks or a shift in lighting can be enough to catch someone's eye and get their attention.

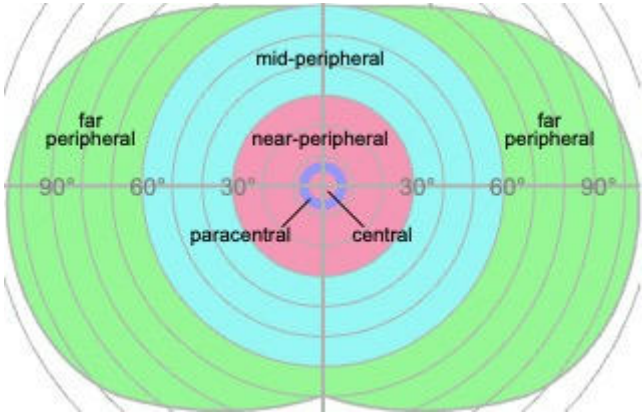
Something about human biology

When considering color choices in a design, it's important to keep in mind the color wheel. While our eyes can distinguish colors, it's best to use contrasting colors in order to ensure clear differentiation. It's not recommended to mix colors that are located right next to each other within the same context or UI widget. Red and green are contrasting colors, as are yellow and either red or green. This is why we see traffic lights displaying red, green, and yellow.



Something about human biology

When it comes to the field of view, it refers to the world you see when your eyes are fixed, and your head is still. If you're sitting about 3 ft (0.91 meters) from your screen, the maximum surface width you can see is around 9 ft (2.74 m). However, the clear recognizable width will be closer to 6 ft (1.83 m) or less, depending on the individual's eyesight. The closer you are to the center, the better details you'll be able to see. If you're farther from the center, you won't see as clearly, but you'll be better able to recognize changes in lighting.



Something about human biology

Easy to process vs hard to process

Each type of widget presents information in a way that can be either easier or harder to understand. There is a reverse dependency:

- The more information a widget displays, the harder it becomes for a human to process.
- Conversely, when less information is conveyed, it becomes easier for a person to comprehend.

In operational environments, visuals overloaded with lengthy labels or dense text can slow comprehension and hinder rapid decision-making. To enhance clarity and engagement, prioritize non-textual elements—such as variations in color, shape, and size—to convey information. Consider using line charts, pie charts, maps, and honeycomb indicators as primary visualization tools.

Information processing

Focus vs out of focus

Another important consideration is to position widgets that display highly detailed information at the center of the screen, where users are most likely to focus. In contrast, widgets that rely on visual indicators—such as changes in color or lighting—should be placed toward the peripheral areas of the screen, where they can still be noticed without distracting from core content.

Information processing

Category	Operational	Category	Operational
Maps	★☆☆ EASY	Problems	★★★ HARD
Geo maps	★★☆ MEDIUM	Host availability	★☆☆ EASY
Honeycomb	★☆☆ EASY	Trigger overview	★★☆ MEDIUM
Gauge	★☆☆ EASY	Problem hosts	★★☆ MEDIUM
Line charts	★★★ HARD	SLA report	★★★ HARD
Pie charts	★☆☆ EASY	Clock	★☆☆ EASY

Alignment of the widgets

Category	Operational	Analytics	Category	Operational	Analytics
Maps	✓	✓	Problems	✓	?
Geo maps	✓	?	Host availability	✓	?
Honeycomb	✓	✗	Trigger overview	✓	?
Gauge	✓	✗	Problem hosts	✓	✗
Line charts	✗	✓	SLA report	✗	✓
Pie charts	✓	✓	Clock	✗	✗

Screen layout

1 The most valuable part of your screen is this section that requires fine color and detail recognition.

2 The second most valuable part of your screen. Simple slight up and down eye movement that requires less refocusing allows placing high detailing widgets of your UI in here.

3 The first perepher-ial zone.

4 The second perepher-ial zone.

Screen layout

Category	Operational	Analytics
Maps	1	1
Geo maps	1	1
Honeycomb	2	2
	3, 4	3, 4
Gauge	3, 4	3, 4
Line charts	2	1
		2
Pie charts	2	3, 4
	3, 4	

Category	Operational	Analytics
Problems	1	1
Host availability	1	1
Trigger overview	1	1
Problem hosts	1	1
SLA report	1	1
Clock	4	4

Final words

If you are already employing some of the strategies and recommendations presented here, congratulations—your experience in this area likely exceeds that of most Zabbix users. If these suggestions are new to you, welcome to the field of real-time data visualization. Notably, in the realm of visualization, our work builds upon traditions established in industrial and transportation data visualization, which predate business data visualization by many years. While certain techniques from business data visualization can be relevant to our efforts, they do not necessarily dictate our overall approach to visualizing data.

I'm Vladimir Ulogov, and I've been using Zabbix for nearly twenty years. I also work as a Zabbix consultant and trainer. Over the years, I've done all sorts of things—from system and security administration to network management. I also done my share of programming in lots of different (and even some unusual!) languages. Fun fact about me: my first personal computer was a PDP-11 running Unix System V.