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2. **Technical** means – nix it

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2. **Technical** means – nix it

3. Other approaches – alert noise is less technical, more **cultural**

ALERTS ARE BAD

SNAO COHOL

MAIR

LSD



Millions of obvious things have turned out to be utterly **wrong**.

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**Obvious things need proof.**

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# THE OVERDOSE

Harm in a Wired Hospital

## How Medical Tech Gave a Patient a Massive Overdose

Pablo Garcia went to the hospital feeling fine. Then the hospital made him very sick.



Robert Wachter, MD · [Follow](#)

Published in Backchannel · 11 min read · Mar 30, 2015



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- “had given the patient not one pill but 38½ of them”
- Multiple ignored alerts.

A total of **2 558 760** unique alarms occurred  
in the 31-day study period

Drew et al., 2014

[Biomed Instrum Technol.](#) 2021; 55(1): 29–40. Published  
online 2021 Mar 4. doi: [10.2345/0899-8205-55.1.29](#)

PMCID: PMC8641425 | PMID: [33662139](#)

## Lessons from the Glass Cockpit: Innovation in Alarm Systems to Support Cognitive Work

[Randall J. Mumaw](#), [Emilie M. Roth](#), and  
[Emily S. Patterson](#)✉



**A well-trained and seasoned cybersecurity professional who can rapidly triage, contain, and eradicate threats — that rarity of rarities — does not enjoy wasting time on chasing ghosts.**

Robinson, 2021

Alert noise is **EXPENSIVE**

Alert fatigue

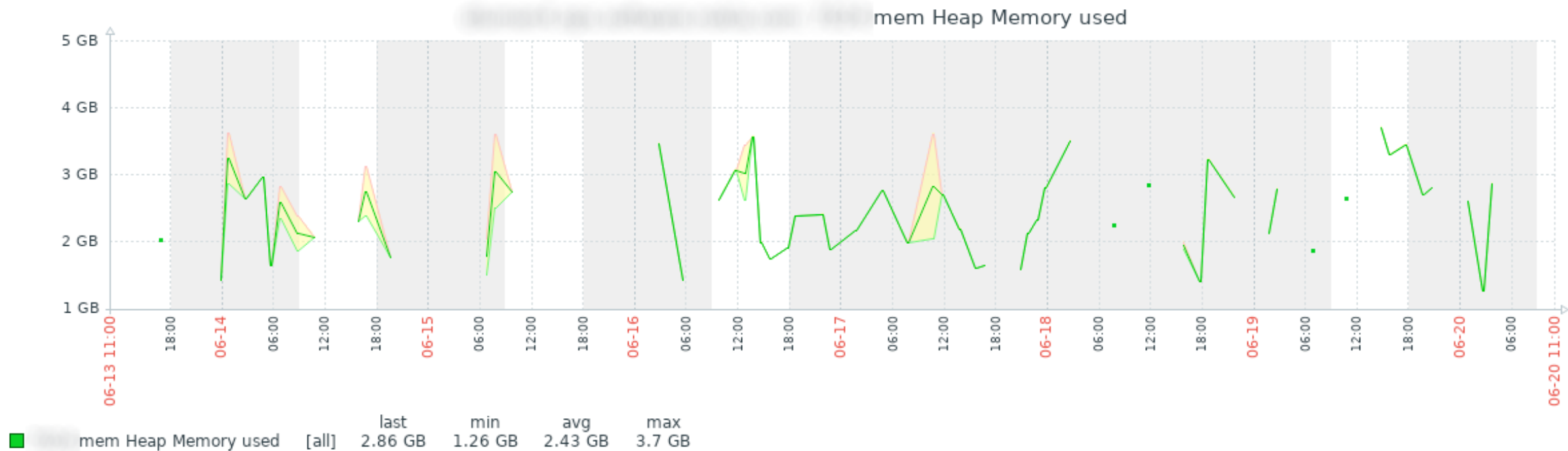
Overtime costs

Burning out (losing the best team members)

last(...) ->

min(..., 15m)

count(..., 1h)



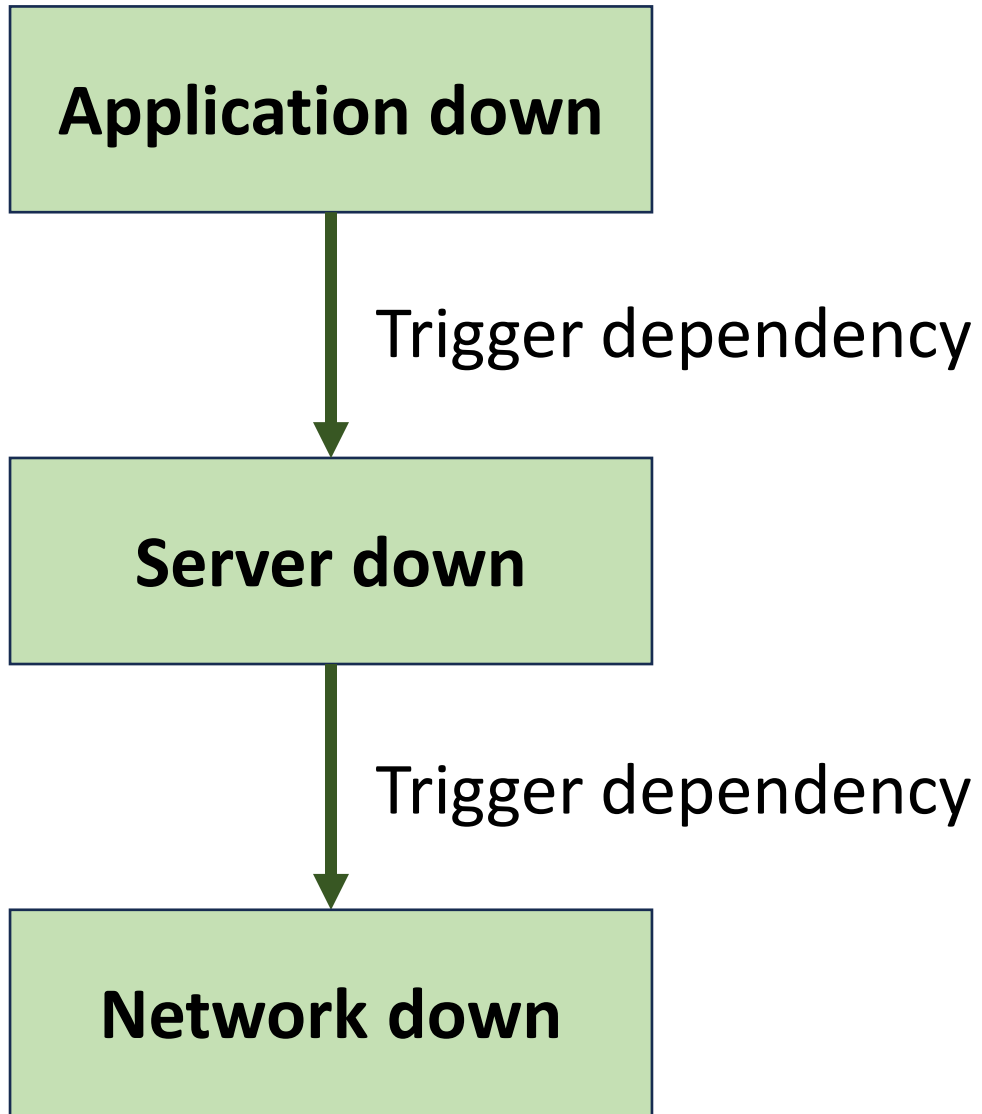
...count(..., 30m) > 3



Predictive functions

$\text{timeleft}(/server/vfs.fs.size[/,free], 1h, 0) < 2h$

$\text{forecast}(/host/key, 1h, 2h) < 0$



Validate everything

---

JBoss Remoting-JMX port discovery: sh:: Connection Created Count

---

JBoss Remoting-JMX port discovery: fork:: Connection Created Count

---

JBoss Remoting-JMX port discovery: Cannot: Connection Created Count

---

JBoss Remoting-JMX port discovery: allocate: Connection Created Count

---

JBoss Remoting-JMX port discovery: memory: Connection Created Count

Validate everything

**sh: fork: Cannot allocate memory**

JBoss Remoting-JMX port discovery: sh::	Connection Created Count
JBoss Remoting-JMX port discovery: fork::	Connection Created Count
JBoss Remoting-JMX port discovery: Cannot:	Connection Created Count
JBoss Remoting-JMX port discovery: allocate:	Connection Created Count
JBoss Remoting-JMX port discovery: memory:	Connection Created Count



Cluster node

Cluster node

Cluster node

# Aggregate cluster host

Cluster node

Cluster node

Cluster node



I have two kinds of problems, the urgent and the important.

The urgent are not important, and the important are never urgent.

Dwight D. Eisenhower

	Urgent	Not urgent
Important	Customer impact or high risk Needs immediate action Immediately <b>actionable</b>	“First thing in the morning” Capacity planning Periodic reviews
Not important	Silence alert noise	Improve monitoring

All problems are important and urgent

... not

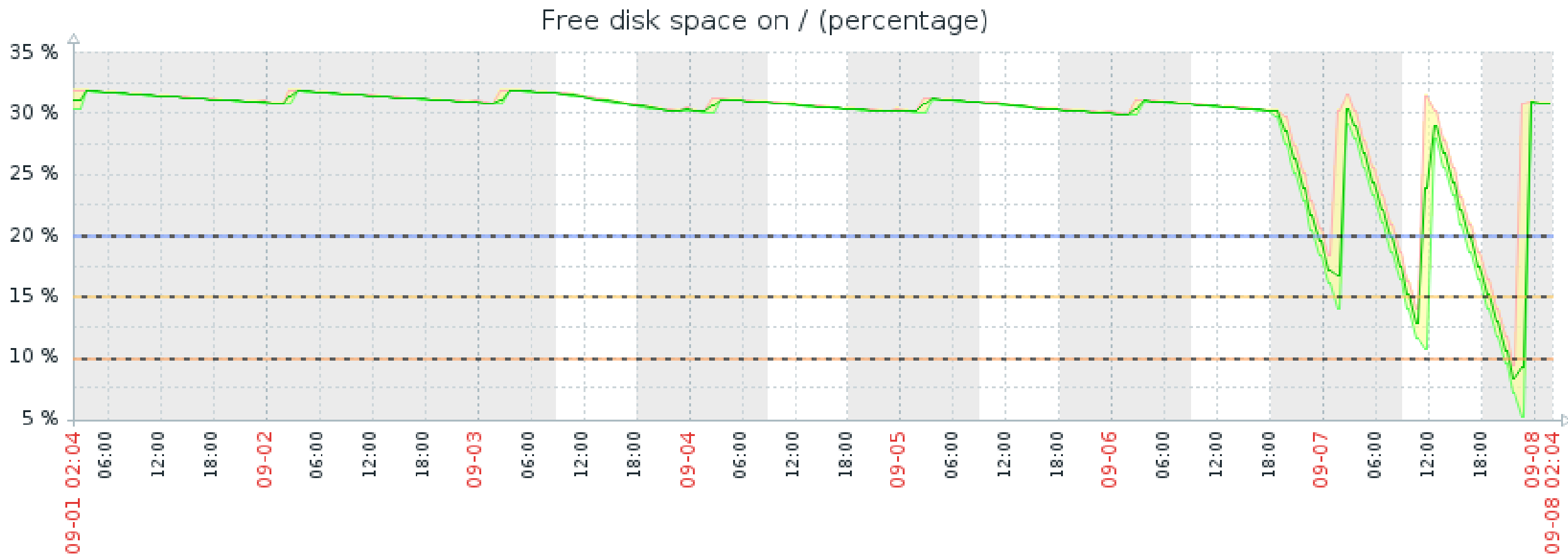
*From:* somebody@example.com

*Subject:* Re: High: appserver.example.com Important service down


thought it was short restart and it won't alert

--

Somebody



currently i don't see a disk space issue



Currently I don't  
see a road issue

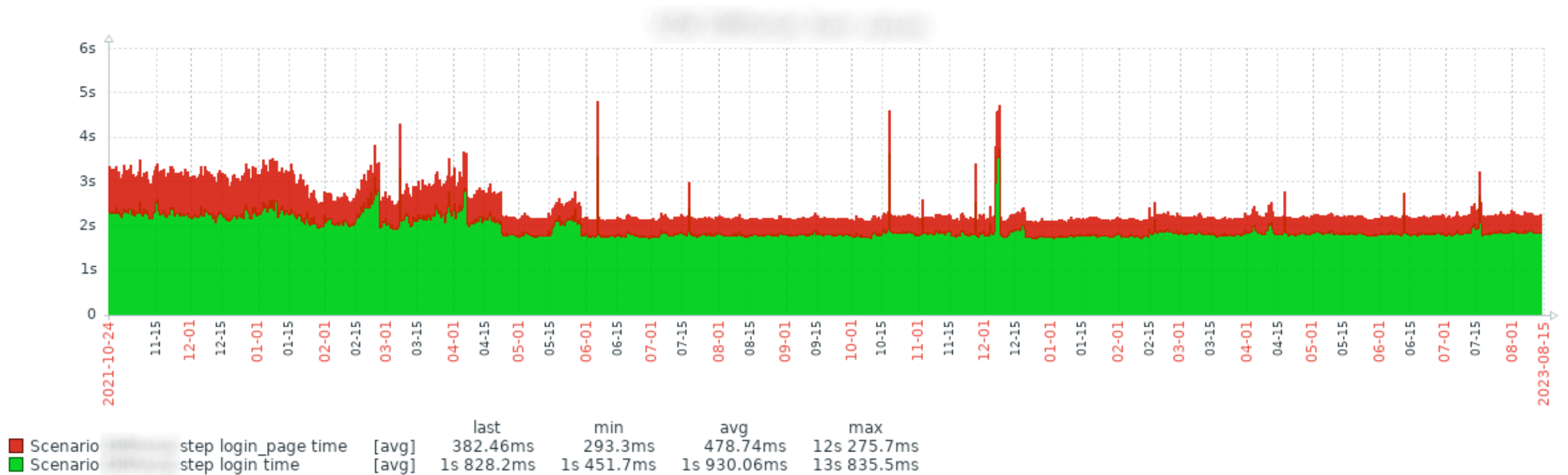
...



# Alert on functional failures

aka

“what do my customers care about?”



Automation is putting process into code.  
A bullet list in a process document is code  
if it is treated that way.

Manual Work is a Bug  
A.B.A: always be automating  
(Limoncelli, 2018)

Alert recipients must know what to do.  
This knowledge must be in writing.

**DESIGN FOR RESILIENCE**

A meme featuring a man in a suit pointing to his temple with a smug expression. The text is overlaid on the image in a bold, white, sans-serif font with a black outline.

**DON'T CARE  
ABOUT ONE SERVER DOWN**

[illegible]

[illegible]

Severity	Recovery time	Status	Info	Host	Problem	Duration	Ack
High		PROBLEM			No JMX data for last 5m <a href="#">[Details]</a>	1h 40m 18s	No
High		PROBLEM			No JMX data for last 5m <a href="#">[Details]</a>	2h 25m 17s	No
Information		PROBLEM			<a href="#">[Details]</a> is not reachable	2h 42m 18s	No
Information		PROBLEM			<a href="#">[Details]</a> is not reachable	2h 42m 19s	No
Information		PROBLEM			<a href="#">[Details]</a> is not reachable	2h 42m 20s	No
Warning		PROBLEM			gc PS Mark Sweep in fire fighting mode on <a href="#">[Details]</a>	4h 47m 32s	No
Warning		PROBLEM			gc PS Mark Sweep in fire fighting mode on <a href="#">[Details]</a>	4h 47m 32s	No
High		PROBLEM			No JMX data for last 5m <a href="#">[Details]</a>	5h 23m 16s	No
Warning		PROBLEM			mp PS Old Gen used on <a href="#">[Details]</a>	6h 12m 32s	No
Warning		PROBLEM			mp PS Old Gen used on <a href="#">[Details]</a>	6h 12m 32s	No
Warning		PROBLEM			gc PS Mark Sweep in fire fighting mode on <a href="#">[Details]</a>	8h 57m 32s	No
High		PROBLEM			No JMX data for last 5m on <a href="#">[Details]</a>	3d 3h 23m	No
High		PROBLEM			No JMX data for last 5m on <a href="#">[Details]</a>	3d 3h 23m	No
High		PROBLEM			No JMX data for last 5m on <a href="#">[Details]</a>	3d 3h 23m	No
High		PROBLEM			No JMX data for last 5m on <a href="#">[Details]</a>	3d 3h 23m	No
High		PROBLEM			No JMX data for last 5m on <a href="#">[Details]</a>	3d 3h 23m	No
High		PROBLEM			No JMX data for last 5m on <a href="#">[Details]</a>	3d 3h 23m	No
High		PROBLEM			No JMX data for last 5m on <a href="#">[Details]</a>	3d 3h 23m	No
Information		PROBLEM			iostat master item missing data for 60 minutes	1M 4d 3h	No
Information		PROBLEM			Memory usage of sssd_nss suspiciously high	7M 10h	No
High		PROBLEM			⬆ SSL certificate has expired on port <a href="#">[Details]</a>	1y 4M 3d	No
High		PROBLEM			Paging started for <a href="#">[Details]</a> 6 <a href="#">?</a>	2y 2M 28d	Yes
High		PROBLEM			Paging started for <a href="#">[Details]</a> 6 <a href="#">?</a>	2y 2M 28d	Yes
High		PROBLEM			Paging started for <a href="#">[Details]</a> 6 <a href="#">?</a>	2y 2M 28d	Yes

**AVIATION**

# **Analysis shows pilots often ignore Boeing 737 cockpit alarm**

By Michael Fabey | Apr 06, 2009





Francis  
Barlow, 1687

ALERTS ARE BAD

Alert noise

-> alert fatigue

It is EXPENSIVE

## ALERTS ARE BAD

Alert noise

-> alert fatigue

It is EXPENSIVE

## TECHNICAL

Trigger functions

Predictive functions

Trigger expressions

Error handling

Group triggers

Trigger dependencies

Alert manager

## ALERTS ARE BAD

Alert noise

-> alert fatigue

It is EXPENSIVE

## CULTURAL

Slice and dice alerts

Set maintenance

Fix for good

Document

Automate response

Functional monitoring

Resilient design

Measure and report

## TECHNICAL

Trigger functions

Predictive functions

Trigger expressions

Error handling

Group triggers

Trigger dependencies

Alert manager

IT'S PEOPLE!



Your stories  
and feedback appreciated

<https://forms.gle/TB9cJGS64fRhTD9L6>



The nuisance and falsity of alarms result in  
**a reduction of trust in monitoring systems.**

Petersen et. al 2017, Lewandowska et. al, 2020

# Further reading

**Manual work is a bug:** <https://queue.acm.org/detail.cfm?id=3197520>

**The Overdose:** <https://medium.com/backchannel/how-technology-led-a-hospital-to-give-a-patient-38-times-his-dosage-ded7b3688558>



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