

Fred Schenkelberg

How to Plan an ALT



Failure Mechanism



saturday

sunday

STYCZEŃ						
	January	Januar	Janvier	Январь		
Pn						
Wt						
Sr	1	6	7	13	20	27
Cz	2		8	14	21	28
Pt	3		9	15	22	29
So	4		10	16	23	30
Nd	5		11	17	24	31
			12	18	25	
			19	26		

LUTY						
	February	Februar	Février	Февраль		
Pn						
Wt						
Sr	3	10	17	24		
Cz	4	11	18	25		
Pt		12	19	26		
So		20	27			
Nd		28				

Acceleration Models

To Do List:

~
~

Constraints



A novel new switch...

What is Known/Unknown



Failure Mechanism(s)

What is known/unknown

Do we know how it fails?

Do we know relationship with stress

Do we know how other mechanisms behave with this stress?



Existing Models

What is known/unknown

If we have a model, is it true? how do we know?

Does this model still apply?



History

What is known/unknown

What have done before? results?

What is in our books, memory, etc?

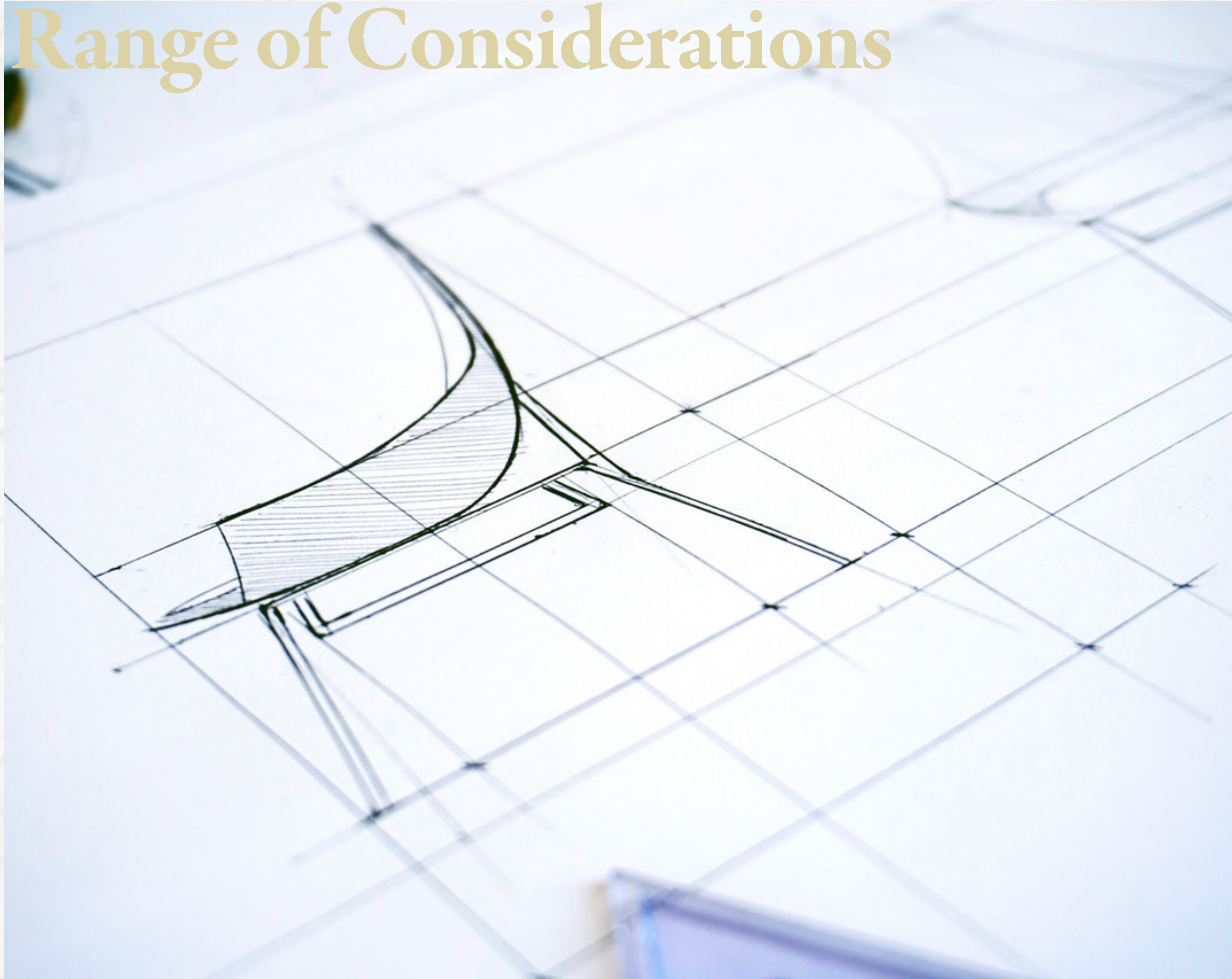
What has changed?



Let's say we have

metal fatigue...

Range of Considerations



Cost & Resources

Range of Considerations

Cost of prototypes

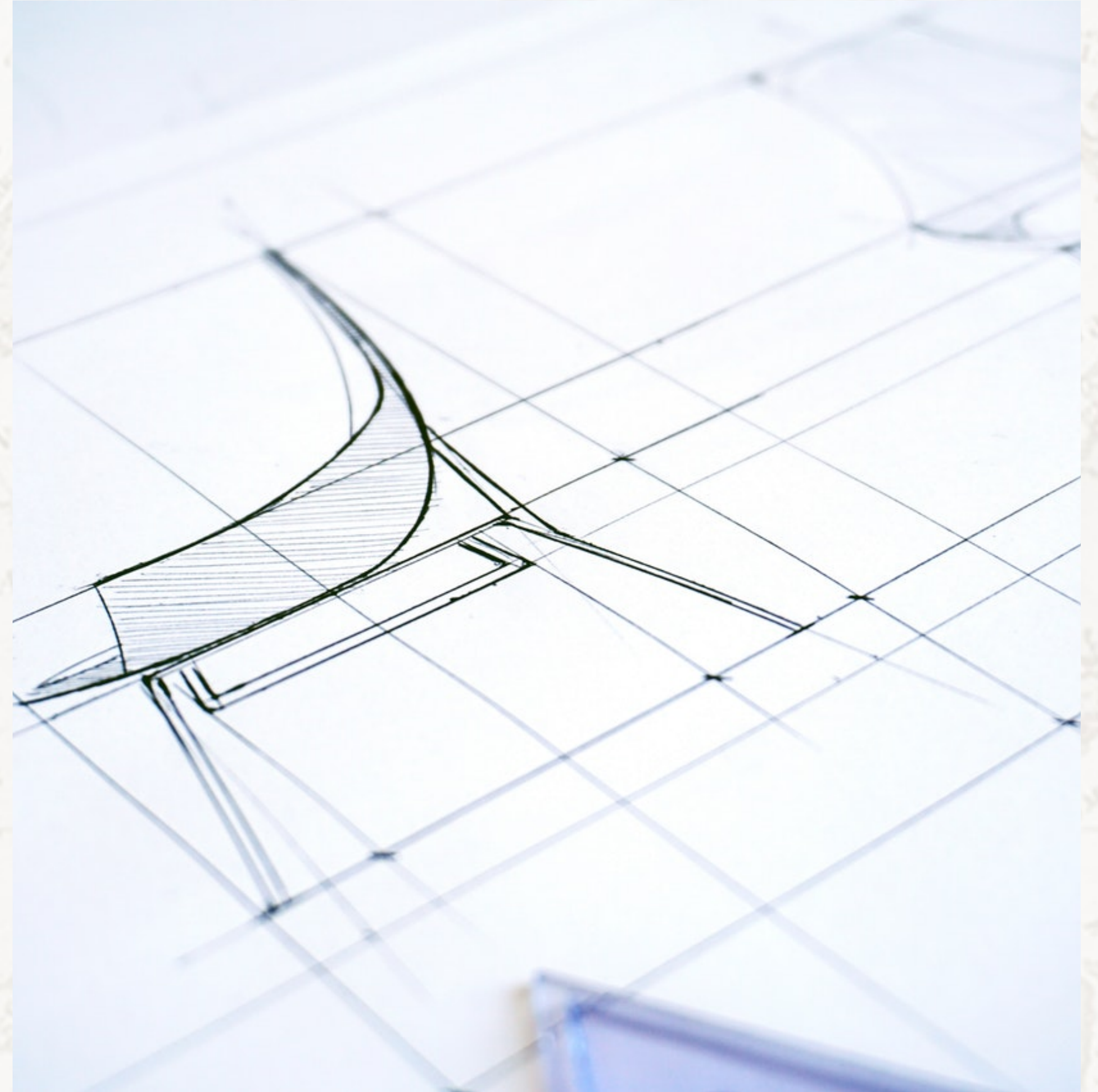
Cost of apply stress

Cost of measurement

Equipment

Facilities

Personel



Measurements

Range of Considerations

What exactly are we measuring?

Variables or attribute data?

Continuous or not?



Other mechanisms

Range of Considerations

What is lurking at the edges?

What is lurking behind the mechanism of interest?

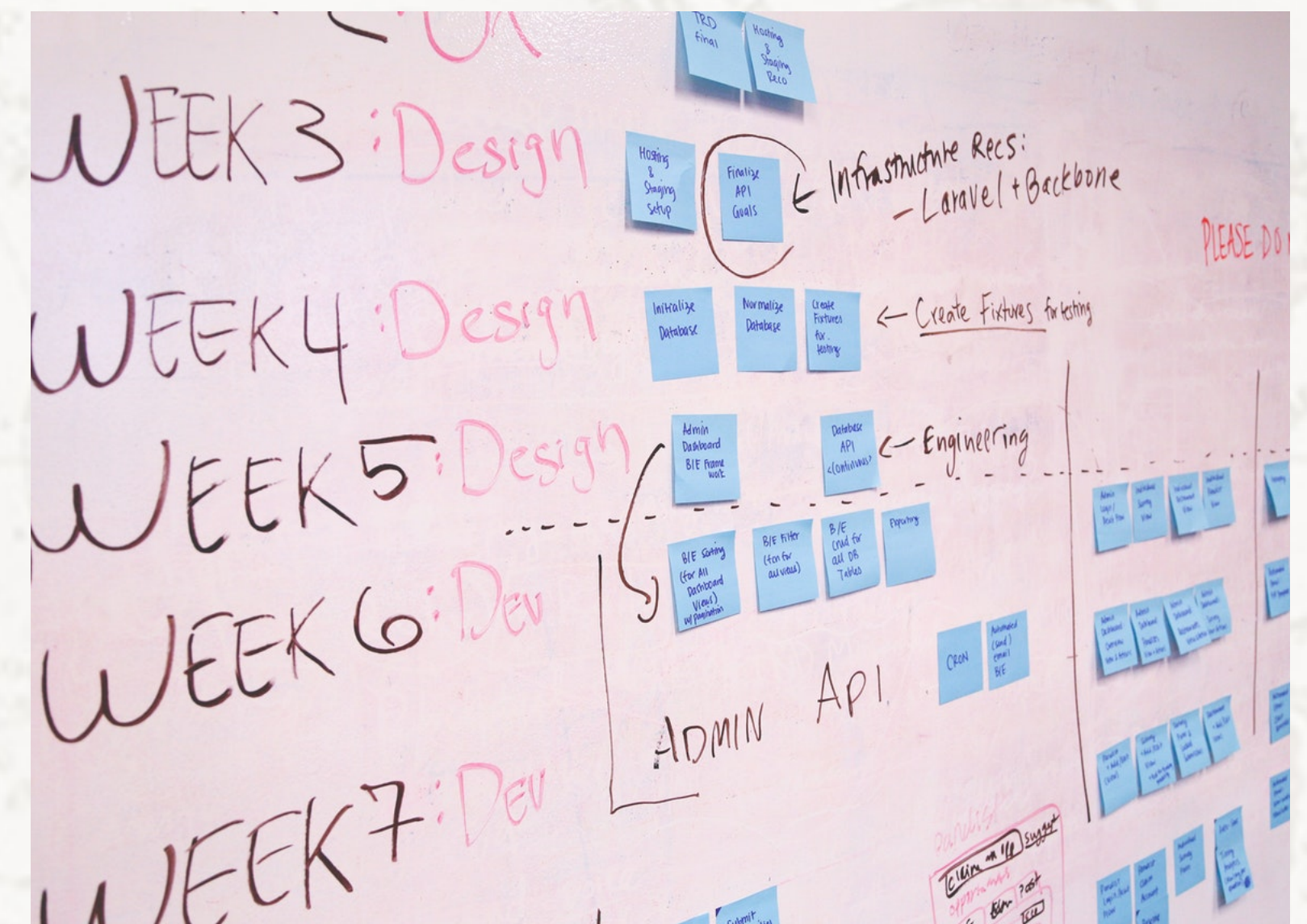
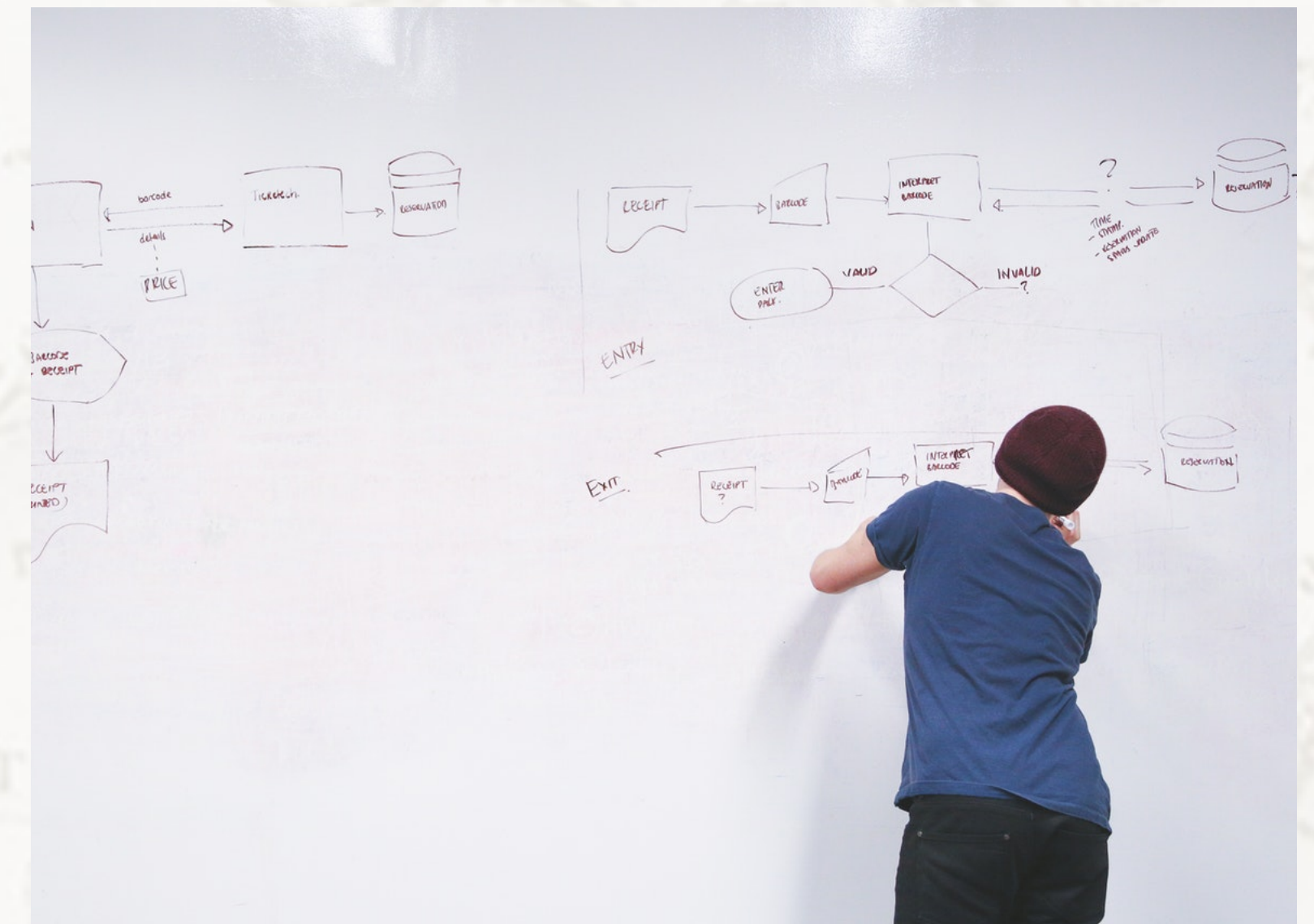
What is competing with the mechanism of interest?



Expect 2 cycles/day

rarely over 20 cycles/day

Impact of Variability



Measurement Error

Impact of Variability

Measurements are never perfect

How well do you need to make the measurement for the analysis?



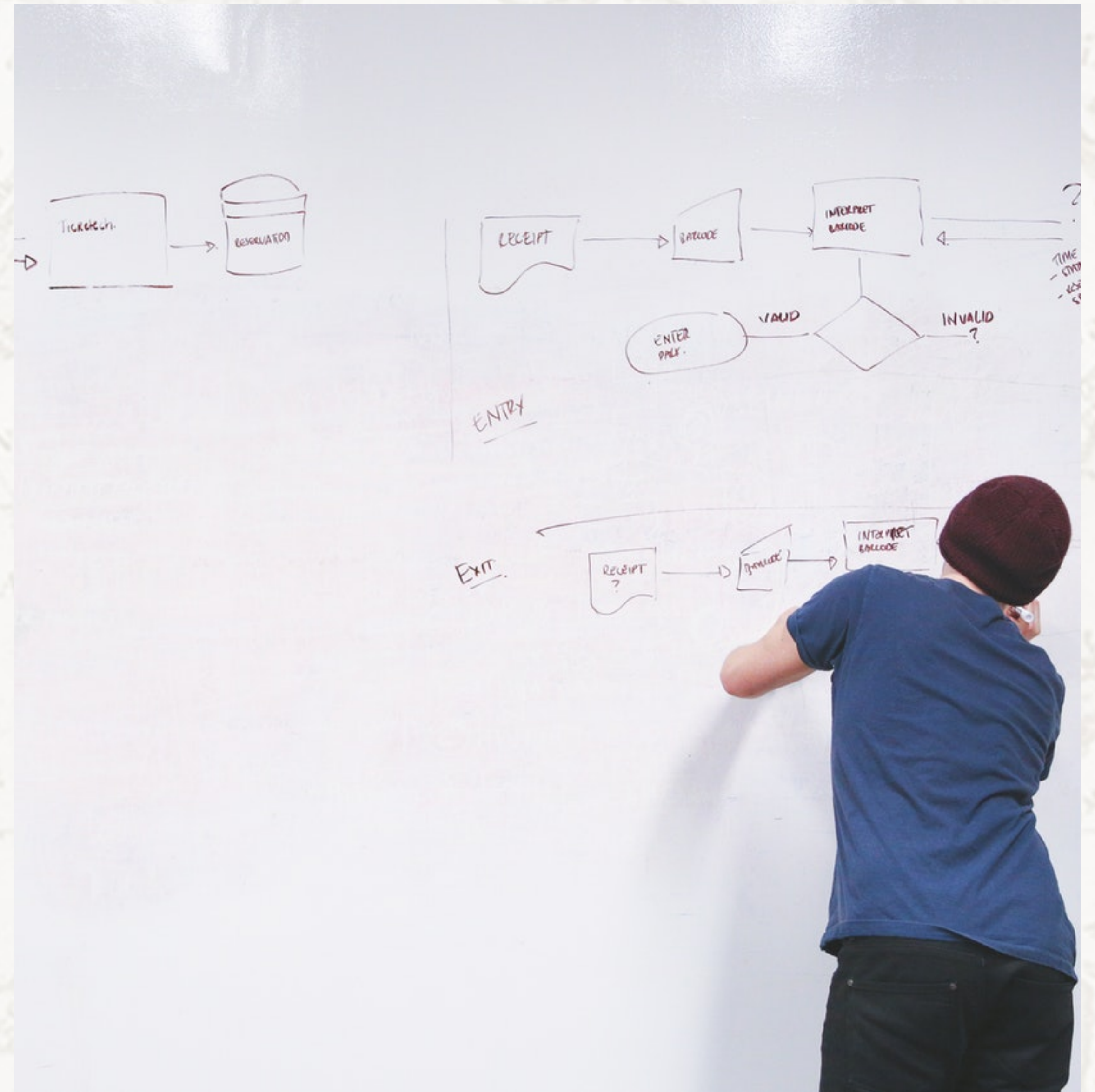
Natural Variability

Impact of Variability

Everything varies

What is the variance?

Can we include the range of differences in the testing?



Regression & variance

Impact of Variability

The ability to fit a line

in part depends on the noise



What other factors

should we consider?

Our Simple Example



Number of cycles

Our Simple Example

How often will this button activate
over it's life time?



Number of samples

Our Simple Example

$$n = \frac{\ln(1 - C)}{m \ln(R)}$$



Analysis

Our Simple Example

If the 22 samples do not fail
over m lifetimes



Analysis - 3 stress levels

Our Simple Example

Stress

time



Do you know enough?

Thanks

see more at AccendoReliability.com