Critical Thinking
Structure of Programme

An Approach to Problem Solving - Karl
Critical Thinking & Defining the Problem - Jamie
Tools to Support Critical Thinking – Part 1 - Karl
Tools to Support Critical Thinking – Part 2 - Karl
Tools to Support Critical Thinking – Part 3 - Karl

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Week 1

An Approach To Problem Solving

Karl Pritchard

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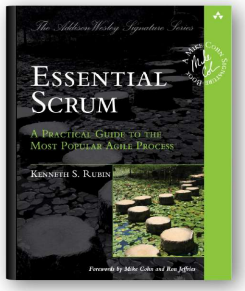
Visual AGILExicon®



Slides in this presentation contain items from the Visual AGILExicon®, which is a trademark of Innolution, LLC and Kenneth S. Rubin.

The Visual AGILExicon is used and described in the book

ESSENTIAL SCRUM

A Practical Guide to the Most Popular Agile Process.

You can learn more about the Visual AGILExicon and permitted uses at: https://bit.ly/agile-pics

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Tasks

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Prayer

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Meta-Learning Topics

- **J-Curve**
- **Imposter Syndrome**
- Andragogy vs Pedagogy
- Blooms Taxonomy
- Metacognition
- Note Taking

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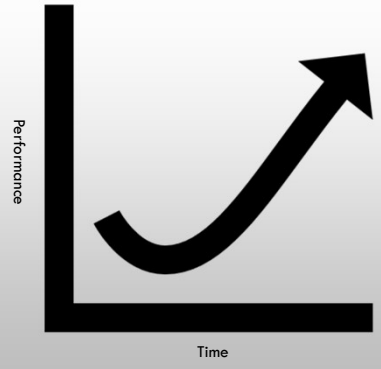
J – Curve theory of learning

Things often get worse before they get better!



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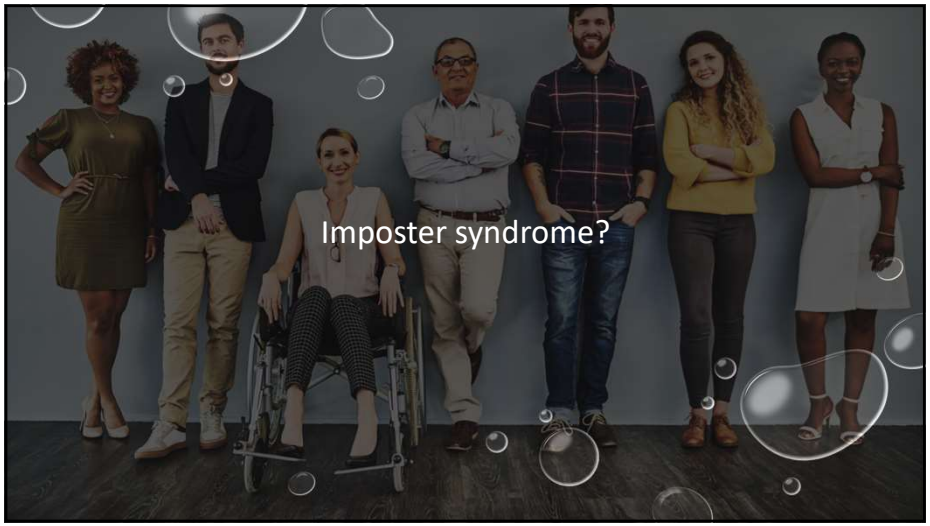

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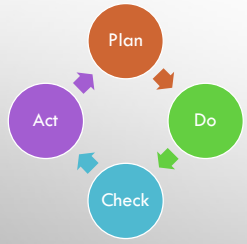
Deming/Shewhart Cycle - PDCA



- Dr W Edwards Deming (from Welter Shewhart's original)
- Father of modern quality management
- 1950's helped restore Japan's industry after WWII
- Feedback Loop
  - https://www.youtube.com/watch?v=e4gOPeHSRo8

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Other Phase Gate Processes?

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Lean Six Sigma DMAIC

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Lean Six Sigma DMADV

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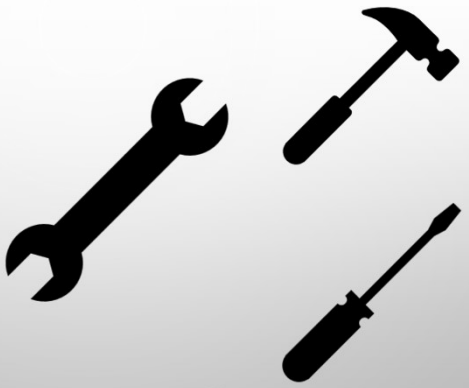
Problem Solving Process



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What is your reaction when you see this process?

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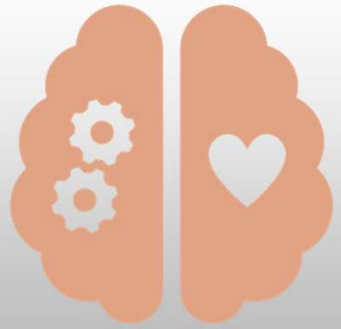
Thinker vs Feeler

- What is your preference?
- Data driven?
- Connection?



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Cognitive Bias

- Be aware that cognitive bias may affect our thinking without our knowing and potentially cause us to deviate from rationality in judgement!
- Cognitive bias can stifle critical thinking and cause us to take dangerous short cuts

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Assumptions

- Assumptions, like our cognitive bias can derail our critical thinking
- What is that?

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ASSUMPTIONS

How might we guard ourselves against our own assumptions?

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Identify & Select the Problem

- Brainstorm
- 5 Whys Root Cause Analysis
- Graphs / Charts
  - What's the picture?
  - What story is the data telling us
- **Roman Voting / Decider Protocol**

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Roman Voting / Decider Protocol

Make a proposal, then vote

Agree

Happy Either Way

Disagree. Present Counter Proposal

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Analyze the Problem

- 5 Whys Root Cause Analysis
- **Star-bursting**
- Ishikawa
- Histogram

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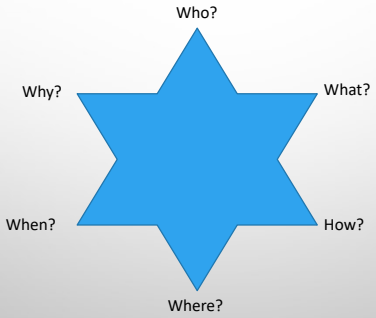
Star Bursting



Also known as 6 thinking friends!

Source: Serreta Pritchard!

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Generate Potential Solutions

- Brainstorm / Mind Shower
- Starburst
- Kano Analysis
- Story Mapping

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Select the Solution

- QCD – Quality Cost Delivery
- CBA - Cost Benefit Analysis
- **FMEA**
  - **Failure Mode And Effect Analysis**
- **Pugh**

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Process Step	Potential Failure Mode	Potential Failure Effect	SEV[1]	Potential Causes	OCC[2]	Current Process Controls	DET[3]	RPN[4]	Action Recommended
What is the step?	In what ways can the step go wrong?	What is the impact on the customer if the failure mode is not prevented or corrected?	How severe is the effect on the customer?	What causes the step to go wrong (i.e., how could the failure mode occur)?	How frequently is the cause likely to occur?	What are the existing controls that either prevent the failure mode from occurring or detect it should it occur?	How probable is detection of the failure mode or its cause?	Risk priority number calculated as SEV x OCC x DET	What are the actions for reducing the occurrence of the cause or for improving its detection? Provide actions on all high RPNs and on severity ratings of 9 or 10.
ATM Pin Authentication	Unauthorized access	• Unauthorized cash withdrawal • Very dissatisfied customer	8	Lost or stolen ATM card	3	Block ATM card after three failed authentication attempts	3	72	
	Authentication failure	Annoyed customer	3	Network failure	5	Install load balancer to distribute work-load across network links	5	75	
Dispense Cash	Cash not disbursed	Dissatisfied customer	7	ATM out of cash	7	Internal alert of low cash in ATM	4	196	Increase minimum cash threshold limit of heavily used ATMs to prevent out-of-cash instances
	Account debited but no cash disbursed	Very dissatisfied customer	8	• Transaction failure • Network issue	3	Install load balancer to distribute work-load across network links	4	96	
	Extra cash dispensed	Bank loses money	8	• Bills stuck to each other • Bills stacked incorrectly	2	Verification while loading cash in ATM	3	48	

1. **Severity**: Severity of impact of failure event. It is scored on a scale of 1 to 10. A high score is assigned to high-impact events while a low score is assigned to low-impact events.
2. **Occurrence**: Frequency of occurrence of failure event. It is scored on a scale of 1 to 10. A high score is assigned to frequently occurring events while events with low occurrence are assigned a low score.
3. **Detection**: Ability of process control to detect the occurrence of failure events. It is scored on a scale of 1 to 10. A failure event that can be easily detected by the process control is assigned a low score while a high score is assigned to an inconspicuous event.
4. **Risk priority number**: The overall risk score of an event. It is calculated by multiplying the scores for severity, occurrence and detection. An event with a high RPN demands immediate attention while events with lower RPNs are less risky.

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Criteria	Progate (Basline)	Plural-Sight (KP)	Linkedin Learning (MO)	Udemy (JS)	Totals	Rank
Fundamental topics covered	0	–	0	0	-1	8
Step wise logical progression of topics	0	–	0	0	-1	8
Beginner friendly	0	–	–	–	-3	15
Hands on Exercises	0	–	0	–	-2	13
Marked Exercises	0	–	–	–	-3	15
Development Environment	0	–	–	–	-3	15
Time required for modules	0	+	+	–	1	2
Time required for course	0	+	+	–	1	2
Cost for course	0	–	0	–	-2	13
Topics available for review during exercises	0	–	+	–	-1	12
Marked Final Projects for module	0	–	–	–	-3	15
Certificate Issued	0	–	0	0	-1	8
Visual learning preference	0	0	0	0	0	
Audio learning preference	0	+	+	+	3	1
Read / Write learning preference	0	0	–	0	-1	8
uses visual studio code	0	0	0	0	0	
Available in offline mode	0	+	+	–	1	2
Visibility of entire syllabus	0	0	0	0	0	
Covers only fundamental topics	0	–	–	–	-3	15
Kinisthetic learning preference	0	–	–	–	-3	15
	Totals	-7	-1	-10		
	Rank	2	1	3		

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Plan the Solution

- Task List / To-do List
- **Gantt**
- Pert
- **Kanban**
- Scrum
- Story Mapping

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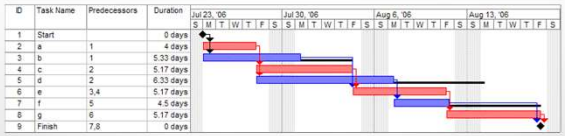
Gantt



ID	Task Name	Predecessors	Duration
1	Start		0 days
2	a	1	4 days
3	b	1	5.33 days
4	c	2	5.17 days
5	d	2	6.33 days
6	e	3,4	5.17 days
7	f	5	4.5 days
8	g	6	5.17 days
9	Finish	7,8	0 days

Jul 23, '06 | Jul 30, '06 | Aug 6, '06 | Aug 13, '06 — S M T W T F S

Source: Karl's random musings!

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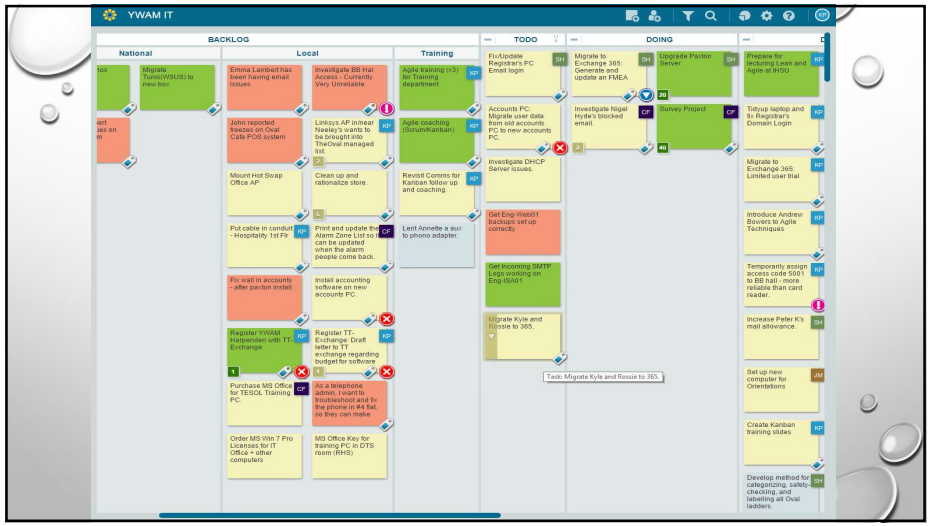

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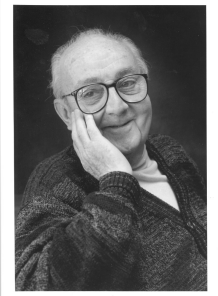
Caveat: All Models Are Wrong!

- **All models are wrong, but some are useful**
  - **George** Edward Pelham (**EP**) **Box**
  - British mathematician
  - Prof. Statistics @ University of Wisconsin
- Models have their uses
  - Extract the benefit and don't be afraid to move on



Source: Wikipedia.org

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Any Questions

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Further Study

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