



*Continuous
Improvement
and
Problem Solving
Tools*

Tom Petullo
tpetullo@bendcable.com

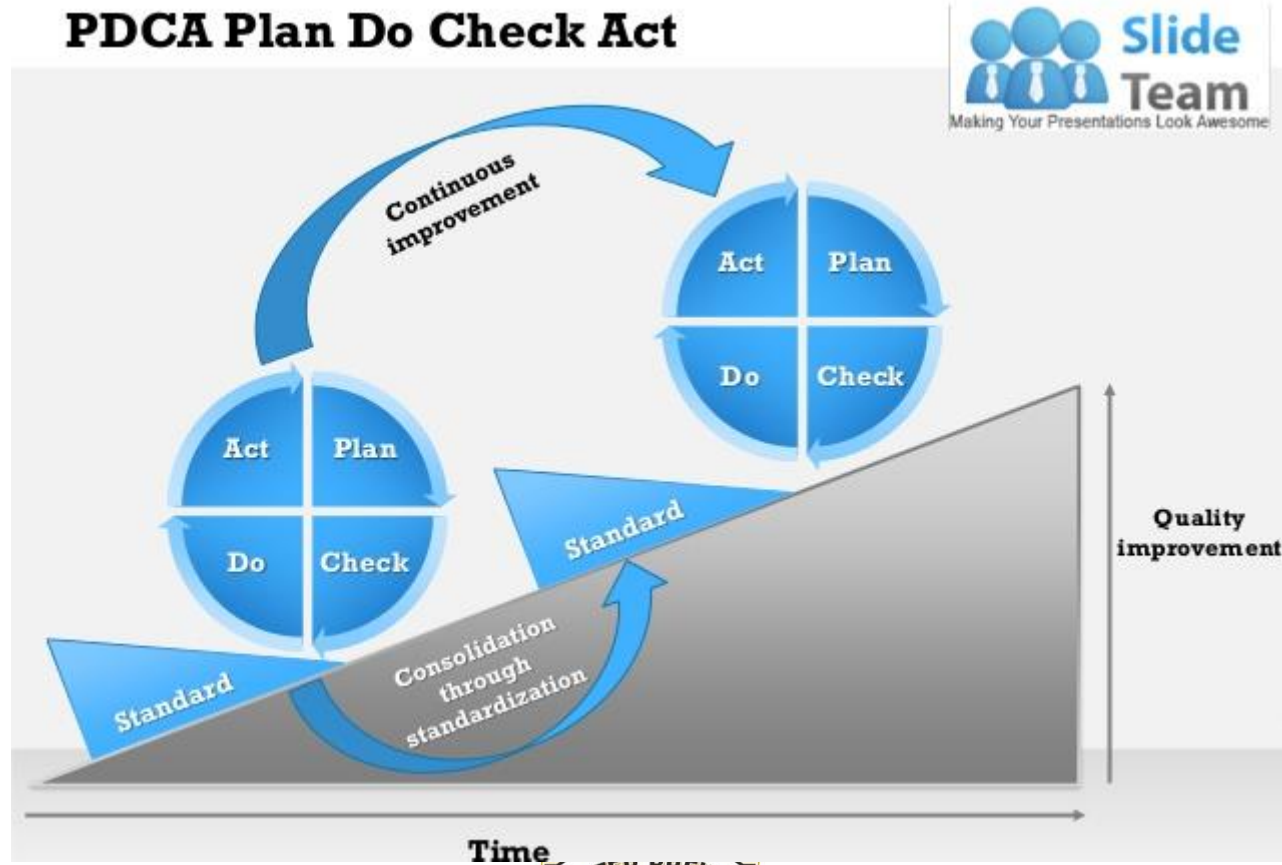
Today's Agenda

- *Continuous Improvement Overview*
- *Plan, Do Check Act vs. DMAIC*
- *Which Problem Solving Tools to use?*
- *When not to use DMAIC !*



UNITED WE BREW.

Continuous Improvement Overview



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Limitations of PDCA summary process

How does one accomplish these improvement projects?

What tools to use in doing so?



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Six Sigma Problem Solving Tools to reduce variation & improve process

American Society of Quality

ASQ Black Belt certification which requires
knowledge of 109 problem solving tools

Of the 109 tools, 74 are listed for use with
the DMAIC problem solving process



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DMAIC problem solving steps

- **Define**
- **Measure**
- **Analyze**
- **Improve**
- **Control**



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PDCA (Plan, Do, Check Act)

VS

DMAIC



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PDCA

Plan

Do

Check

Act

DMAIC

Define

Measure

Analyze

Improve

Control



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PDCA

Plan

DMAIC

Define

Measure

Analyze

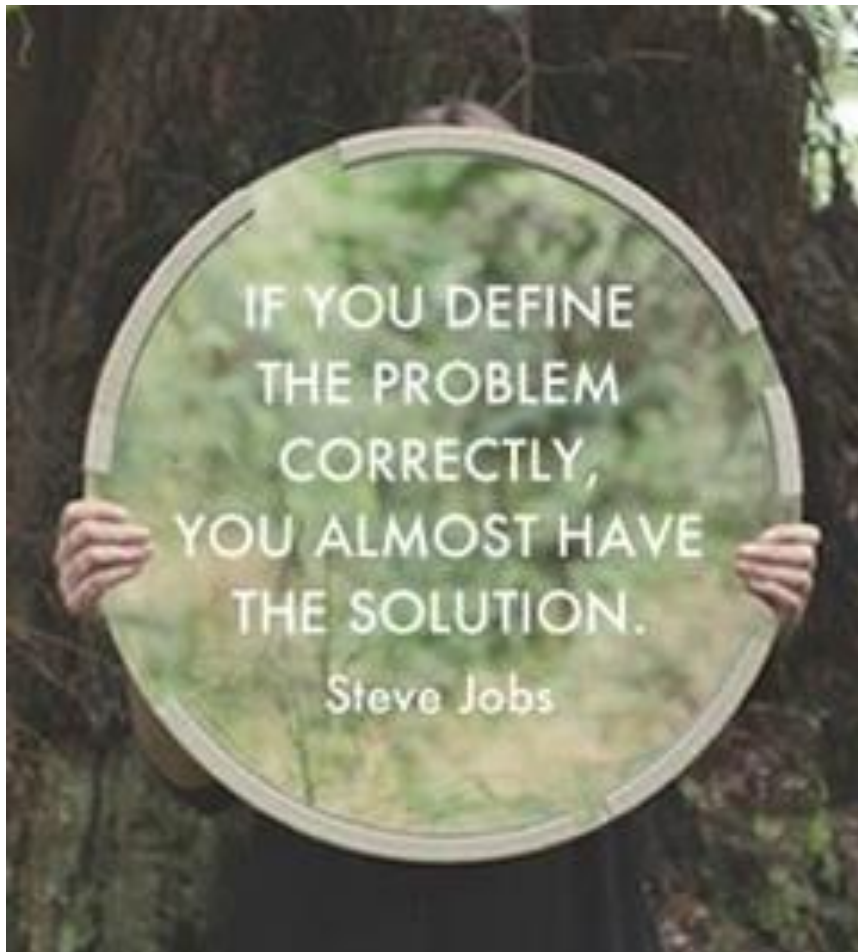


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Plan

Define

Define Problem



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Plan

Define

Define Problem

Problem definition:

A. Pre-established

or

B. Team determined



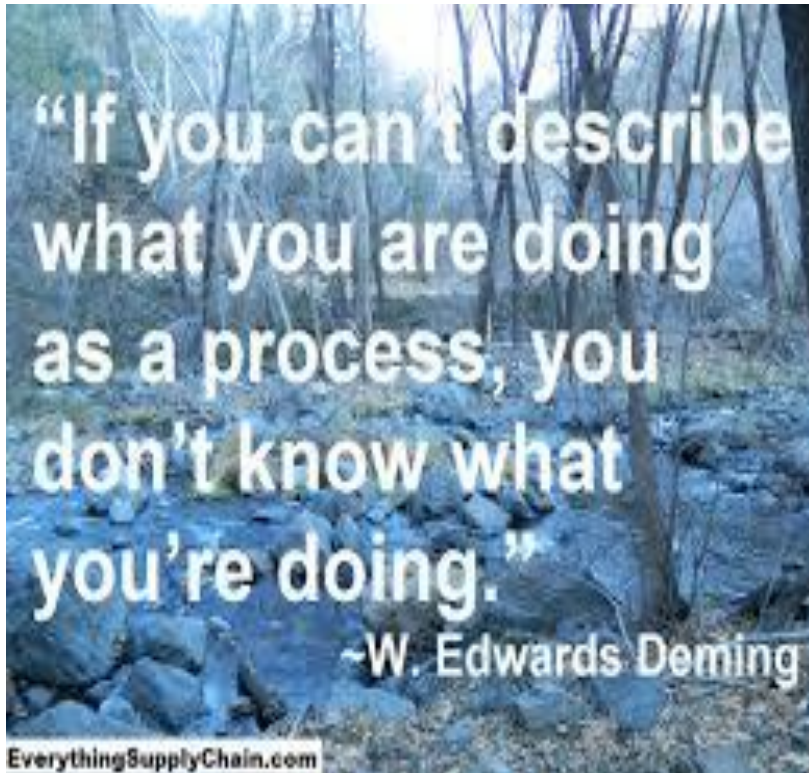
UNITED WE BREW.

Plan

Define

Define Problem

Define Process



UNITED WE BREW.

Plan

Define

Define Problem

Define Process



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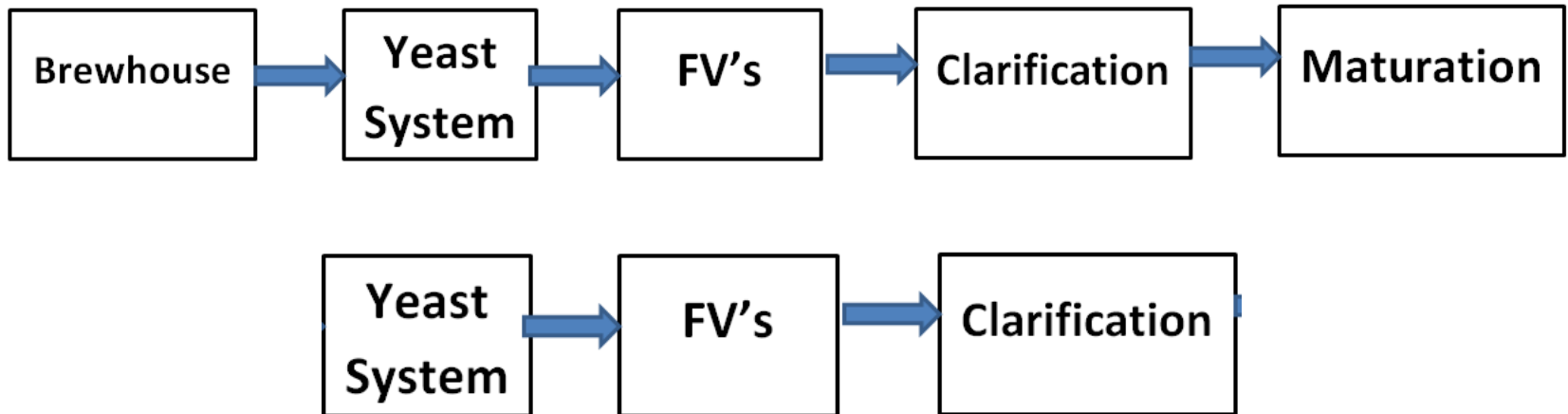
Plan

Define

Define Problem

Define Process

Define Scope



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Plan

Define

Define Problem

Define Process

Define Scope

Measure



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Plan

Accounting data
QA data
Time Studies
Brain Storming

Define

Define Problem
Define Process
Define Scope

Measure

Measure/collect data



UNITED WE BREW.

Plan

Define

Define Problem

Define Process

Define Scope

Measure

Measure/collect data

Determine Base Line



UNITED WE BREW.

Plan

Define

Define Problem

Define Process

Define Scope

Measure

Measure/collect data

Determine Base Line

Analyze

Analyze data (Root Cause)

Evaluate alternate solutions

Select Solution



UNITED WE BREW.

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UNITED WE BREW.

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Do

Improve

Implement Solution

Implement Solution



UNITED WE BREW.

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Define Problem

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Implement Solution

Do

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Measure/collect data

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Implement Solution

Do

Implement Solution

Check



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Define Problem

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Define Scope

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Measure/collect data

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Analyze

Analyze data (Root Cause)

Evaluate alternate solutions

Select Solution

Improve

Implement Solution

Do

Implement Solution

Check

Act

Repeat PDCA as necessary



UNITED WE BREW.

Plan

Define

Define Problem

Define Process

Define Scope

Measure

Measure/collect data

Determine Base Line

Analyze

Analyze data (Root Cause)

Evaluate alternate solutions

Select Solution

Improve

Implement Solution

Do

Implement Solution

Check

Act

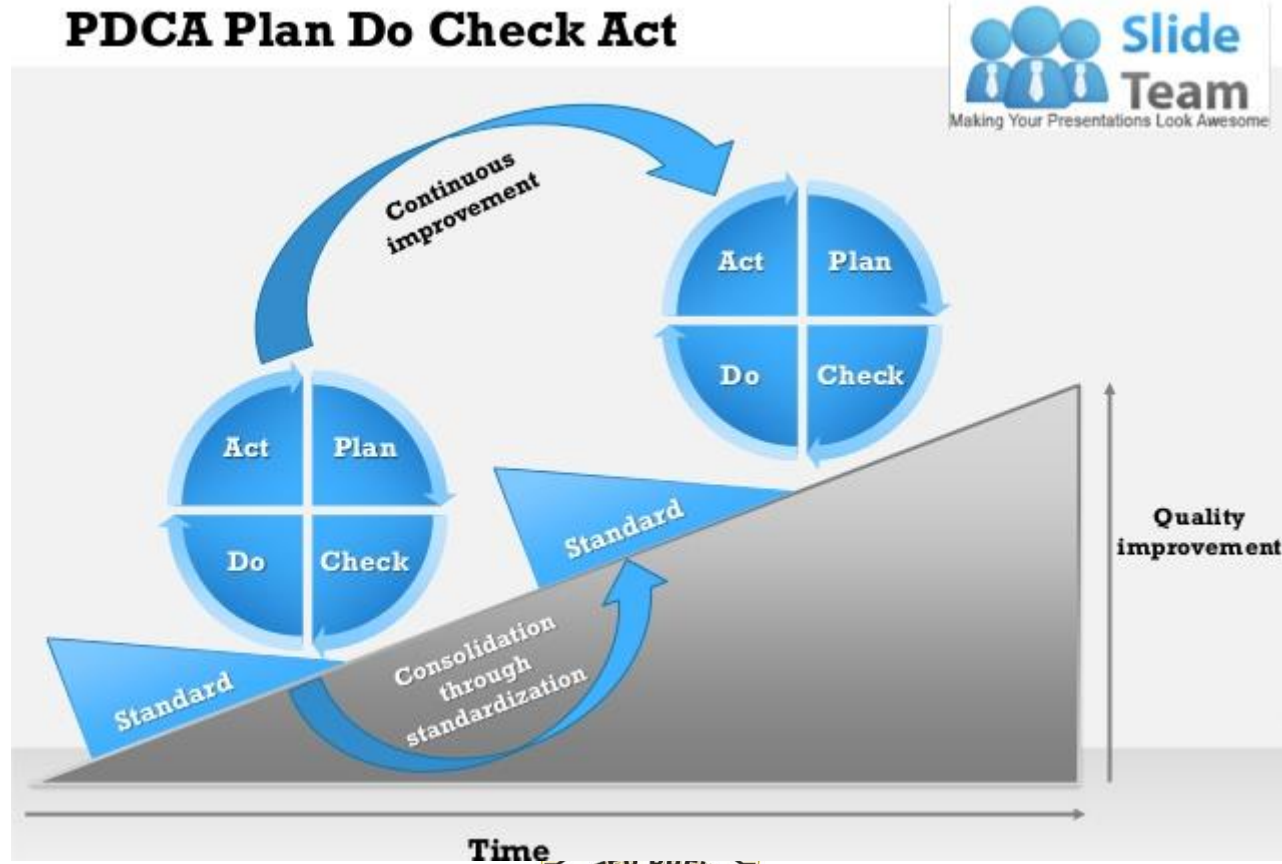
Control

Maintain the gain



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Continuous Improvement Overview



UNITED WE BREW.

Define

Define Problem

Define Process

Define Scope

Measure

Measure/collect data

Determine Base Line

Analyze

Analyze data (Root Cause)

Evaluate alternate solutions

Select Solution

Improve

Implement Solution

Check

Act

Control

Maintain the gain



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Today's Agenda

- *Continuous Improvement Overview*
- *Plan, Do Check Act vs. DMAIC*
- ***Which Problem Solving Tools to use?***
- *When not to use DMAIC !*



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Learning problem solving tools and when to apply them?

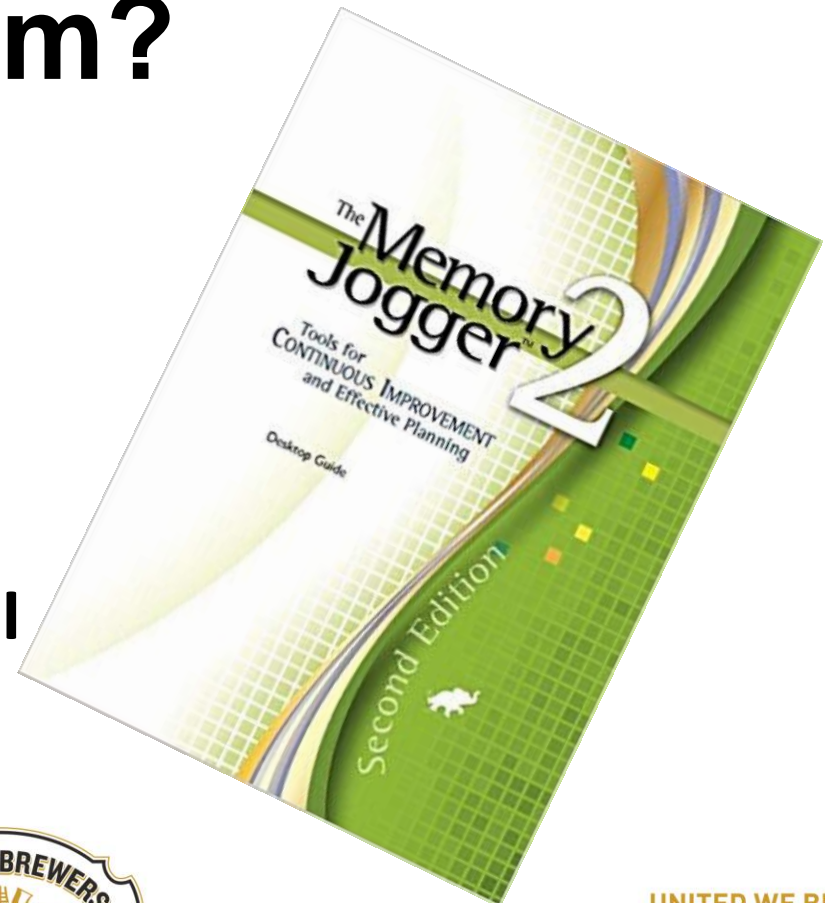


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Hood River, OR

Learning problem solving tools and when to apply them?



Memory Jogger II
Amazon.com
\$18.00



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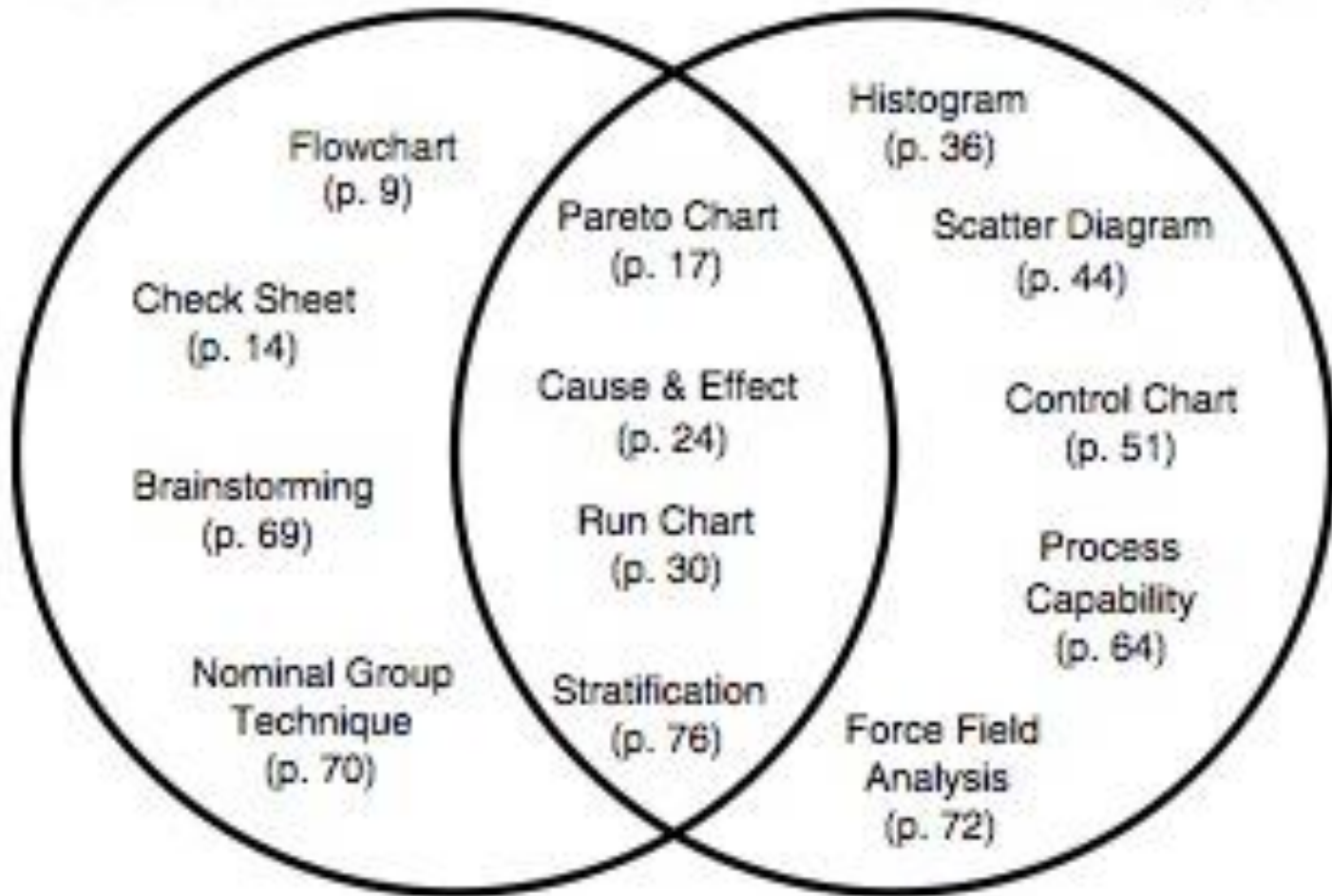
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Problem Identification

Problem Analysis



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WWW:QualityCouncil.com
Certified Six Sigma Black Belt
Primer
Price: \$80.00



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- *Continuous Improvement Overview*
- *Plan, Do Check Act vs. DMAIC*
- *Which Problem Solving Tools to use?*
- ***When not to use DMAIC !***



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Guidelines for when to use DMAIC

1. If the problem is simple, go right to the solution and don't waste your and your team's time doing the full DMAIC
2. If the problem is complex, don't waste your and your teams time by not doing the full DMAIC
3. If you are not sure if the problem is simple or complex, lead your team through the 1st activity of the initial DMAIC step-Define the problem-to determine if the full DMAIC process is warranted



END

Tom Petullo
tpetullo@bendcable.com



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Data → ***Information*** → ***Knowledge***



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DATA

4,1,2,5,3,4,2,1,5,2,4,2,3,2,1,5,
2,4,3,1,5,3,1,3,4,2,3,2,3,4,2



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4,1,2,5,3,4,2,1,5,2,4,2,3,2,1,5,
2,4,3,1,5,3,1,3,4,2,3,2,3,4,2

Value Occurrences

1	5
2	9
3	7
4	6
5	4

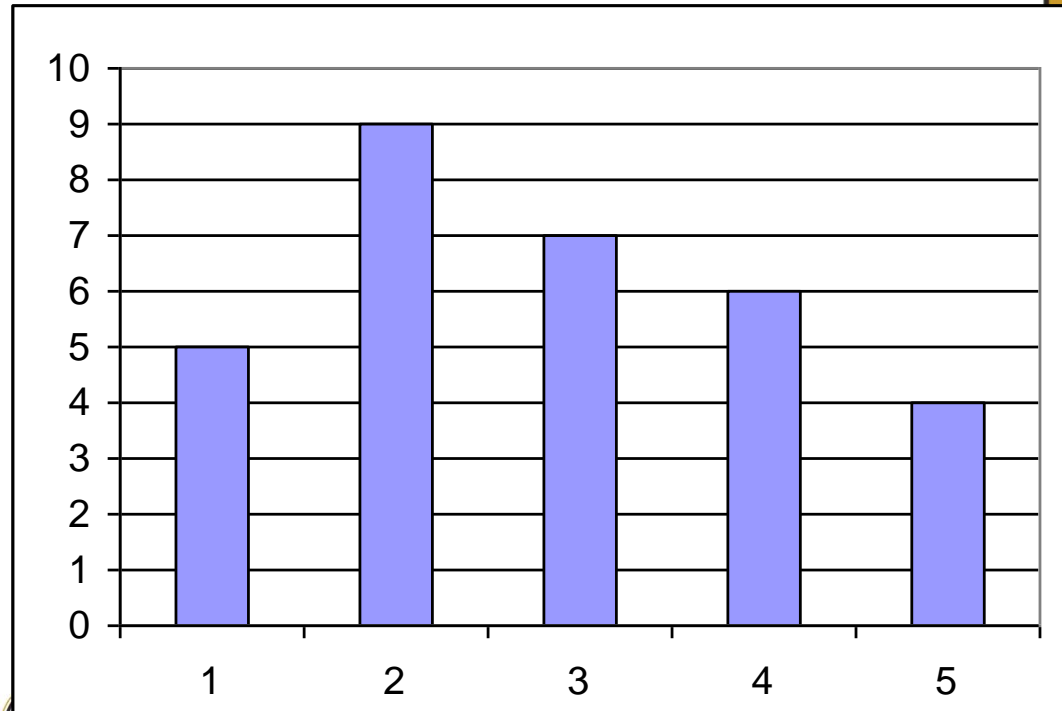


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DATA

4,1,2,5,3,4,2,1,5,2,4,2,3,2,1,5,
2,4,3,1,5,3,1,3,4,2,3,2,3,4,2

<u>Value</u>	<u>Occur.</u>
1	5
2	9
3	7
4	6
5	4



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-0.0407	-0.6296	-0.016	-0.06	0.0236	-0.0923	0.0024	-0.0384	0.0509	-0.1114	-0.0056	-0.0457	0.0398	-0.0701	0.0146	-0.0242
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-0.0397	-0.2346	-0.0156	-0.0596	0.0238	-0.0916	0.0027	-0.0373	0.0527	-0.1101	-0.0037	-0.0454	0.0409	-0.0677	0.0147	-0.0236
-0.0395	-0.2104	-0.0153	-0.0594	0.0238	-0.0914	0.003	-0.0367	0.0531	-0.1083	-0.0032	-0.0452	0.041	-0.0674	0.0153	-0.023
-0.0394	-0.2011	-0.0153	-0.0585	0.0243	-0.0909	0.0038	-0.0366	0.0534	-0.1065	-0.0027	-0.0451	0.0411	-0.0671	0.0154	-0.0225
-0.0393	-0.1832	-0.0151	-0.0573	0.0244	-0.0898	0.0044	-0.0365	0.0535	-0.105	-0.0024	-0.045	0.0415	-0.0669	0.0163	-0.0224
-0.0386	-0.1824	-0.0151	-0.0573	0.0244	-0.0896	0.0051	-0.0362	0.0542	-0.1044	-0.0021	-0.0447	0.0418	-0.0665	0.0167	-0.0221
-0.0386	-0.1682	-0.0147	-0.0573	0.0246	-0.0896	0.0051	-0.0357	0.0554	-0.104	-0.0021	-0.0447	0.042	-0.0663	0.0171	-0.0219
0.0196	-0.1678	-0.0147	-0.0565	0.0252	-0.0892	0.0058	-0.0353	0.0561	-0.1036	-0.0021	-0.0445	0.0428	-0.0657	0.018	-0.0217
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0.0214	-0.1477	-0.0117	-0.0552	0.0263	-0.0869	0.0068	-0.0344	0.0574	-0.1015	-0.0016	-0.0431	0.0434	-0.0651	0.0183	-0.0207
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0.022	-0.14	-0.0115	-0.0549	0.0273	-0.0827	0.0073	-0.0339	0.0587	-0.0995	-0.0011	-0.0427	0.0446	-0.0643	0.0185	-0.0201
0.0227	-0.1399	-0.0115	-0.0547	0.0275	-0.0825	0.0073	-0.0339	0.0598	-0.0984	-0.0008	-0.0426	0.0447	-0.064	0.0186	-0.0198
0.0231	-0.1395	-0.0112	-0.0546	0.0284	-0.0821	0.0074	-0.0325	0.0598	-0.097	-0.0006	-0.0425	0.045	-0.0631	0.0188	-0.0197
0.0234	-0.1384	-0.0111	-0.0541	0.0288	-0.0818	0.0077	-0.0318	0.0615	-0.0965	-0.0194	-0.0409	0.045	-0.0631	0.0194	-0.0196
-0.0166	-0.1378	-0.0108	-0.0539	0.0295	-0.0812	0.0078	-0.0317	0.0619	-0.0187	-0.114	-0.0058	-0.0461	0.039	-0.0715	0.0145
-0.0162	-0.1365	-0.0108	-0.0539	0.0295	-0.0804	0.0078	-0.0315	0.0623	-0.0174	-0.1124	-0.0056	-0.0459	0.0391	-0.0714	0.0145
0.2438	-0.1361	-0.0106	-0.0537	0.0298	-0.0796	0.008	-0.0315	0.0642	-0.0963	0.0885	-0.0608	-0.1156	-0.007	-0.048	0.0368
0.0001	-0.1352	-0.0102	-0.0531	0.0299	-0.0793	0.0083	-0.0313	0.0647	-0.0954	0.0891	-0.0608	-0.1152	-0.0068	-0.0463	0.038
0.0005	-0.1341	-0.0099	-0.053	0.0303	-0.0793	0.0083	-0.0308	0.0648	-0.0942	0.0904	-0.0193	-0.1144	-0.0063	-0.0461	0.0384
0.0006	-0.134	-0.0097	-0.0526	0.0303	-0.079	0.0084	-0.0297	0.0652	-0.0939	0.0921	-0.0745	0.0137	-0.0255	0.0794	0.0494
0.0006	-0.1317	-0.0095	-0.0522	0.0317	-0.0785	0.0086	-0.0297	0.0654	-0.0936	0.0926	-0.0739	0.0139	-0.0254	0.0821	-0.0196
0.0012	-0.1301	-0.0094	-0.0521	0.032	-0.0777	0.009	-0.0292	0.0662	-0.0935	0.0983	-0.072	0.0141	-0.0253	0.0836	-0.0195
0.0015	-0.1289	-0.0094	-0.0518	0.0321	-0.0773	0.0091	-0.0291	0.0663	-0.0932	0.0995	0.1254	0.0852	0.1438	0.2007	-0.1106
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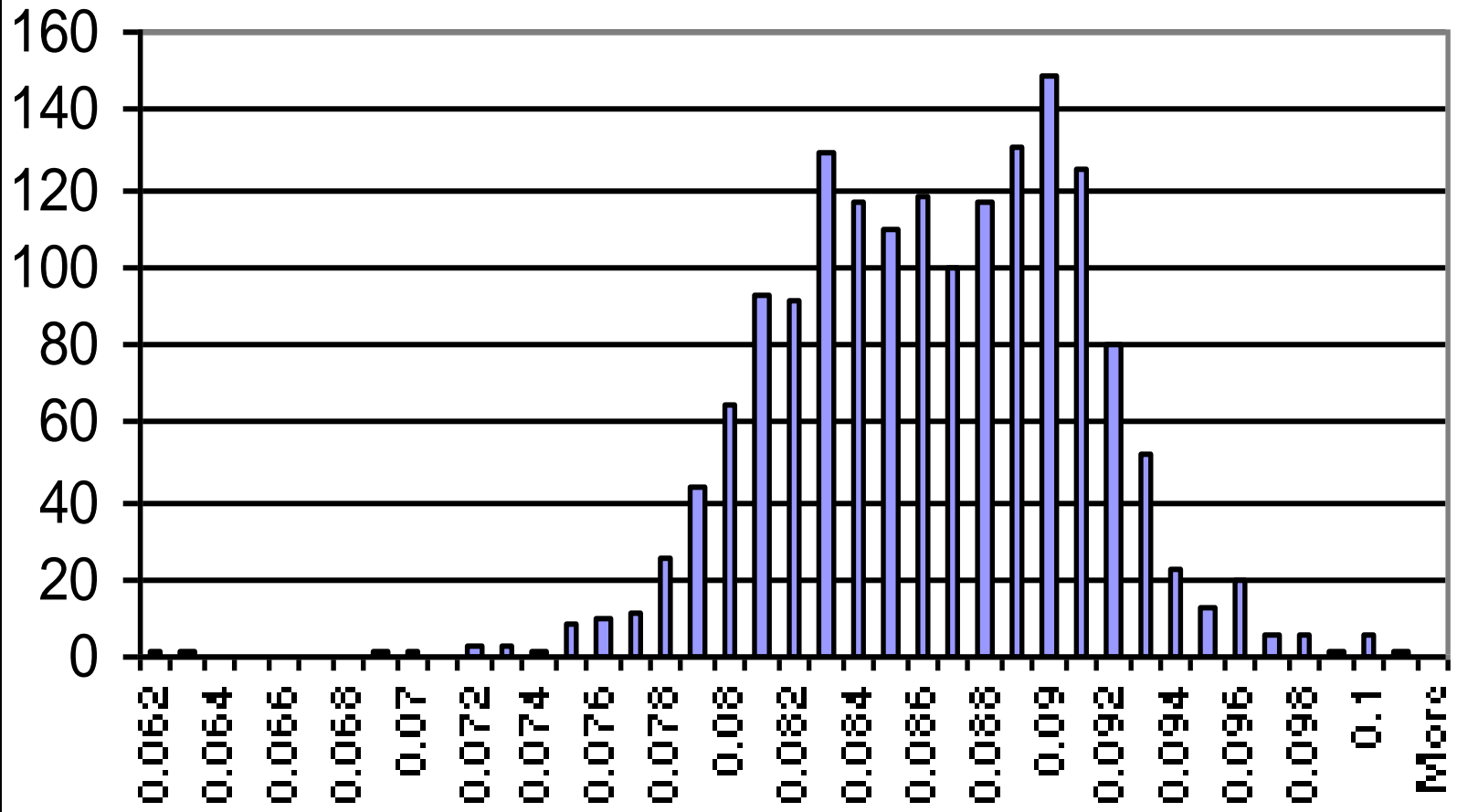
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S-S Veneer

276 veneers @ 6 checks



Additional Problem Solving Tools

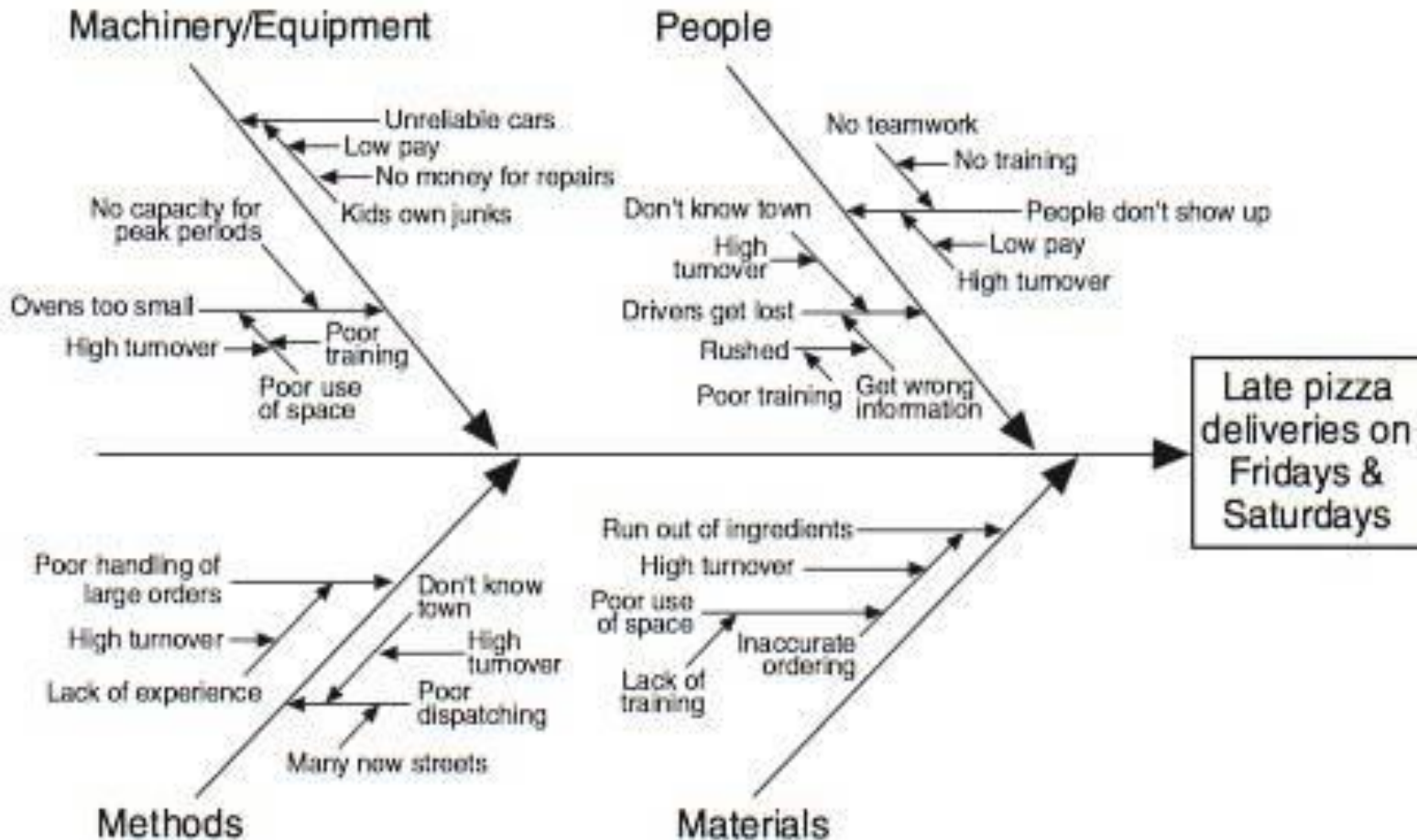


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FISHBONE



REW.



Brainstorming Rules

I. Collect brainstorming Ideas

1. **Don't discuss brainstorming ideas as they are presented**
2. **Don't criticize brainstorming ideas.**
3. **Record brainstorming ideas exactly as presented**
4. **Encourage participants to give outrageous ideas. Others will build on their ideas**
5. **Build enthusiasm and encourage everyone to participate**
6. **Make sure that the scribe can keep up with the flow of ideas**
7. **Record ideas on a flip chart so they are visible to the team**

II. Clarify listed ideas as necessary

Allow contributors to clarify the listed ideas as necessary

I. Vote on the importance/significance of each idea

1. **Provide each participant with 3 votes (dots) for every 4 ideas listed (75% of total)**
2. **Vote in silence without discussion**



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End



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