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Лекции № 10: Lean Software Development; Lean Six Sigma. DMAIC Instruments

Курсов ръководител: проф. д-р инж. Огнян Андреев

	Ключови процеси	Критични фактори за успех	Съставни компоненти, свързани с проектите с отворен код
Група: Инициране и планиране	**Идентифициране на заинтересованите страни**	**Контекстуално управление**	Преглед и анализ на съществуващите проекти
			Изграждане на устойчива коалиция
			Разбиране на маркетинговите аспекти
			Оценка на финансовите нужди и източници
		Обследване на заинтересованите	Обследване на заинтересованите
	Планиране на управлението на заинтересованите страни	**Стратегия за ангажиране на заинтересованите**	Проблемно-ориентирано проектно начало
			Изчистена и резонираща проектна мисия
			Възлагане на отговорности
			Стабилност чрез привличане към общността
		Отчитане на цялостния продуктов жизнен цикъл	Поглед върху всички области на системната разработка
			Планиране и дизайн преди иницииране
			Отчитане на социо-техническата еволюция на проекта
			Потребителско опосредстване и подкрепа, клиентска поддръжка
		Технологична съгласуваност	Отчитане на технологичните ограничения
			Равновесие между техническото ниво на проекта и участниците
			Развитие на обкръжаващата екосистема
			Развитие чрез модулна организация на работата
Група: Изпълнение и контрол	**Управление на участието на заинтересованите**	**Изграждане на общност**	Подхранване на общностната идентичност
			Менторство и подкрепа в общността
			Провеждане на общностни събития
			Възможности за развитие
		Стратегически управленски подход	Посвещаване на проектната стратегия
			Модел за управление и вземане на решения
			Прилагане на доказани проектни практики
			Проактивна мрежова стратегия
		Техническо управление, насърчаващо участието	Динамично развитие на нови версии
			Управление на комплексността
			Формализирано управление на изискванията и приносите
			Систематичност на заявките за отстраняване на проблеми
	Контрол по управлението на заинтересованите	**Превенция на конфликти от тех. характер**	Прилагане на лицензионни споразумения
			Качествено-ориентиран развоен процес
			Отворени срещи по техническото управление
		Оценка и оптимизация на представянето	Оценка и оптимизация на представянето

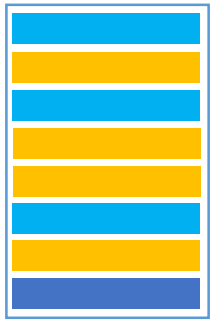
Цикъл на непрекъснатото иновиране

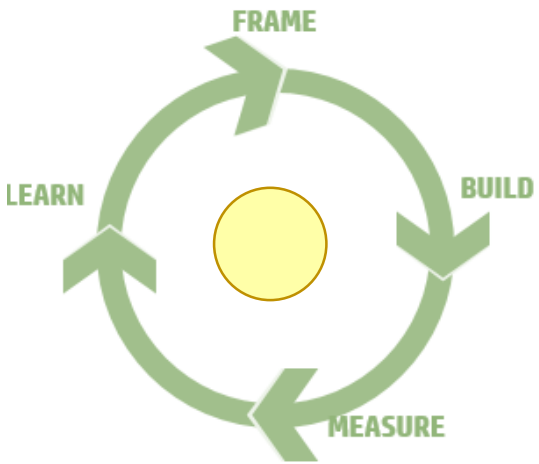
New

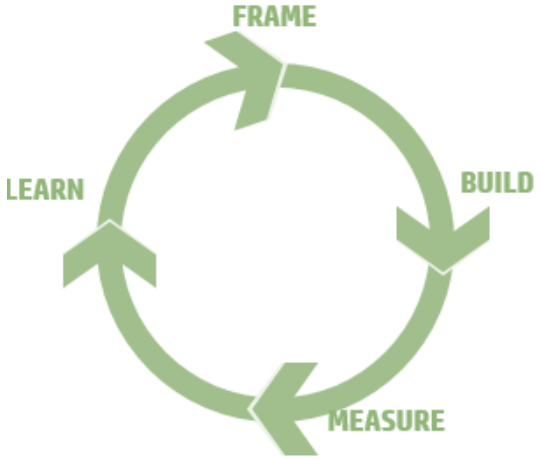
Research & Ideate → **Develop / Validate** → **Transition & Impact**

- Ways to produce
- Value propositions
- Delivery models
- Customers and experiences
- Business models

Innovation pipeline







Measure impact

Execution:	Kaizen	Lean Startup
Definition:	Design thinking	Open innovation process
Foundation:	Innovation Strategy / Agile organizations	

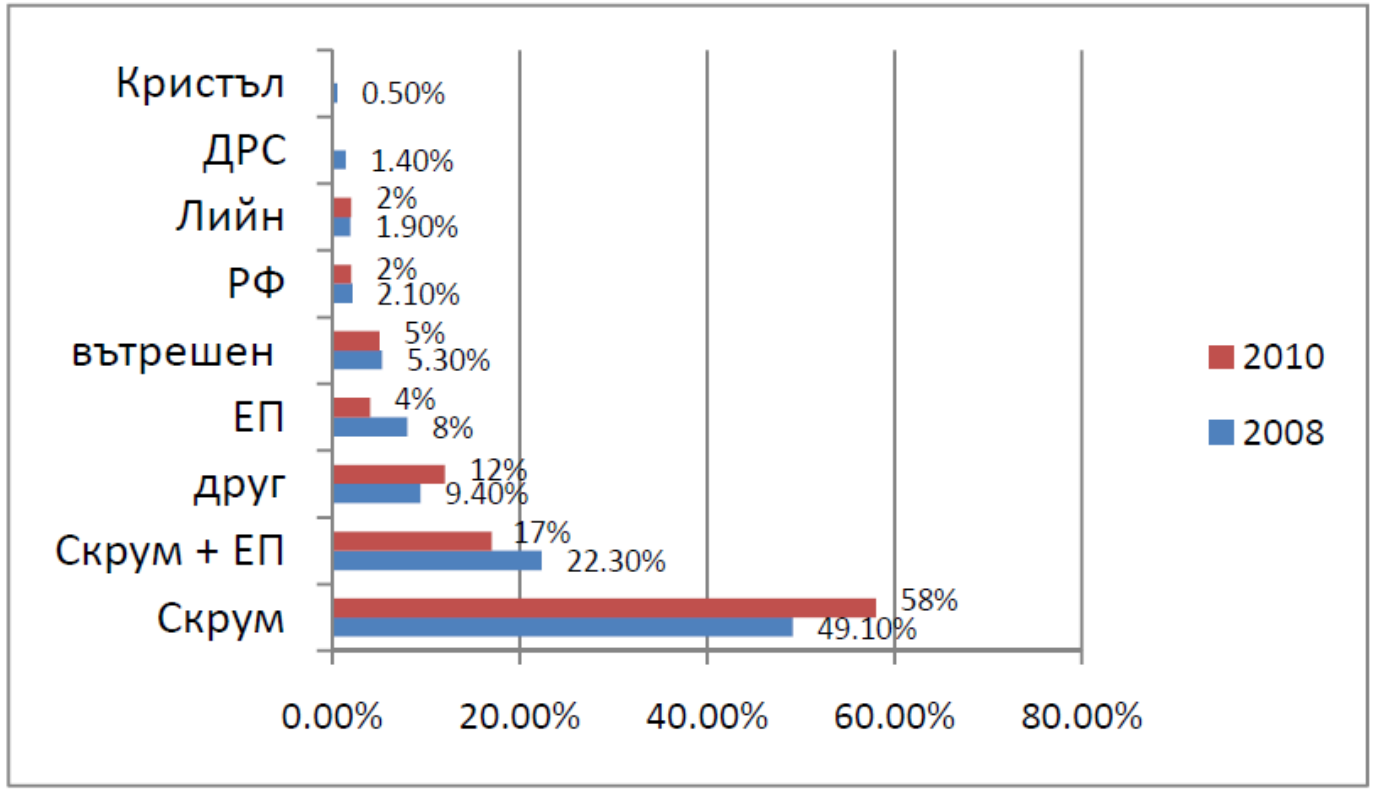
Lean Software Development

ТЕМА IV, МОДУЛ II «СПЕЦИФИКА ПРИ УПРАВЛЕНИЕТО НА СОФТУЕРНИ ПРОЕКТИ»

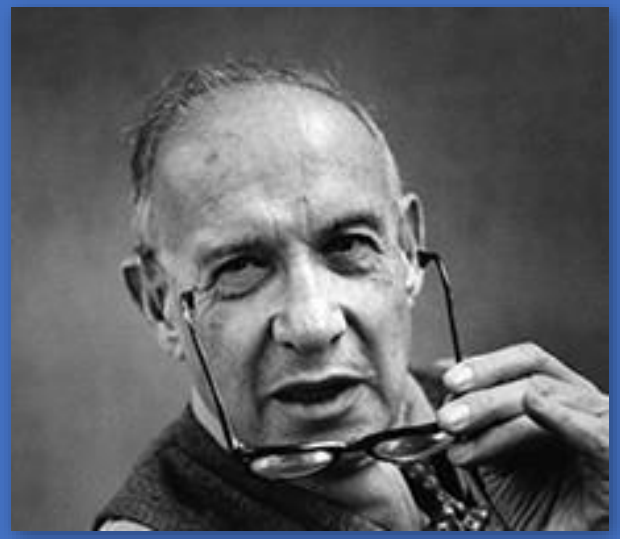
Данни от изследване на разпространението на гъвкавите методологии

- Скрум (Scrum) е най-широко прилаганата методология с около 50 процента приложение с тенденция към разширяване на приложението - приблизително 10 процента от 2008 до 2010 година.
- Хибридът между Скрум и Екстремното програмиране (Extreme programming) заема второто място по приложение.
- След тях с проценти между 10 и 2 се нареждат Екстремното програмиране (ЕП), Разработването по функционалности (Feature-driven development) и **Лийн (Lean).**
- Динамичното разработване на софтуер (Dynamic systems development method) и фамилията Кристъл (Crystal family) намират приложение в по-малко от 2% от проектите през 2008 година.

„Гъвкава методология за разработване на софтуерни приложения“, И. Кръстева

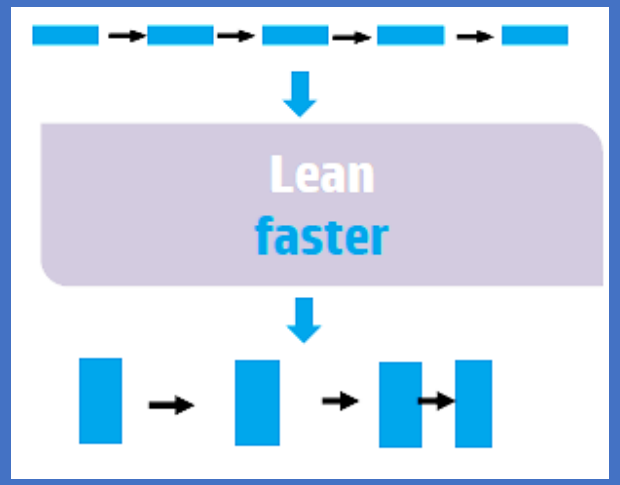


Данни от проведени от VersionOne изследвания през 2008 и 2010 година относно приложението на отделните гъвкави методологии в практиката. Изследванията представят данни от интернет въпросници с няколко хиляди участници (3061 участници през 2008 година и 4770 през 2010 година) от повече от 80 страни.



“There is nothing so useless as doing efficiently that which should not be done at all”

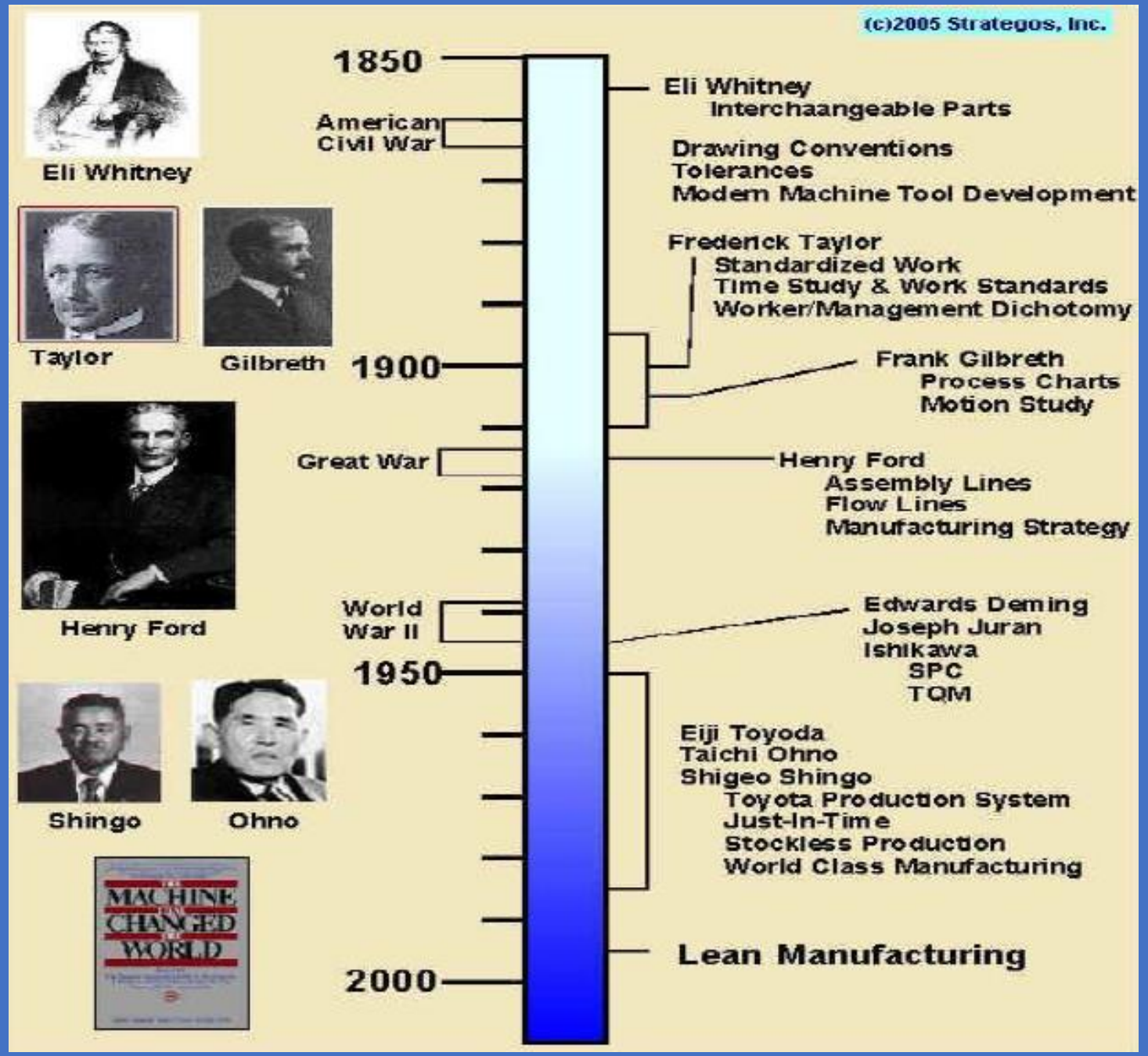
Peter Drucker



1. Терминът “Lean” произхожда от книгата *„The Machine that Changed the World“* на James Womack (1990).

2. “*Lean Software Development: An Agile Toolkit*” (2003) „транспонира“ понятието в софтуерната практика като хибрид между „класическия“ подход за Lean Manufacturing и „новаторската“ концепция за Agile Development.

3. “Lean Startup” (2011) разширява смислово концепцията в друга насока, която излиза отвъд разработката и обхваща цялостното управление на софтуерния startup (стартиращата иновативна предприемаческа организация).



Lean method

Theories, models, tools & techniques

7-те „Lean“ принципа

- **Flow**

Waste-free processes providing material and information without interruption

Eliminate Waste

- **Empower the team**

Defect-free products and services

Empower the Team

- **Customer Centricity**

Customers define **value**

- **Pull**

Products created **as the customer needs them**

Amplify Learning

- **Tact**

Cycle time and production are **aligned to the customer demand**

Deliver as fast as possible

Decide as late as possible

- **Zero Defects**

Defect-free products and services

Optimize the Whole

- **Continuous Improvement**

Always **driving customer satisfaction**

Build integrity in

Radical transparency

Eliminate Waste

Continue the work as is today:

- All Reports show everything is ok
- Keep saying that the customer is important.
- Work jams occur all over the organization but we don't do anything.
- There are no tools and processes to report problems or impediments.
- Talks to improve morale, karaoke competitions. Nothing changes.

We start seeing the reality and question it:

- Recognition of tensions between quality and quantity.
- Reports are not accounting for what's really going on or the competitive position.
- We see that the work is agonizingly slow. Work jams and waste are everywhere.
- We see that the failure of workers is also the failure of management.
- Bureaucratic practices appear comical or pointless.
- We understand that talk and karaoke competitions are distractions from the problems.

Lean philosophy regards everything not adding value to the customer as waste (muda). Such waste may include: Partially done work, Extra features, Relearning, Task switching, Waiting, Handoffs, Defects, Management activities

Creating self organizing teams

Empower the Team

1. Articulate a compelling purpose in terms of delighting the “customer”.
2. Consistently communicate a passion believe in the worth of the purpose.
3. Transfer power to the team to accomplish the team purpose.
4. Recognize the contributions of the people doing the work.
5. Consistently use tools and techniques to create and sustain self organizing teams.

Self organizing teams: managing the knowledge worker

Nothing beats an agile team:

- *Workers themselves are best placed to make decisions about how to perform their work.*
- *To effectively lead, the workers must be heard and respected.*
- *Knowledge workers have to manage themselves. They have to have autonomy.*
- *Continuing innovation has to be part of their work, the task, and the responsibility of knowledge workers.*

Какво?

- Cross functional team empowered to define the problem space and craft solutions
- They assume the responsibility to plan, commit and work collaboratively with the customer
- Have collective ownership and decide how the work is to be assigned
- Deliver results together

Защо?

- Traditional top down approach for management assumes that leaders have all the answers and teams need to execute these plans to drive success.
- Today we know that delighting the customers is a **complex** problem that requires alignment and teamwork.

Workers are knowledge workers if they know more about the work they perform than their bosses.

Work on client driven iterations

Amplify Learning

Какво?

- Define short iterations in which the team can commit to deliver customer valuable outputs and improvements.
- Work with the team in defining what is the work to be done in the iteration and what improvements are to be done in the team dynamics.

Защо?

- By working in customer driven iterations the team can focus on what are the most valuable activities that can do to increase the value for the customer and select improvements in they way they work to be more effective.
- The team can adjust the direction and priorities adapting to those of the customer.
- Iterations help to drive experimentation to find new ways to delight the customer.

Deliver so fast that your users don’t have time to change their minds

Practices from Agile to be used at the client driven Lean iterations

1. Focus on what's valuable for your stakeholders
2. Identify the primary performance objective for the primary stakeholder.
3. Consider how to deliver more value sooner or cheaper
4. Decide as late as responsibly possible what work is to be included in the iteration.
5. Have the client or client proxy participate in deciding the priorities for the iteration
6. Spell out the Goals of each iteration before the iteration begins.
7. Define the goals in the form of User Stories.
8. Use User Stories as the beginning, not the end of the conversation.
8. Keep the user stories simple and track them informally.
9. Display the user stories in the workplace.
10. Include test to determine when the story is fully executed.
11. Provide coaching to encourage the good practices.

Deliver value to clients in each iteration

Deliver as fast as possible **I** ***Decide as late as possible***

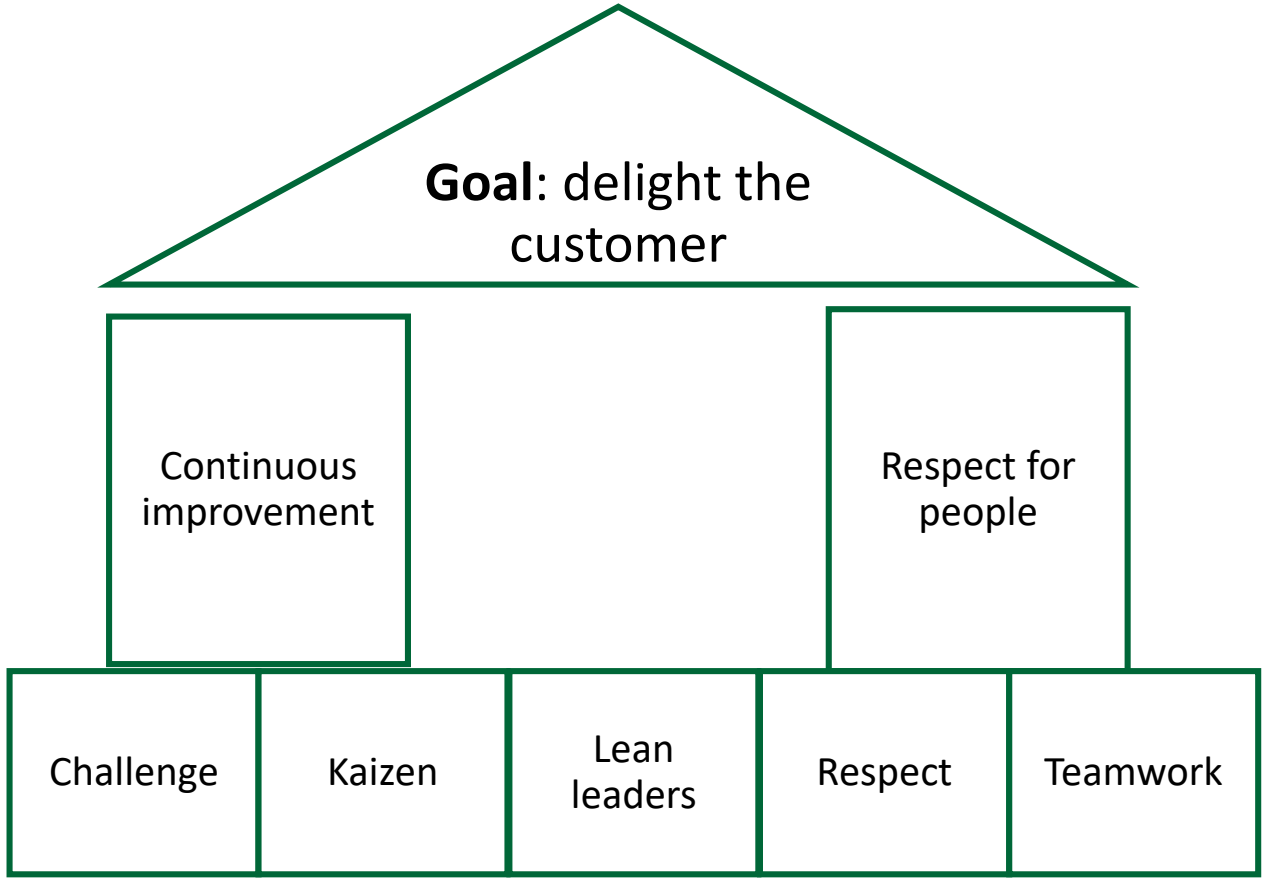
1. Focus on finishing the most important work first.
2. Ensure that user stories are ready to be worked on, prepare work before beginning to work on it.
3. Have the team Itself Estimate how much time the work will take.
4. Give the team the responsibility for deciding how much work it can do in an iteration.
5. Let the team decide how to do the work in the iteration.
6. Encourage Open communication Within the team.
7. Systematically Identify and remove **impediments** to getting work done.
    - Daily meeting: Ask what did I do yesterday? What am I going to do today? What impediments are getting on the way?
8. **Don't interrupt** the team in the course of an iteration.
9. Have the team work sustainable hours.
10. Fix problems as son as they are identified.
11. Measure progress in terms of value delivered to clients.
12. At the end of the iteration, Get feedback from the client or the client proxy.
13. Calculate the velocity of the team.
14. Conduct a **retrospective** review of what has been learned in the iteration and how the next iteration can be improved.

Generate a continuous flow of value to the end-user and for the sponsor.

Continuous improvement

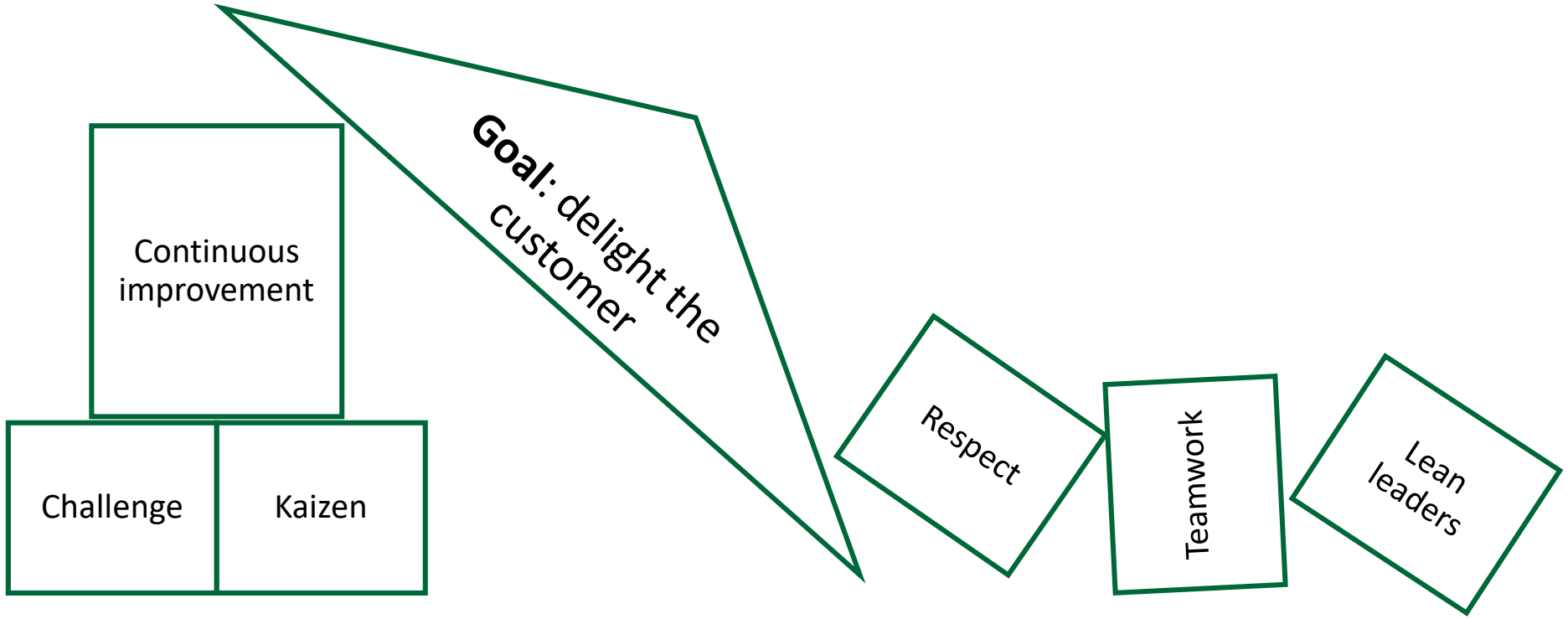
Optimize the Whole **I** ***Build integrity in***

1. Have a constant sense of danger
2. Small steady, improvements
3. Consider data carefully, implement change rapidly
4. Reflect at milestones to identify and improve shortcomings
5. Use tools like retrospectives, root cause analysis, and value stream mapping
6. Protect the knowledge base by developing stable personnel and careful succession systems
7. “Go and see” for your self.



Team reflection and Continuous improvement as an organizational value

The "traditional management" implementation of Lean

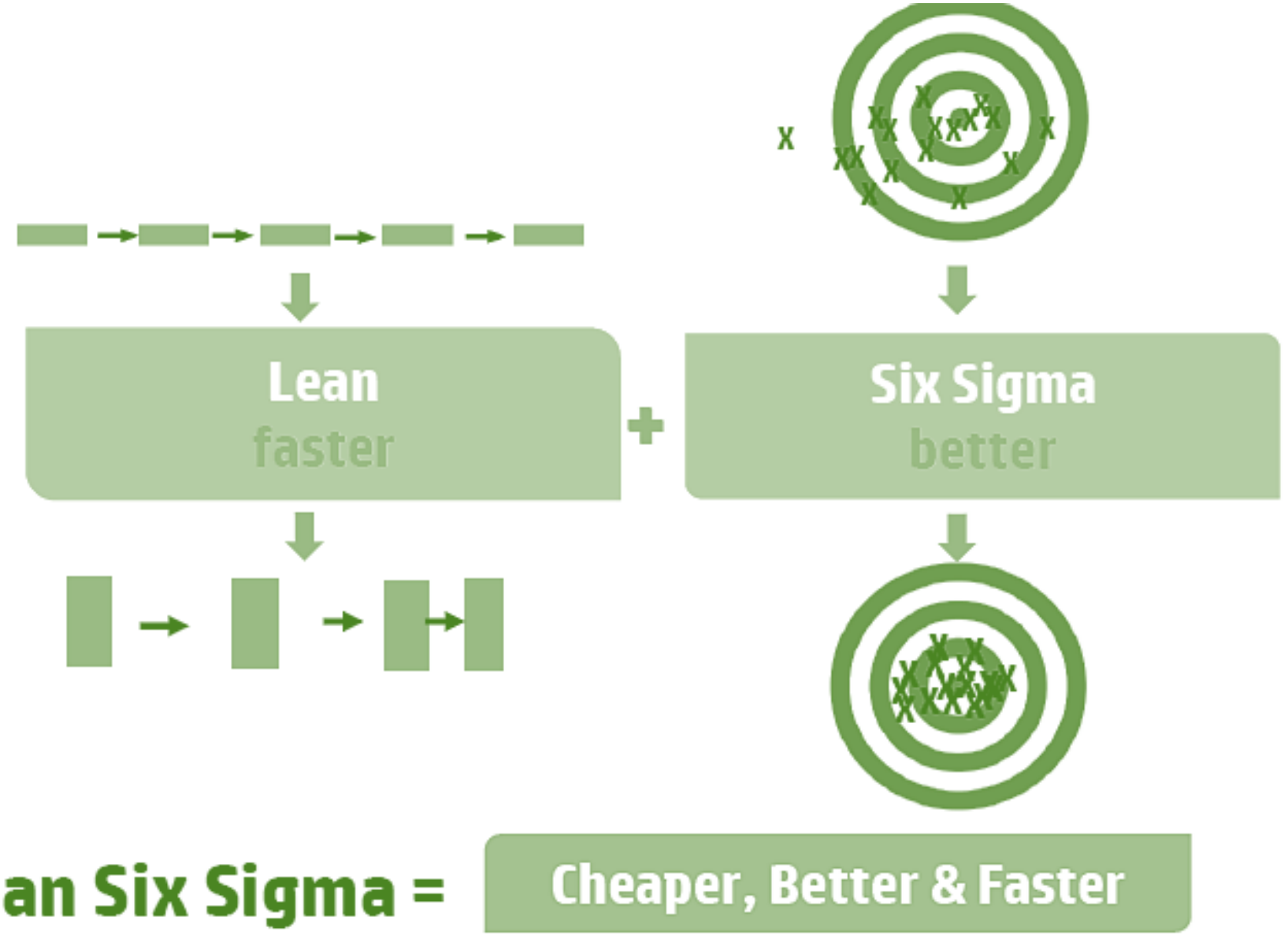


Lean + Six Sigma

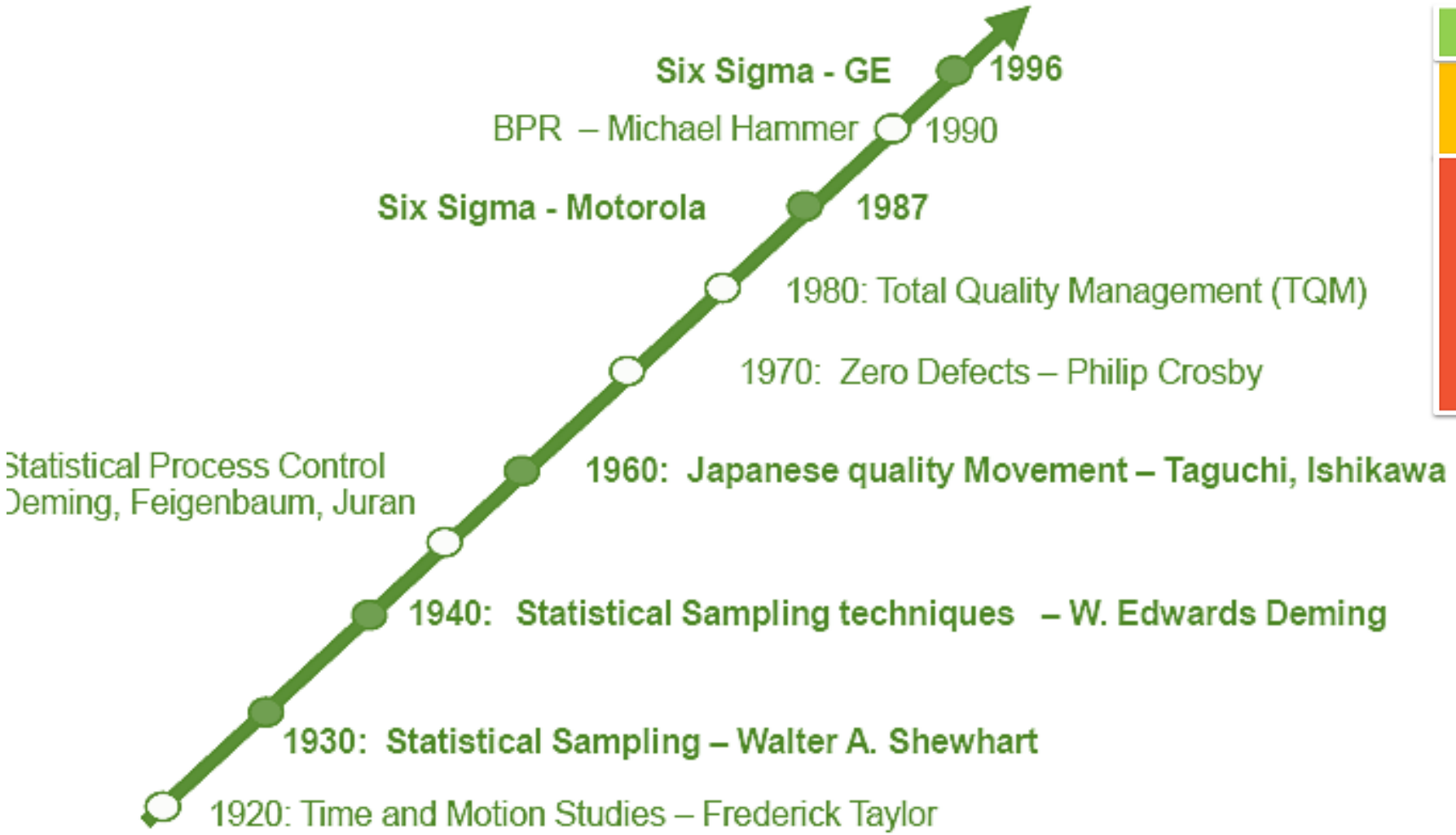
ТЕМА IV, МОДУЛ II «СПЕЦИФИКА ПРИ УПРАВЛЕНИЕТО НА СОФТУЕРНИ ПРОЕКТИ»

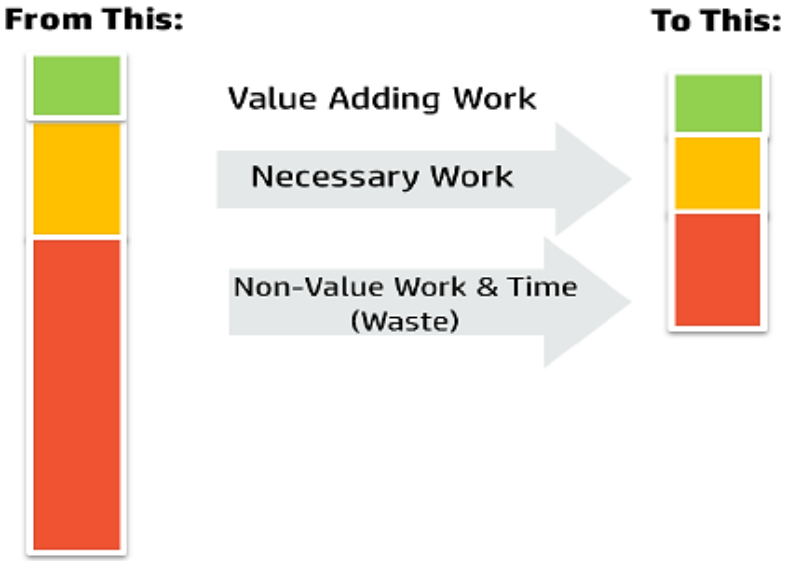
Lean Six Sigma

- *Клиентски – ориентирана философия за* ***задвижвано от данни процесно съвършенство***
- ***Общ набор от инструменти и тактики*** *за постигане на устойчива промяна*
- ***Доказана стратегия за бизнес резултати***

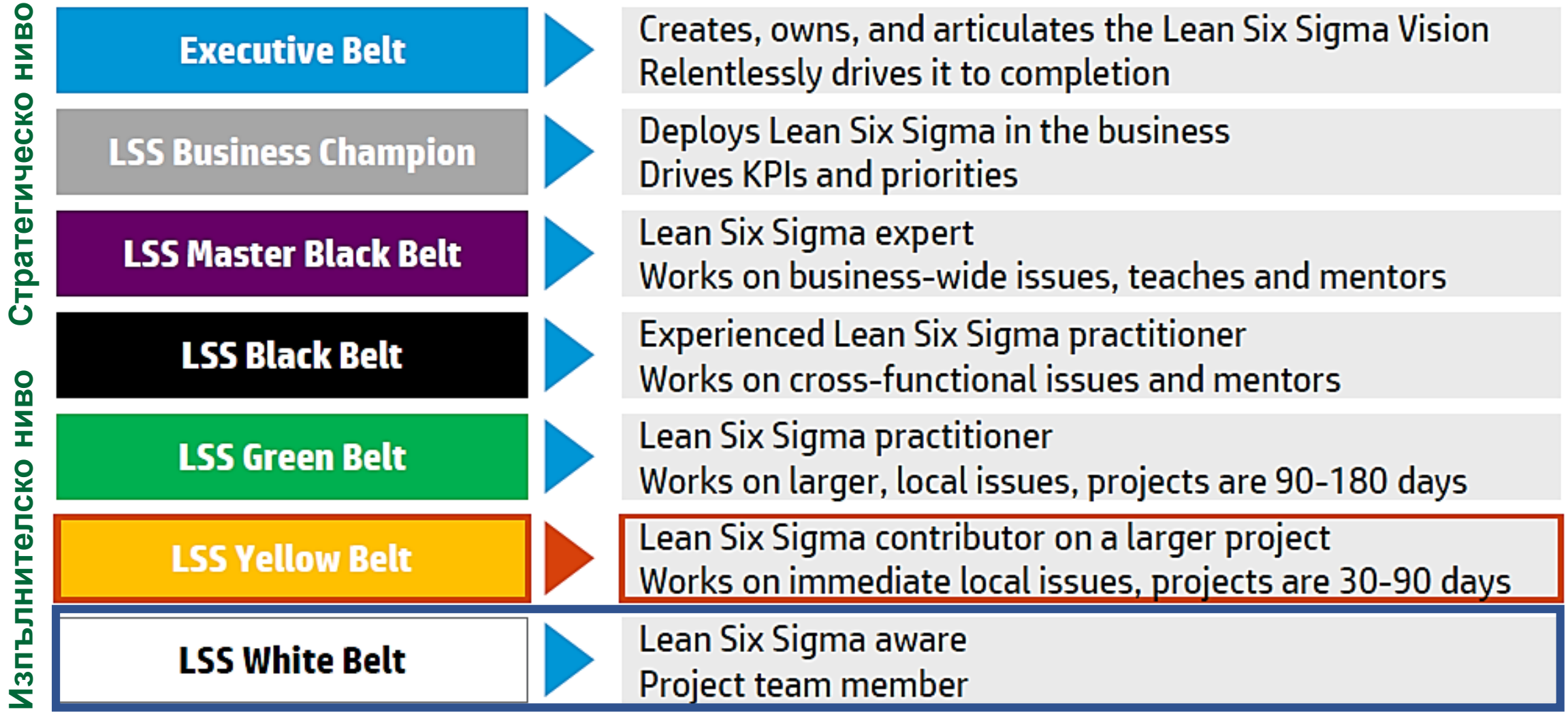


Историческо развитие на Six Sigma концепцията





Lean Six Sigma роли (нива на развитие)



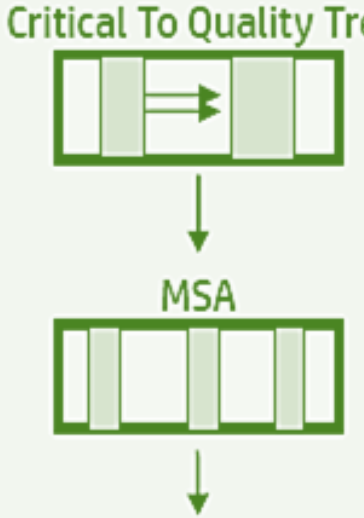
Lean Six Sigma Framework

1. Define
Describe the problem

- Project Selection
- Project Charter
- VOC, VOB
- Problem Statement
- Process Map/SIPOC

2. Measure
Collect baseline data

- CTQ Metrics
- Meas. Sys. Analysis
- Summary Statistics
- Process Capability
- Control Chart



3. Analyze
Identify the root cause

- Pareto Chart
- Run Chart
- Cause and Effect
- Scatter Diagram
- Value Analysis

4. Improve
Select the best solution

- Brainstorming
- Benchmarking
- Force Field Analysis
- Criteria Test
- FMEA

5. Control
Sustain the gains

- Statistical Process Control
- Control Plan
- Cost-Benefit Analysis
- Mistake Proofing

Example: Project Description

What Were We Trying to Improve and Accomplish?

Description of Project	Project Link to Customer	Improvement Objectives
Improve the maturity of the process to manage customer initiated audits impacting respective business units. The current low maturity of this instance of the Audit Management Process has negative impact on the: • Maintenance of the Quality Management System • Increasing heavily redundant flows of communication among the customer, the account team, the leveraged delivery units involved and the quality contacts along the chain • Increasing penalties risk • Increasing time/resource impact to handle audit events and bad time management • No clear communication path and responsibilities are outlined, no traceable audit records are maintained in the unified database tool	Low maturity of process could lead to several negative points: • Improvement will enable a more effective approach to evidencing and communicating commitment to contractual requirements. • Improvement would increase customer satisfaction • Improvement will minimize time impact • Link to external certification management by addressing the quality gaps in the audit management process against general standards such as ISO 9001	• Increase maturity of process in place • Avoid negative impact by improving the existing process [process flow description, process stages, R&R, inputs/outputs, reporting and performance metrics] in accordance with business need and internal process requirements. • Improve satisfaction by improving process • Communicate and rollout the process developed to ensure operation and minimize negative impact of low process maturity and poor quality on internal and external business relations, delivery of services of customers and business workload of auditees.

Example: PDSA Cycles Overview

Project Phase	D	M	A	I	C	Tools Used
Project Scope Definition	x					• Improvement Plan template • RASCI for project participants • Stakeholder analysis
Initial Data Collection to Baseline Existing Process Performance		x				• Data collection and extract forms • Input from Quality Management • Control chart • Survey data input.
Study of Existing Process			x			• SIPOC • Process flowchart: Internal audit process
Gap Analysis/Weaknesses of Process identification			x			• Fishbone: Root Cause Analysis • VAP to prioritize
Design of Improved Process to address root causes of process occurunces to date.				x		• Process map • RACI of process • Process collateral (R/R. Big Rules, timelines)
Pilot a process improvement in real environment				X		• Process map, audit collateral • Meeting minutes, audit checklists and schedule. • Feedback on process implementation. • Audit tracking tool
Aligment to PPM existing process				X		• Process mapping • Gap analysis
Perform communication of improved process and verify compliance					x	• Comms records • Approval and feedback by stakeholders • Survey results
Monitor and Sustain Improvements					x	• Sustainability • Comms involvement in the Consolidated Audit Schedule Governance meeting

Define Phase

Описание на проблема, процеса, проекта

Фаза на дефиниране

Приблизителна продължителност:

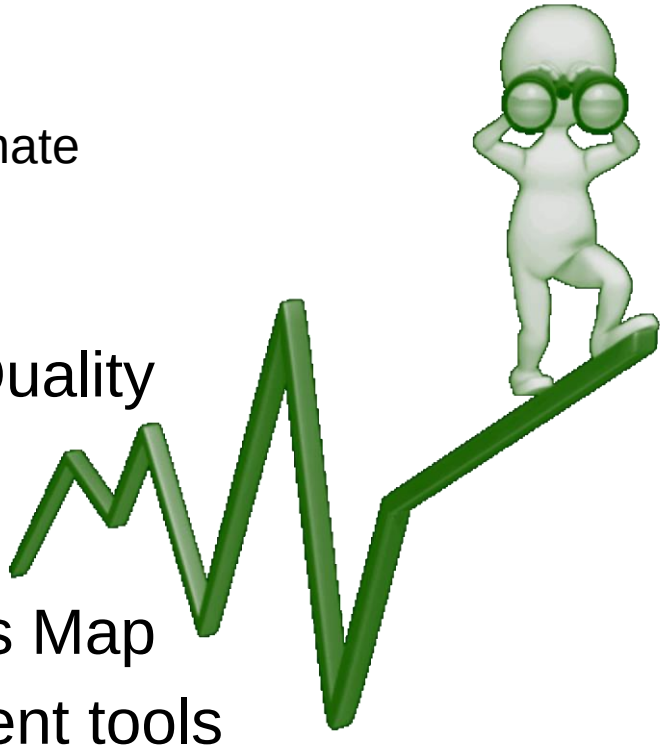
- 2-4 Weeks

Цели:

- Confirm that the project is viable
- Define and confirm scope
- Confirm sponsor and stakeholder support
- Finalize team members
- Begin to detail the problem, process, and project
- Estimate benefits and costs

Изходни резултати:

- Project Charter
  - Problem statement
  - Business impact estimate
  - Key metrics
  - Team members
- VOC / Critical to Quality Tree
- SIPOC
- High-level Process Map
- Project Management tools
  - Stakeholder Analysis
  - Communication Plan
  - Project Plan
  - Project Risk Assessment



Lean Six Sigma Project Charter

Project Title	Process	Process Owner
Problem Statement:		

Start Date		**Team Members/Role**
Sponsor		
Executive Sponsor		
Project Lead		
Finance Rep		
Scope	**IS:** **IS NOT:**	
Project Goals: Qualitative & Quantitative		
Key Risks/Dependencies		
Aligned with which Strategic Goal		

Define: Gantt Chart

Schedule of Activities	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Define						
Measure						
Analyze						
Improve						
Control						

Define: Stakeholder Analysis

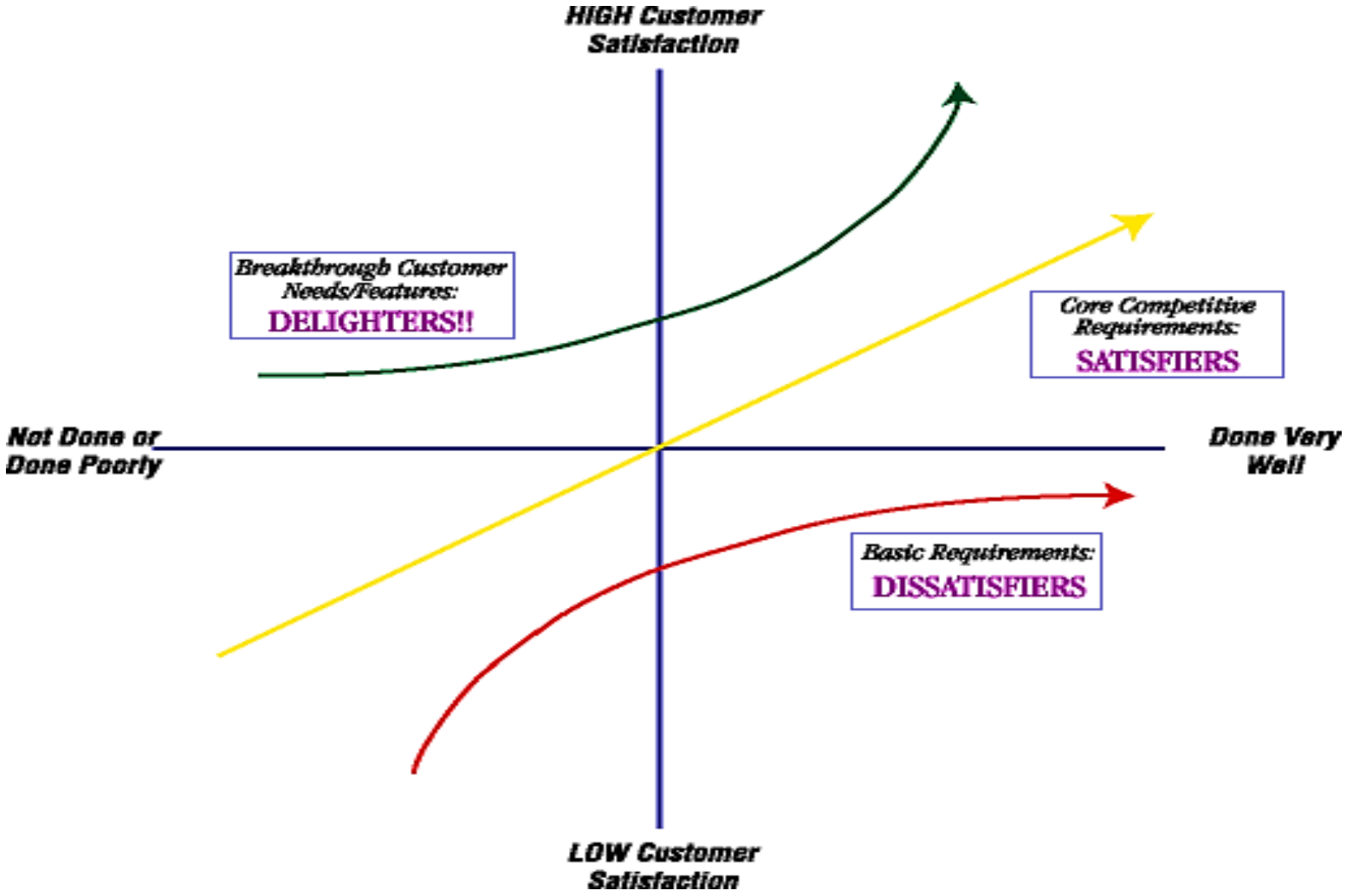
Stakeholder	*Level of Support (H, M, L)*	*Level of Influence (H, M, L)*	*Communication Requirements – What will they want to know?*	*Who will inform them?*	*How? How often?*

Example: Stakeholder Analysis & Engagement Plan

Who is affected or needed?	How Cricital is Participant?			What is needed from person for plan's accomplishment?	Why Plan is Important to Participant?		Proposed Strategy to Address and Strategy to Obtain Commitment
	High	Medium	Low		Importance	Risks	
EMEA Quality Lead (Sponsor)				Approve, review, communicate, verify compliance.	Quality compliance and audit management.	Workload capacity issues.	Engaged. Persuasion of direct benefit for region.
ITO Quality Lead				Review, communicate process contents.	Quality compliance, avoidance of risks to delivery and penalties.	Workload capacity issues.	Engaged. Persuasion of direct benefit for capability.
BPO Quality Lead				Review, communicate process contents.	Quality compliance, avoidance of risks to delivery and penalties.	Workload capacity issues.	Engaged. Persuasion of direct benefit for capability against low degree of involvement.
APPS Quality Lead				Review, communicate process contents.	Quality compliance, avoidance of risks to delivery and penalties.	Workload capacity issues.	No reaction. Should engage further. Use EMEA Quality manager and Quality Managers commitment as argument.
EMEA Consolidated Audit Schedule Lead				Incorporate approach in EMEA Consolidate Audit Schedule.	Mitigate gaps in EMEA audit planning.	Workload capacity issues.	No reaction. Should engage further. But his Mananger is actively involved, being a Sponsor.
Coach				Coach Candidate.	Advise and control.	Workload capacity issues.	Involved.
EMEA Account Management				Communicate and use proces.	Quality compliance, avoidance of risks to delivery and penalties.	Communication.	Communication strategy to be worked out later in project.
Quality Reviewers				Review process contents.	Quality compliance, avoidance of risks to delivery and penalties.	Workload capacity issues.	Involved, committed to feedback.

Define: KANO MODEL

Basic Needs	More the Better	Wow Factors
Implicit needs MUST be met for customer to engage	**Perfor-mance require-ments.** Explicit AND have direct impact on customer satisfaction	Implicit, can be difficult to determine but will create positive customer experience



Define: SIPOC

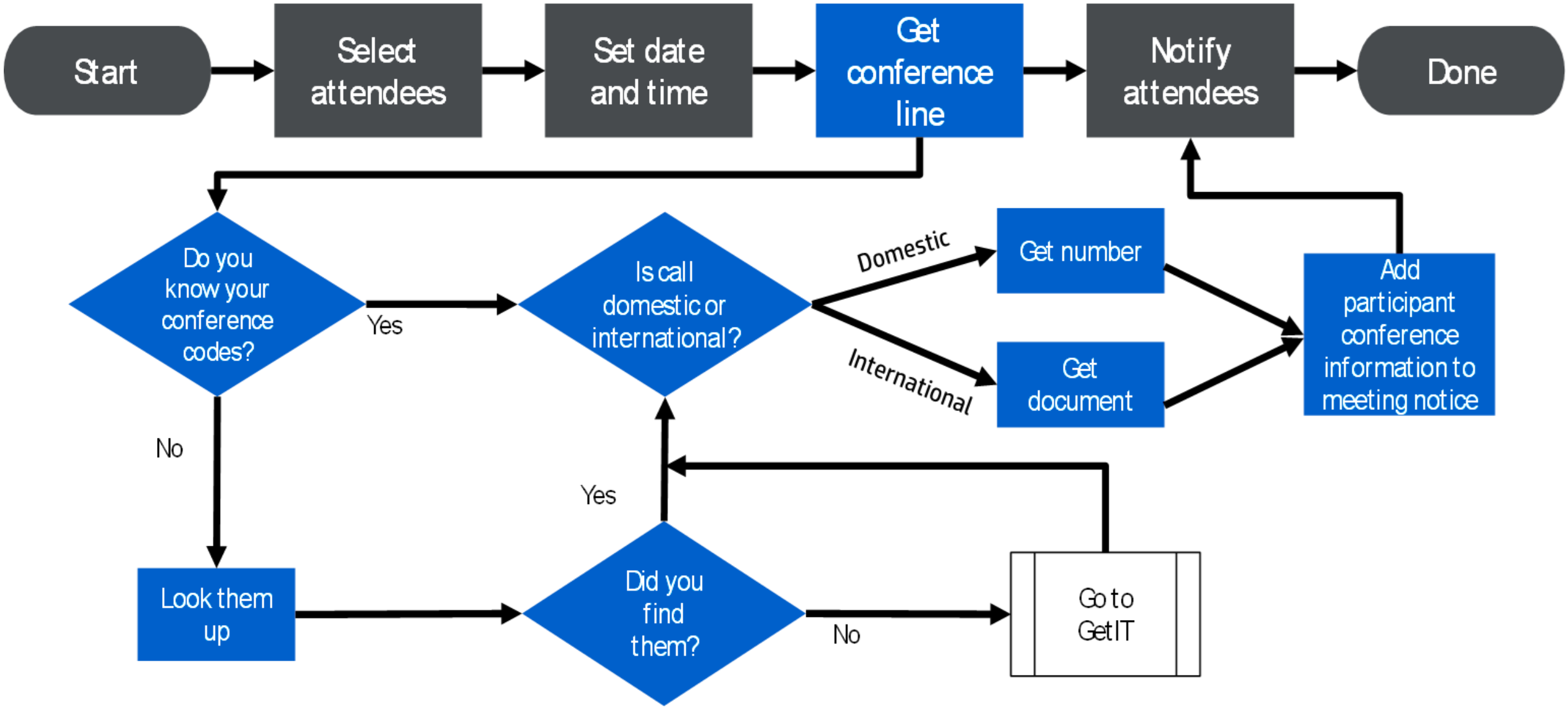
Process Definition				
Process Name:			Process Owner:	
Process Starts With:			Process Ends With:	
S	**I**	**P**	**O**	**C**
Suppliers	Inputs	Process	Outputs	Customers

Example: SIPOC of Customer Audits Process

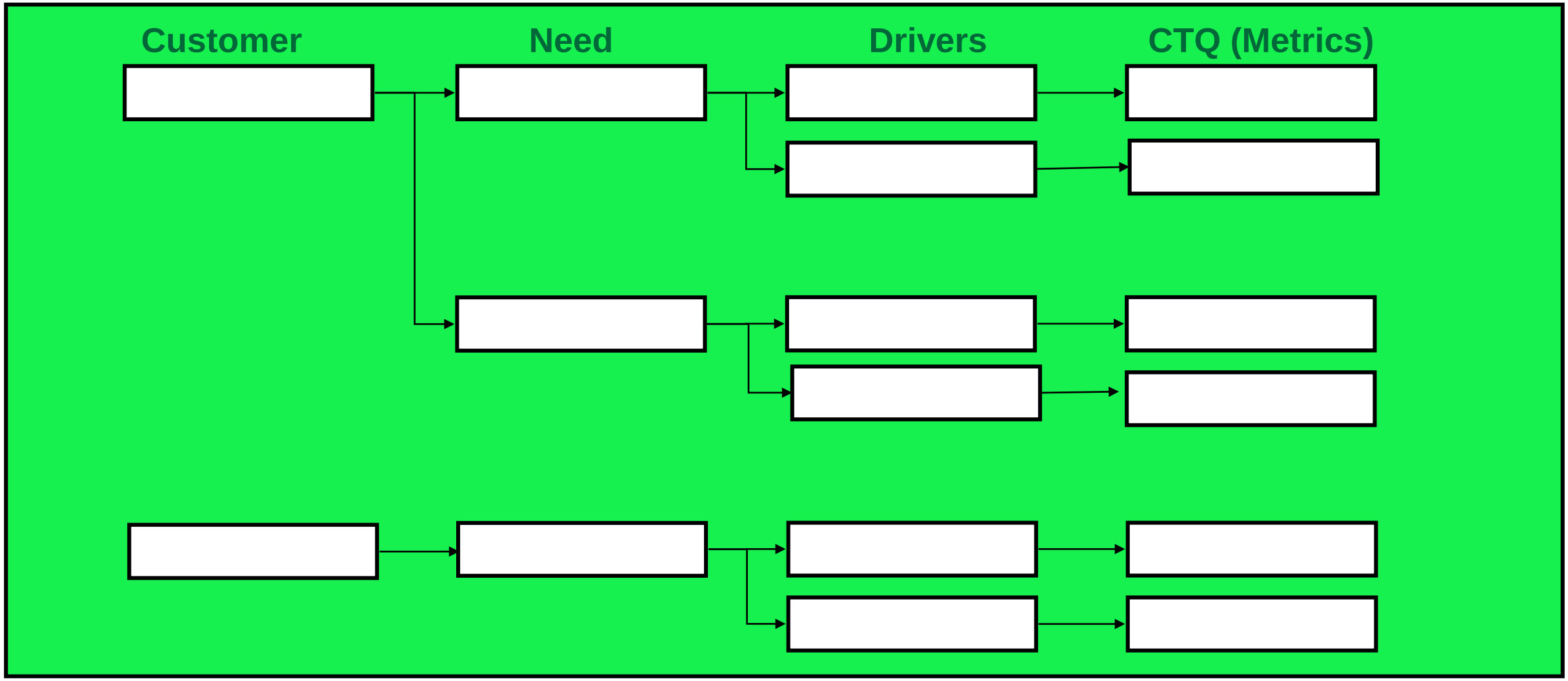
SUPPLIERS	INPUTS	DESCRIPTION OF THE PROCESS	OUTCOMES	CUSTOMERS
Who triggers the step?	*What is provided as initial input?*	*What happens in this process step?*	*What is the deliverable?*	*Who needs this?*
Customer/Customer Audit Coordinator	Customer audit requirements Audit request	Audit request communication, audit justification and initiation	Audit event approval Audit Coordinator assignment	Management Representative
Audit Coordinator Customer Audit Coordinator	Customer audit requirements Audit approval	Agreement of audit scope Definition of impacted internal capabilities	Audit scope agreed internal capabilities audit SPOCS assigned Audit agenda and logistics arranged, agreed and communicated	Auditees internal capabilities audit SPOCS
Audit Coordinator Customer auditor internal capabilities audit SPOCS	Audit agenda and scope definition	Audit execution: audit interviews and recording of findings	Draft of audit report and findings Customer audit report/finding records Audit report approval Audit record in internal tools	Auditees Management Representative
Audit Coordinator Employees	Audit report/record of findings	Audit follow up actions and action plans	Mitigation plans follow up actions	Management Customer Audit Coordinator

Roles
Customer Audit Coordinator
Customer Auditor
Management Representative
Audit Coordinator
Leveraged units audit SPOCs
Auditees [Employees]

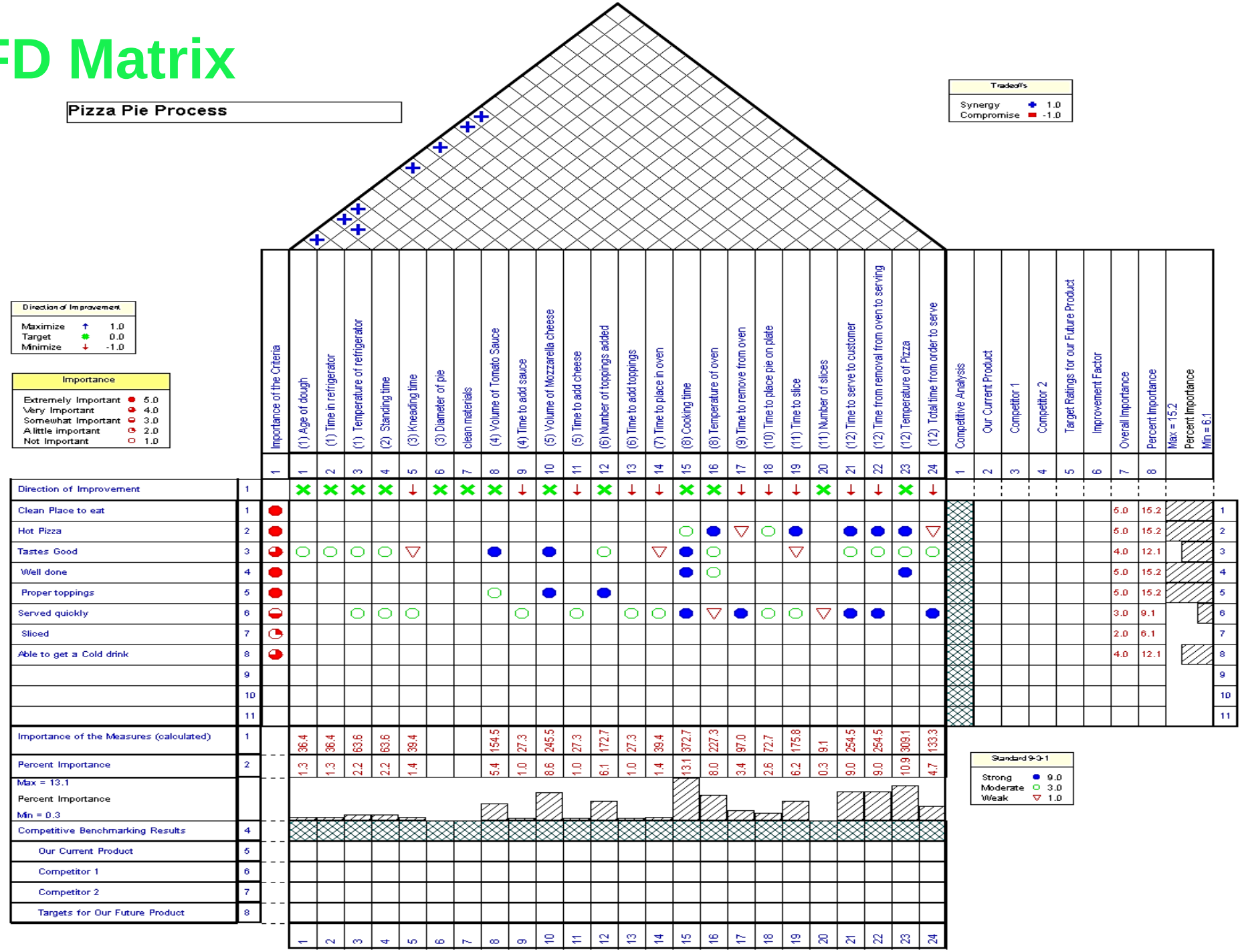
Define / Measure: Example Process Map



DEFINE / Measure: Critical to Quality (CTQ) Tree



Define: QFD Matrix



Measure Phase

Събиране на данни за състоянието

Фаза на измерване

Приблизителна продължителност:

- 2-6 Weeks (depending on data availability)

Цели:

- Identify critical variables
- Validate measurements and measurement system
- Determine key output variables (Ys)
- Determine key input variables (Xs)
- Collect and display baseline data
- Determine baseline process capability

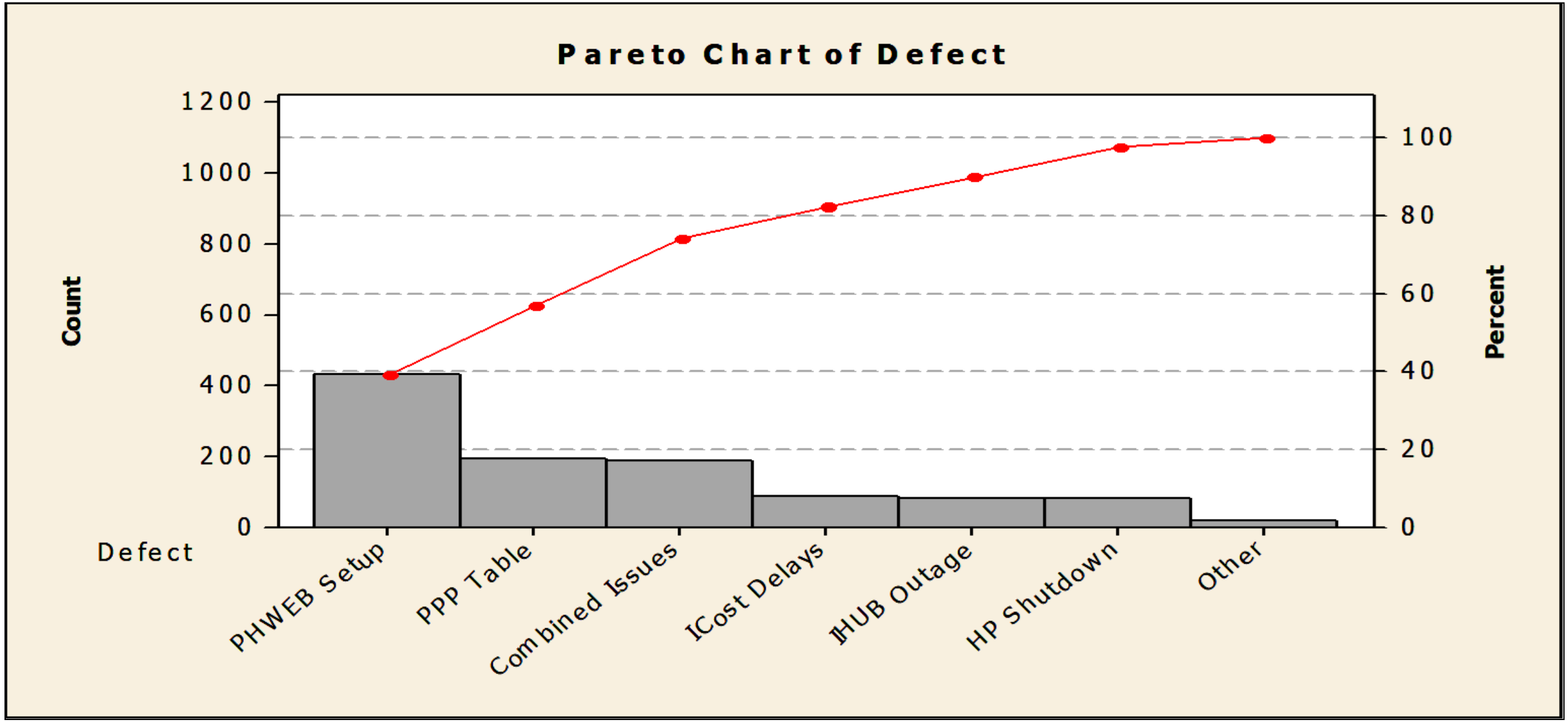
Изходни резултати:

- Detailed Process Map
- Key metrics
  - Input/Process/Output Metrics
- Operational definitions
- Data collection plan
- Measurement System Analysis
- Baseline data display
  - Histograms
  - Run charts
  - Control charts
  - Pareto charts
- Capability analysis

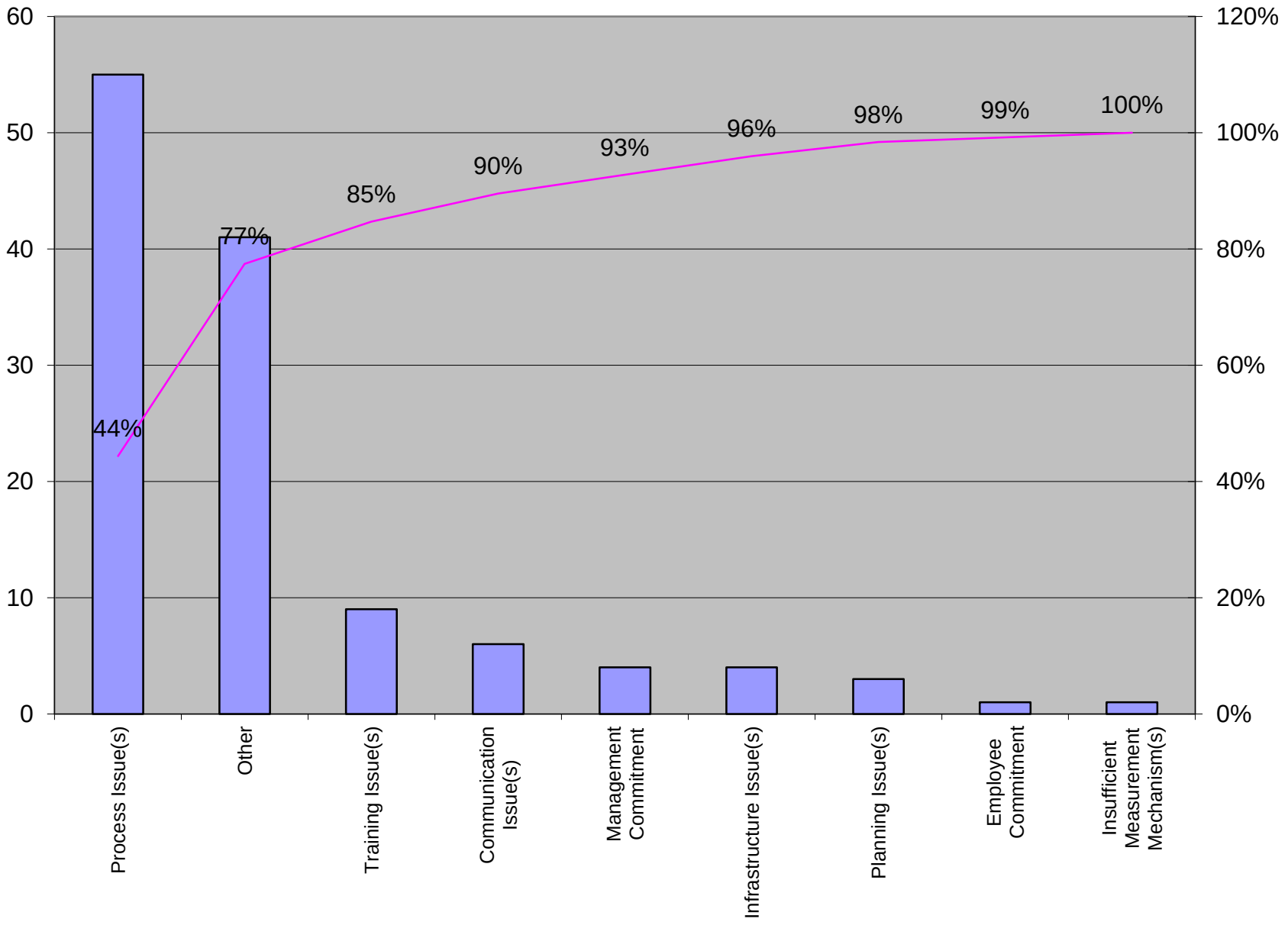
Measure: Data Collection Plan

Data Collection Plan					
Measure	**Operational Definition**	**How will Data be Collected?**	**Who will Collect the data?**	**When will Data be Collected? (frequency and for how long)**	**How much will be collected?**

Measure: Pareto Chart



Example: Pareto Chart of Root Causes for Client Audit Findings



Pareto Analysis

Overall **124 audit** findings have root cause assigned

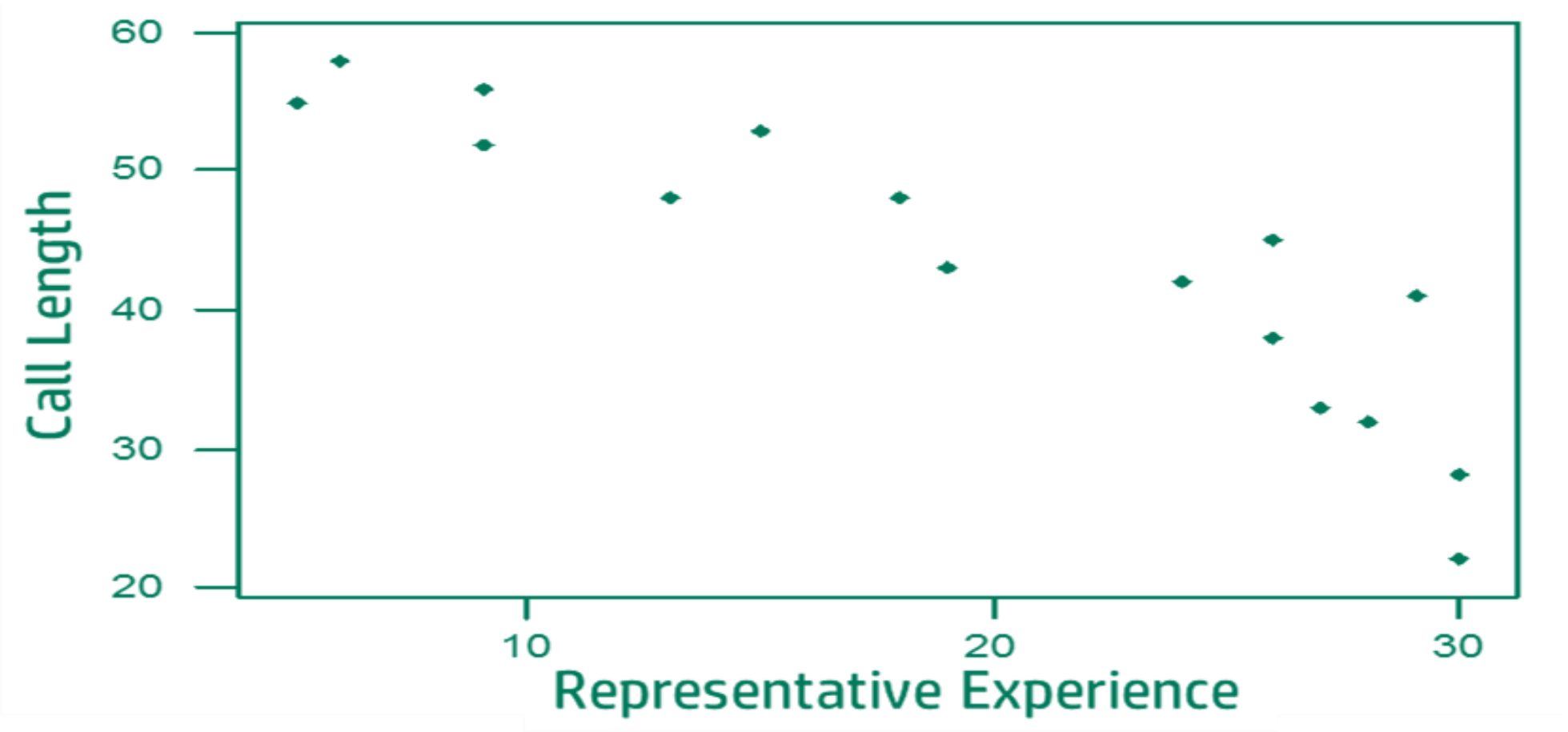
"*Other*" is to be excluded as root cause is unknown and pollutes data

Top three polluters appear to be:

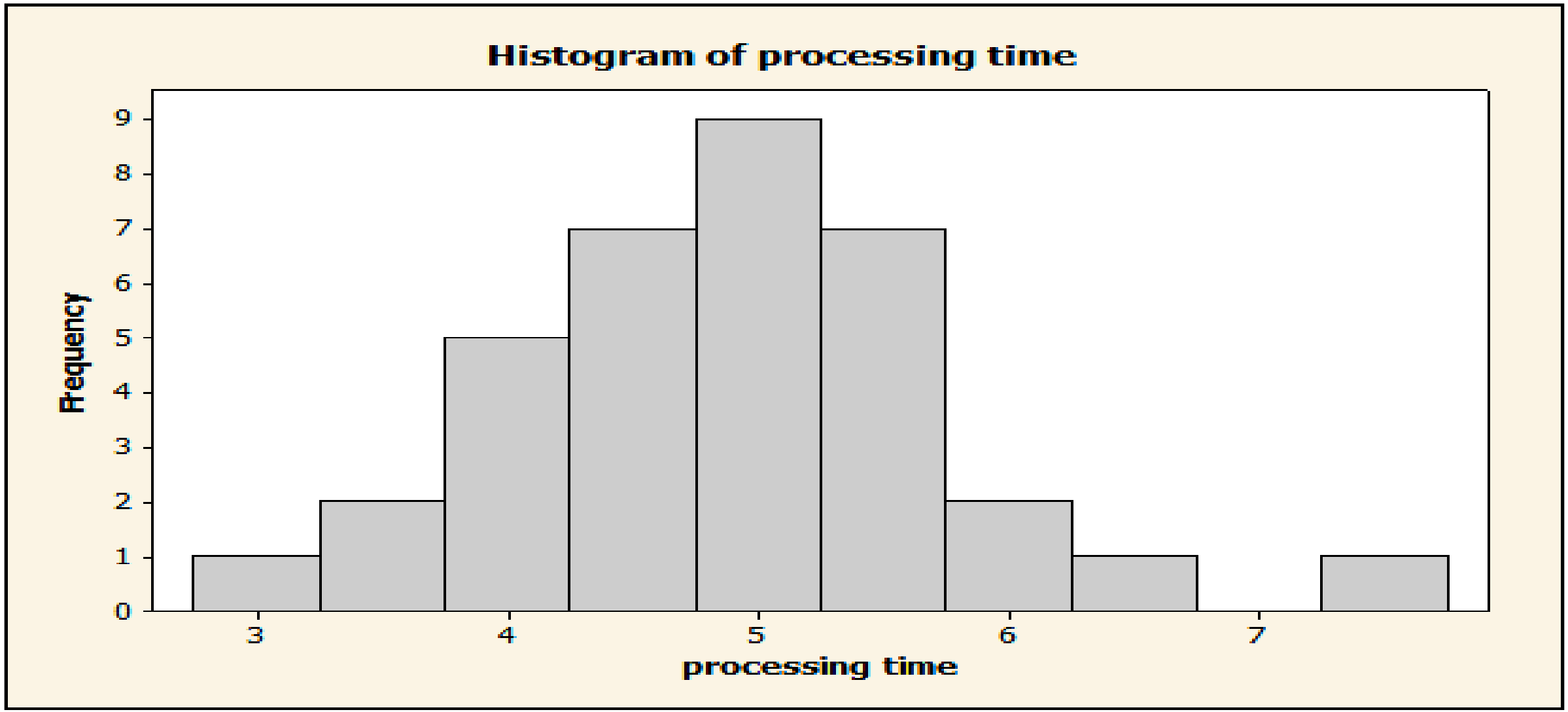
- *Process issues*
- *Training issues*
- *Communication issues*

Need to narrow possible reasons through other tools

Measure: Scatter Plot

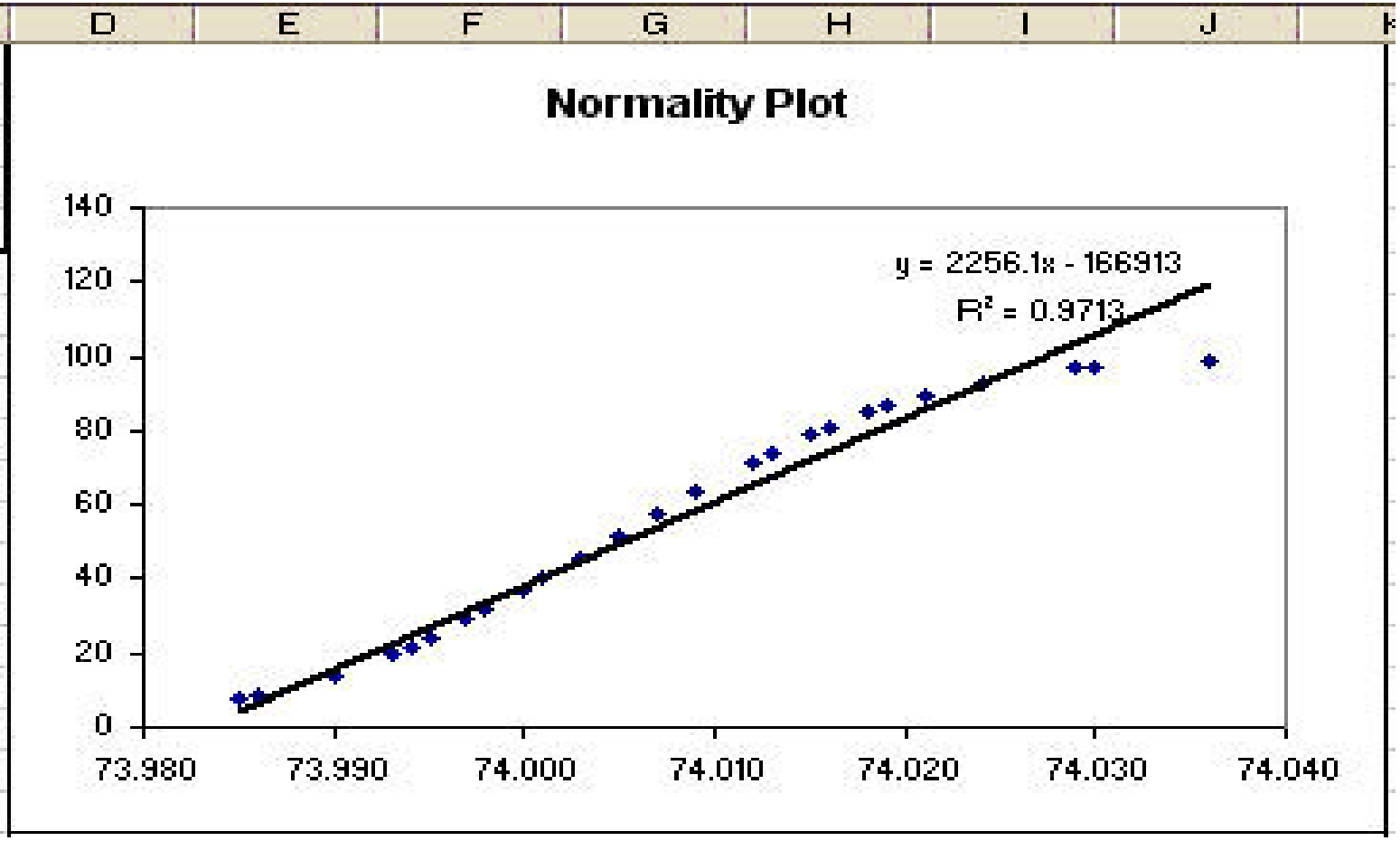


Measure: Histogram



Measure: Test for Normality

	A	B	C
1	Obs 3	Anderson-Darling	
2	74.019	A-Squared	0.932
3	74.001		0.016
4	74.021	95% Critical Value	0.787
5	73.993	99% Critical Value	1.092
6	74.015	Mean	74.004
7	73.997	Mode	73.990
8	73.994	Standard Deviation	0.013
9	73.993	Variance	0.000
10	74.009	Skewedness	0.581
11	73.990	Kurtosis	-0.634
12	73.994	N	40.000
13	74.007		
14	73.998	Minimum	73.985
15	73.994	1st Quartile	73.994
16	73.998	Median	74.001
17	74.005	3rd Quartile	74.015
18	73.986	Maximum	74.036
19	74.018		



Measure: Gage R & R

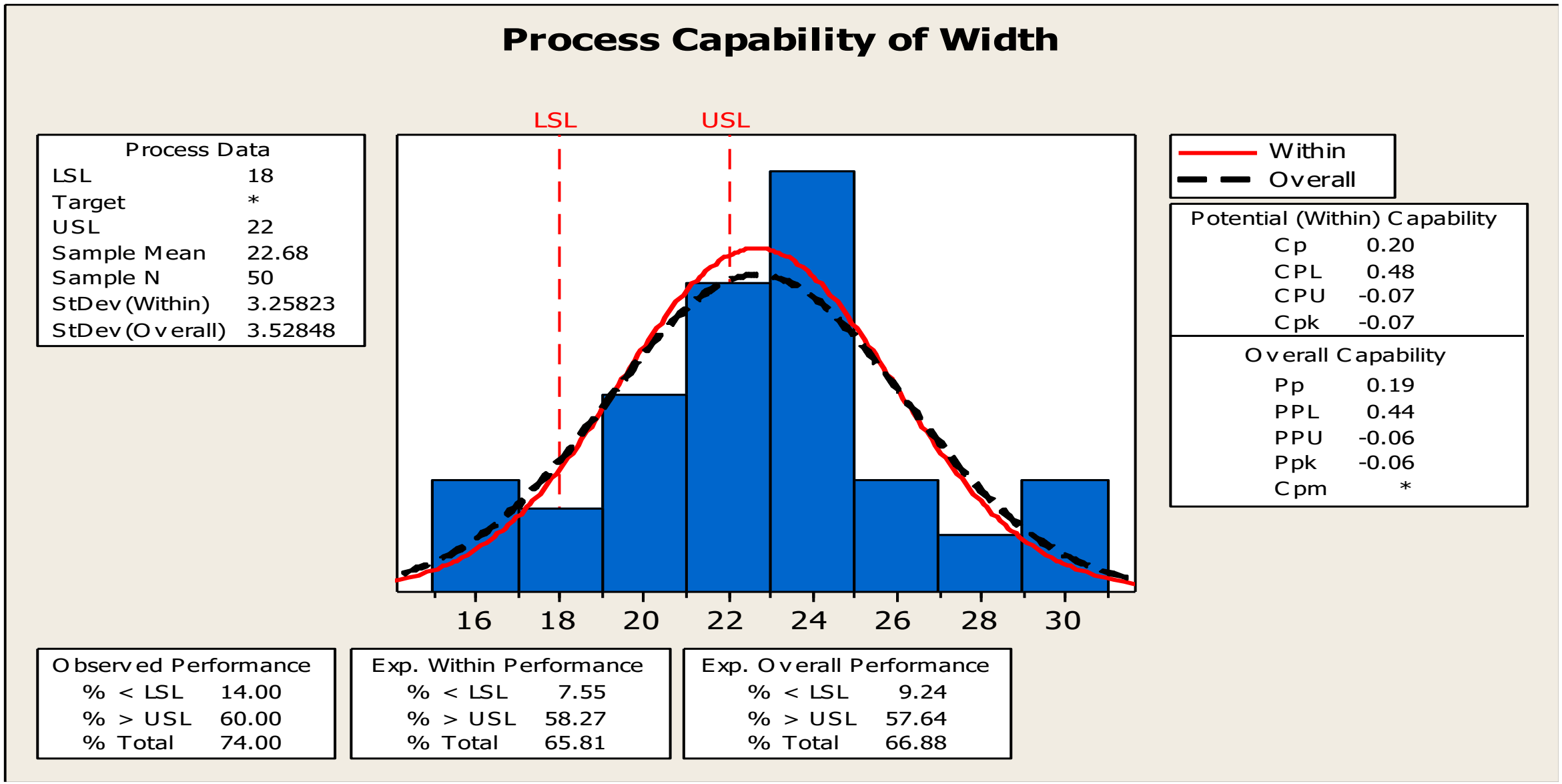
Sl. No	Transactions		Employee A		Match for Repeatability of Employee A	Employee B		Match for Repeatability of Employee B	Employee 3		Match for Repeatability of Employee C	Match for Reproducibility
		True value	Trial 1	Trial 2		Trial 1	Trial 2		Trial 1	Trial 2		
1	80630269588	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
2	80630269591	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
3	80630269596	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
4	80630269640	With error	Y	Y	1	N	Y	0	Y	Y	1	0
5	80630269643	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
6	80630269660	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
7	80630289785	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
8	80630289787	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
9	80630289794	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
10	80630417144	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
11	80630417155	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
12	80630417203	With error	N	Y	0	Y	Y	1	Y	Y	1	0
13	80630269563	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
14	80630269580	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
15	80630269586	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
16	80630435761	W/O error	Y	Y	1	Y	Y	1	N	N	1	0
17	80630435792	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
18	80630435850	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
19	80630297728	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
20	80630297729	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
21	80630297752	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
22	80630421271	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
23	80630421281	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
24	80630421294	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
25	80630286600	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
26	80630286610	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
27	80630286639	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
28	80630290656	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
29	80630290659	W/O error	Y	Y	1	Y	Y	1	Y	Y	1	1
30	80630290690	With error	Y	Y	1	Y	Y	1	Y	Y	1	1
					29			29			30	27
	Total No of agreement of A,B,and C = 29+29+30 = 88					Total no of opportunities = 90		Repeatability=		98%		

Y = Agreement to true value

N = Disagreement to true value

Gage R&R is accepted as Reproducibility is 98% and Reproducibility is 90%

Measure: Capability Analysis



Analyze Phase

Идентифициране на причините зад проблема

Фаза на анализ

Приблизителна продължителност:

- 2-4 Weeks

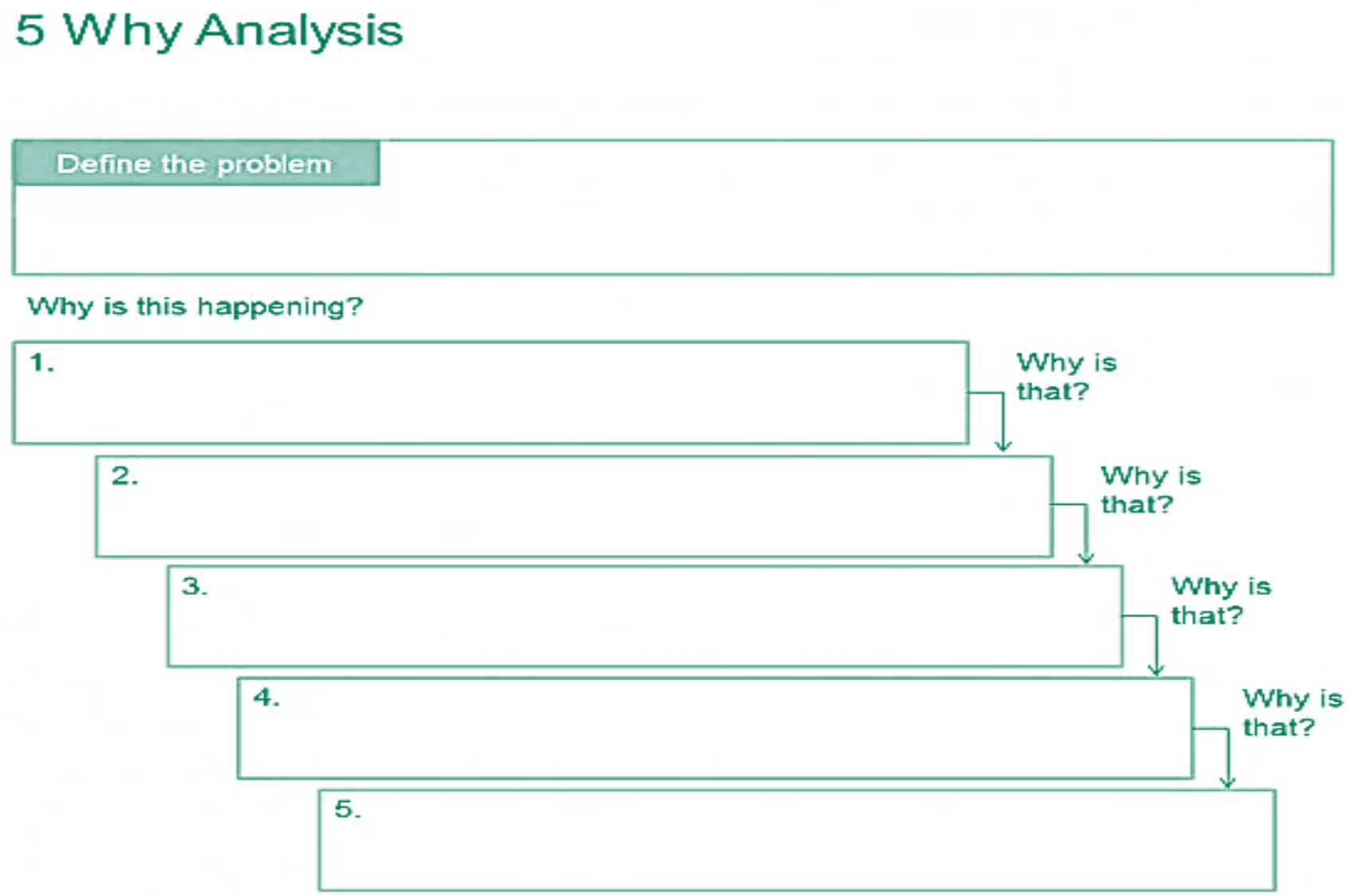
Цели:

- Narrow down key input variables
- Establish cause-effect relationships
- Passively validate root causes
- Refine problem statement

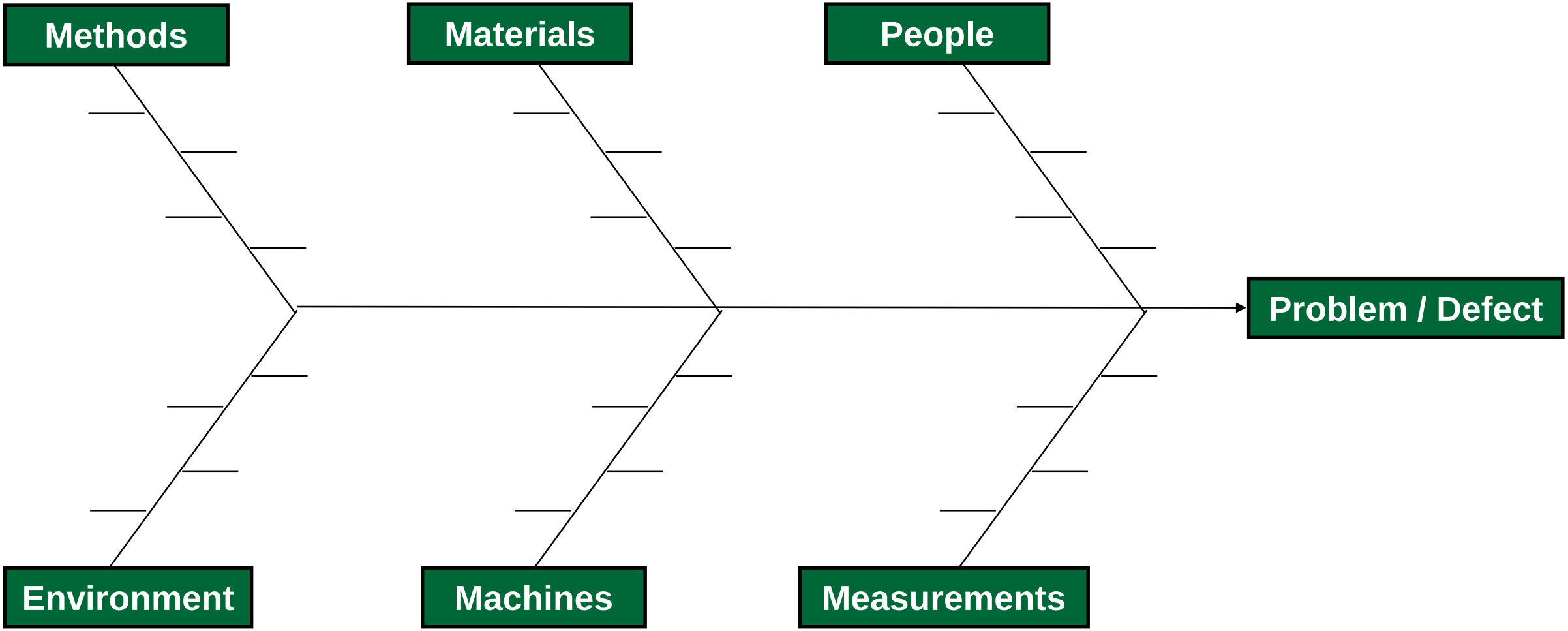
Изходни резултати:

- Identify potential root causes
  - Process constraint ID
  - Brainstorming
  - FMEA for “as is’ process
- Narrow list of root causes
  - Cause-Effect Diagram / Cause Screening
  - Pareto chart
  - NVA Analysis/8 Wastes
- Confirm root cause to output relationship
  - Correlation and regression
- Prioritize root causes
  - Pareto chart

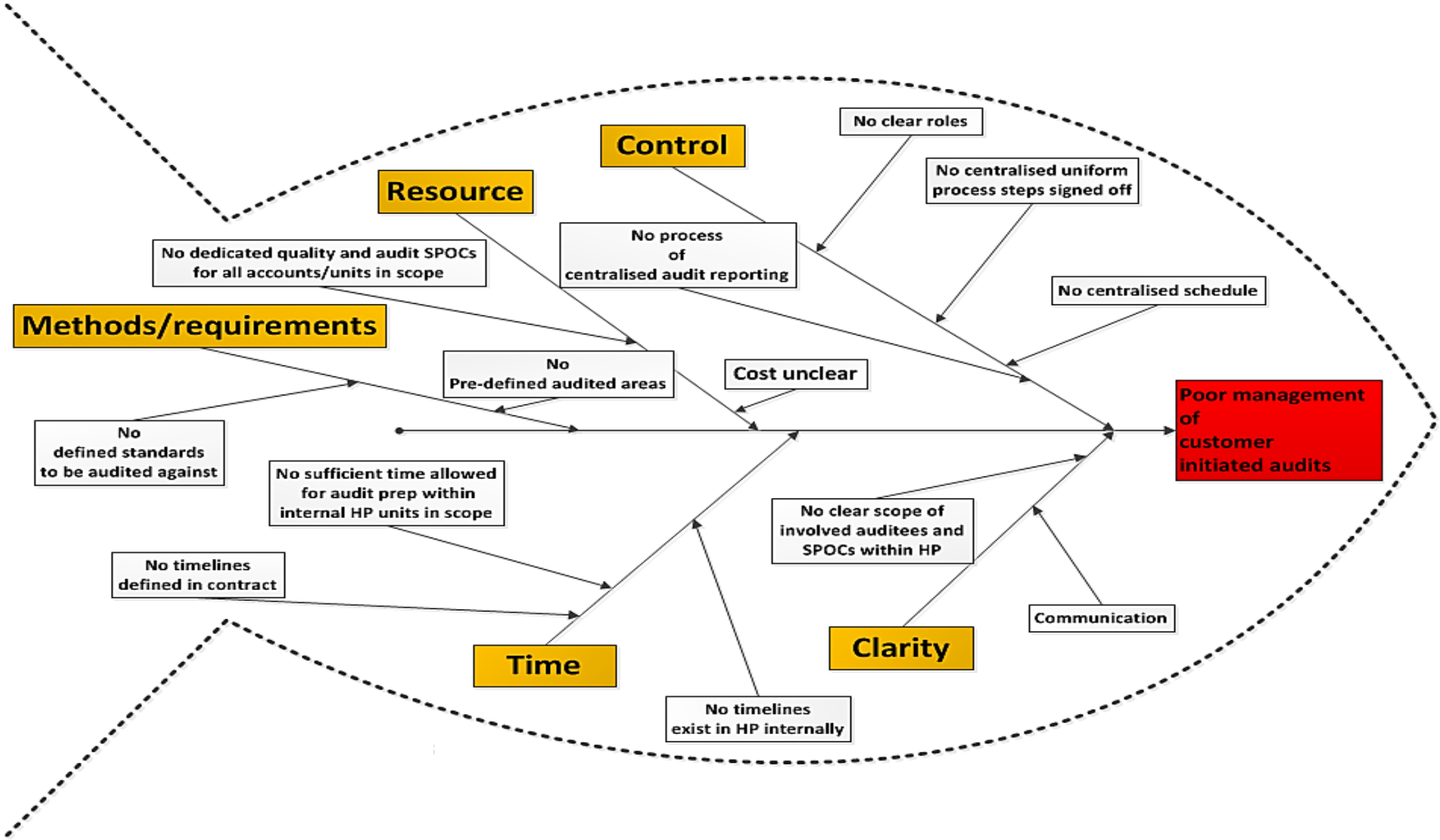
Analyze: The Five Whys



Analyze: Fishbone Diagram



Example: Root Cause Analysis of defect audits process [cause - effect]



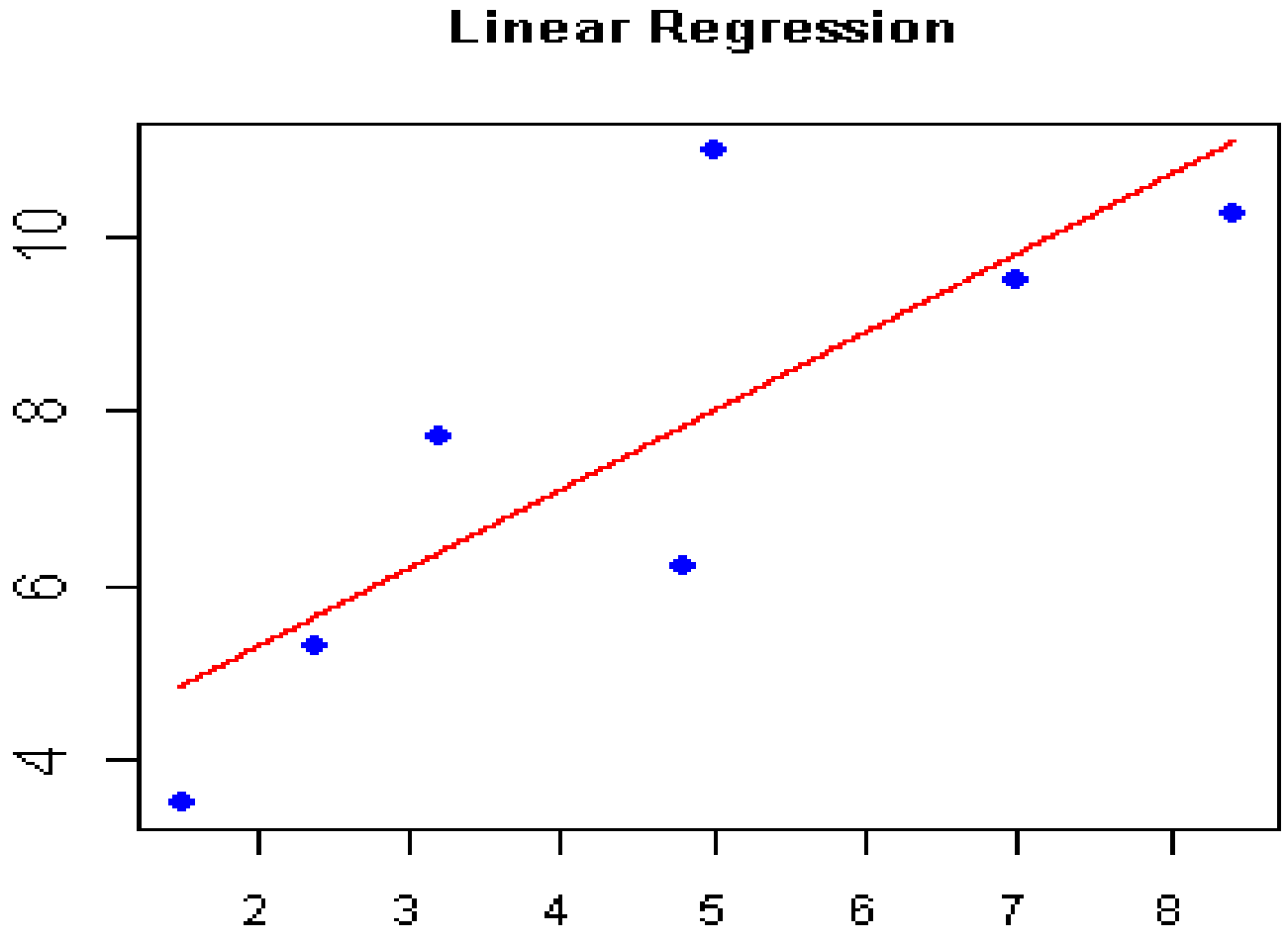
Analyze: Cause & Effect Matrix

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1																				
2		Cause Effect Matrix		Key Process Outputs																
3			Customer Importance	4	3														(1-5)	
4																				
5		Process Step	Key Process Inputs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Rank	Total
6	Process Steps	Step 1		3															2	12
7		Step 2			1														3	3
8		Step 3			9														1	27
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23			Upper Specification Limit																	
24			Target																	
25			Lower Specification Limit																	

Analyze/Improve: FMEA (Failure Mode & Effects Analysis)

Process, Step, or Input	Potential Failure Mode	Potential Failure Effects	SEVERITY	Potential Causes	OCCURANCE	Current Controls	DETECTION	RPN	Recom-mended Actions	Resp.	Actions Taken	SEVERITY	OCCURANCE	DETECTION	RPN
What is under investigation?	*In what ways does process fail?*	*What are impacts of failure on customer?*		*What are possible causes?*		*What are existing controls and procedures to detect cause?*			*What are actions for reducing occurrence of cause, or improving detection?*	*Who is responsible?*	*What are completed actions taken w/ recalculated RPN?*				

Analyze: Regression Analysis



y = a + bx a = 3.46212 b = 0.904273

Analyze: Hypothesis Test Decision Matrix

		X		
		Discrete		Continuous
		Two Categories	Two or More Categories	
Y	Discrete	Bar Chart Pie Chart		Stratified Frequency Plot Probability Curve
	Continuous	Stratified Frequency Plot		Scatter Plot

		X			
		Discrete			Continuous
		Comparing (Null Hypothesis)	Two Categories	Two or More Categories	
Y	Discrete	Proportions ($P_a = P_b$)	2-Proportions Test	Chi-Square Test	Logistic Regression
	Continuous	Averages ($\mu_a = \mu_b$)	2-Sample T-Test Paired T-Test	ANOVA	Regression (Linear, Non-Linear, Multiple)
		Standard Deviations ($\sigma_a = \sigma_b$)	(Test for Equal Variance) F-Test	Bartlett's	
			Levene's		
		Medians ($\eta_a = \eta_b$)	Mann-Whitney Test 1-Sample Sign Test	Kruskal-Wallis Test Mood's Median Test	

Improve
PHASE

Избор на най-доброто решение

Фаза на подобрение

Приблизителна продължителност:

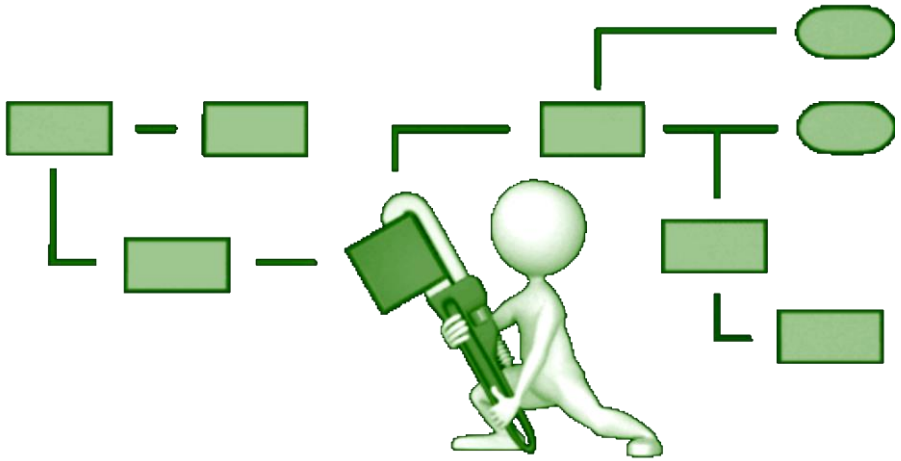
- 2-6 Weeks

Цели:

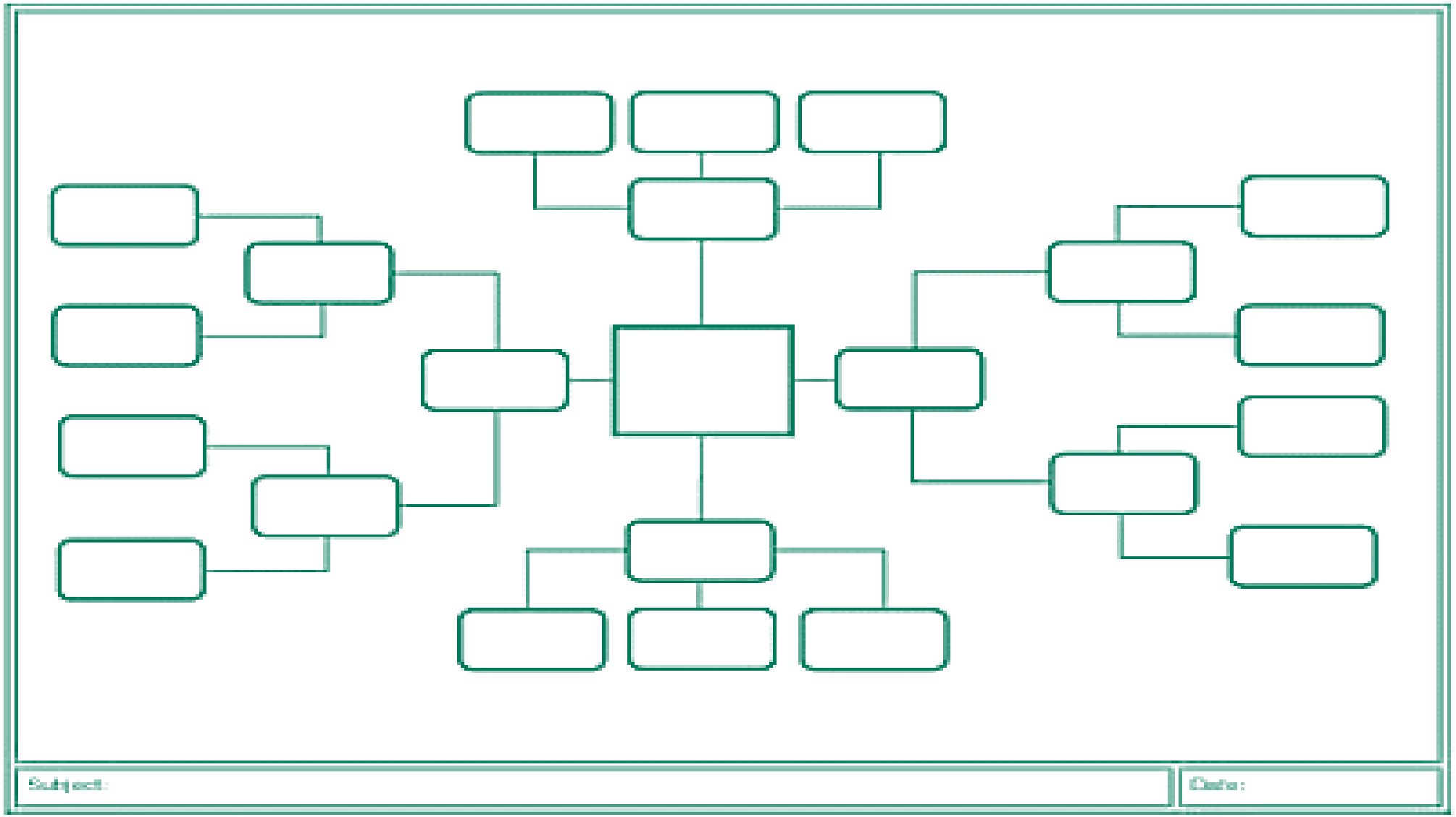
- *Actively* validate root causes
- Determine optimal solution
- Assess risk with new solution
- Document future process
- Determine financial benefit
- Develop Implementation Plan
- Implement new process

Изходни резултати:

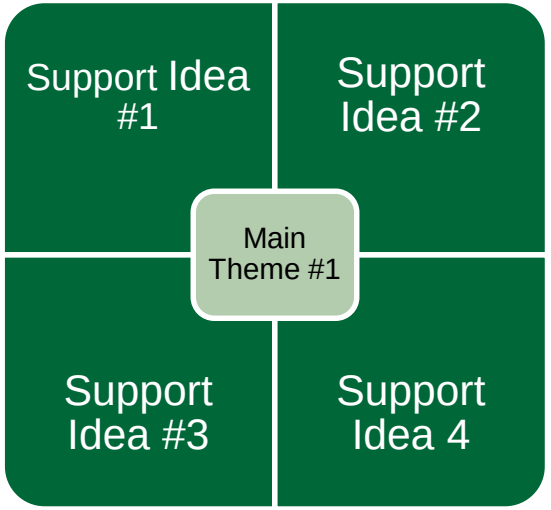
- Data showing that the problem improves/disappears with cause removal
- Decision-making and evaluation tools
  - Criteria matrix
  - Impact-difficulty matrix
- “Should be” map
- Project Implementation Plan

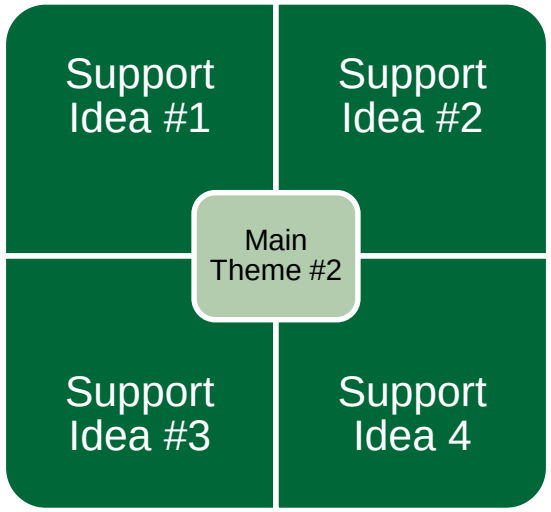


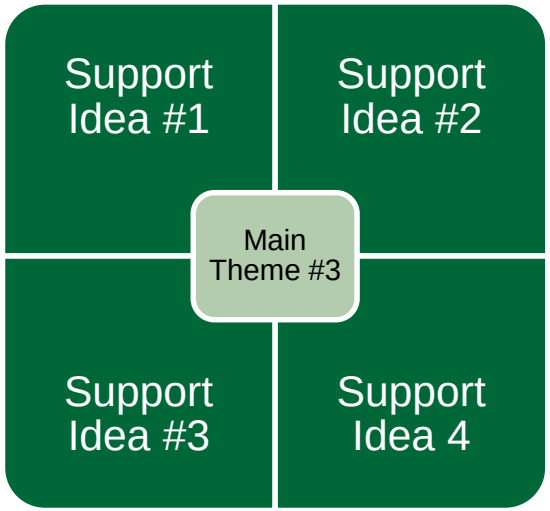
Improve: Brainstorming Analysis



Improve: Affinity Diagram





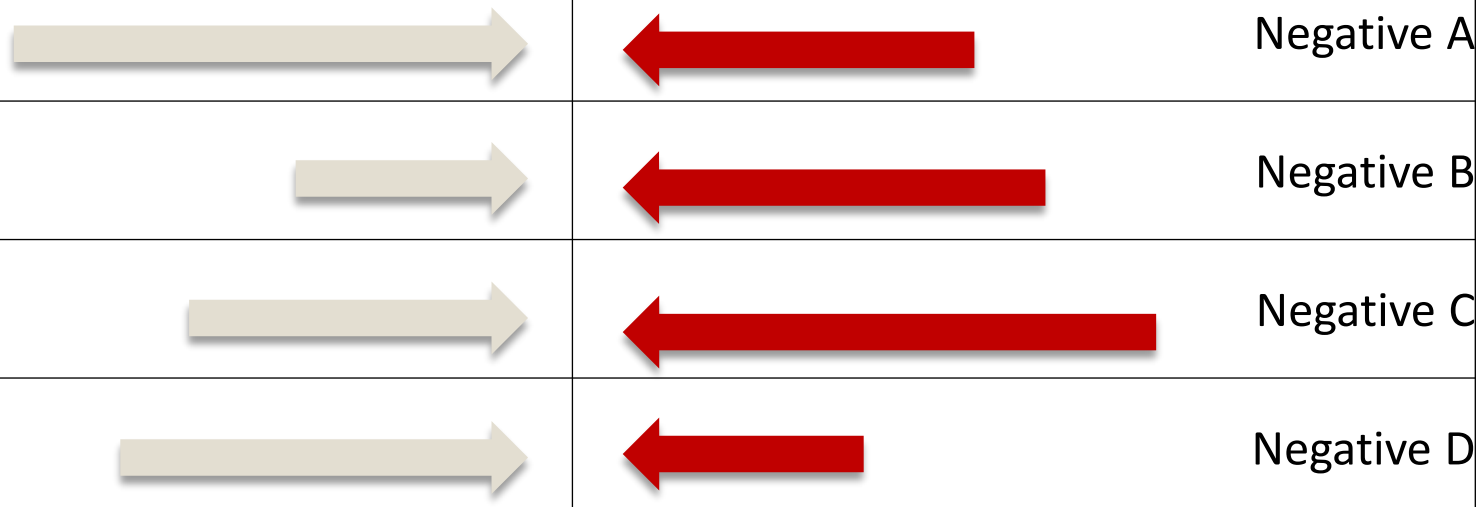


Improve: Solution Evaluation Matrix

	Criteria and weights			
	Easy to implement	Low cost	Will improve customer satisfaction	
Solution	**4**	**7**	**9**	**Sum**
New phone system	3 (rating) x 4 (wt) = 12	1 (rating) x 7 (wt)= 7	3 (rating) x 9 (wt) = 27	46
More training	4 (rating) x 4 (wt) = 16	3 (rating) x 7 (wt) = 21	1 (rating) x 9 (wt) = 9	46
Increase staff	6 (rating) x 4 (wt) = 24	3 (rating) x 7 (wt) = 21	1 (rating) x 9 (wt)= 9	54

Improve: Force Field Analysis

Driving Forces (helpers)	Restraining Forces (hinderers)
Positive A	Negative A
Positive B	Negative B
Positive C	Negative C
Positive D	Negative D



Note: Use length of arrows each *force* to indicate strength of each *force*

Control Phase

Съхраняване на напредъка

Фаза на контрол

Приблизителна продължителност:

- 4-6 Weeks

Цели:

- Develop Control Plan
- Monitor performance
- Complete transition meeting
- Develop communication / close-out plan
- Document opportunities for replication
- Document additional project opportunities

Изходни резултати:

- Solution implemented
- Capability Analysis
- Control chart monitoring
- Training and control documents
  - Process Control Plans
  - Training Plans
  - Visual process controls
- Project Transition Plan
- ROI validated by Finance
- Project hand-off and closure
  - Team feedback session
  - Final Project Report

Control: Control Plan

Process Measure	Target	Spec	Sample frequency	Analysis Method	Control Methods	Reaction Plan	Owner

Example: Project Control Plan

No	Description	Assigned to	Due in	Status
1	**Process incorporated in EMEA Audit Collaterals** • *Process handed over to EMEA QPI.* • *Process is formally now part of the EMEA OAAP audit collaterals and has become a standard one.*	-	September 2013	Completed
2	**Audit tooling to support overall planning** • *Global Audit Centre of Excellence KHH committed that customer audits can be supported by the ACE audit planner, in case needed.*	-	September 2013	Commitment of KHH obtained on Dec 2nd 2013, ACE audit schedule fit to accommodate request
3	**Consolidated Audit Schedule review** • *SM quality representative included in the EMEA Consolidate Audit Schedule review to maintain visibility*.	-	Ongoing	Monitoring in place
4	**Communication from EMEA Operations Lead to EMEA management** • *QMB temporarily on hold.*	-	September 2013	Ongoing
5	**Presentation of process to QMB** • *EMEA Quality Lead made aware and presented with this.*	-	December 2013	Ongoing, QMB series just sent out, process presented to Sponsor
6	**CQATS extract to track compliance**	-	Q2 FY14	Ongoing

Example: How do we know we have improved?

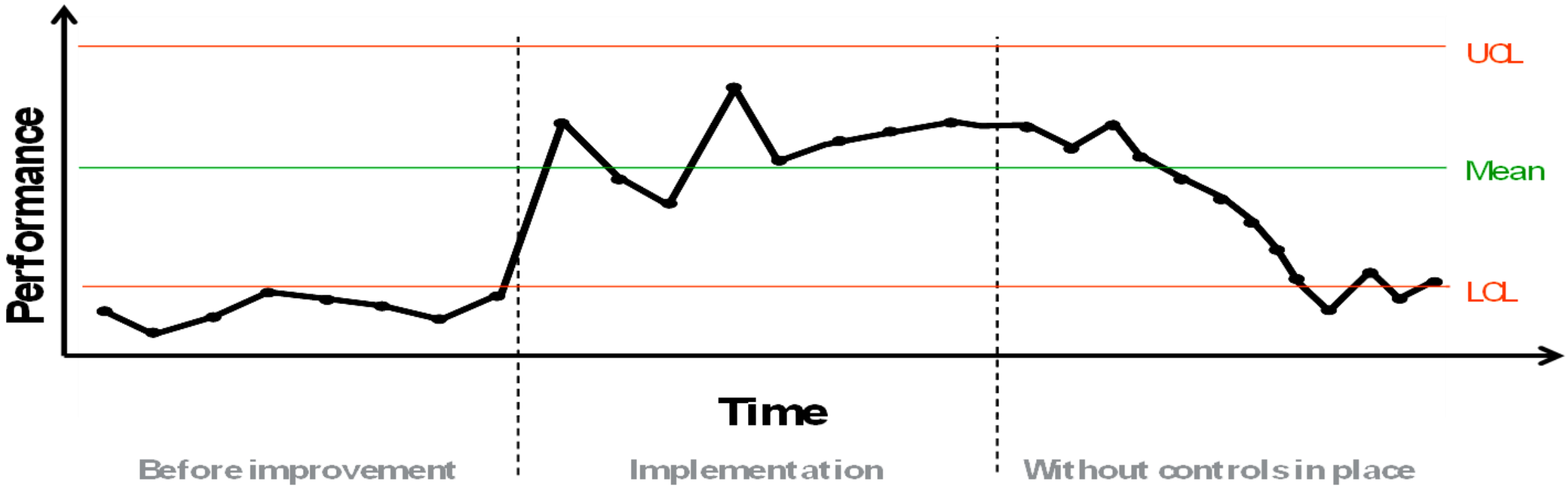
Area	Description	Improvement
Users satisfaction	Satisfaction of users of the process of handling customer initiated audits.	CSAT improved from to 2.56 to 4.48 out of 5
Process maturity	Measurement of process maturity as per QPI CMMI/COBIT 4 assessment approach.	Maturity improved from 1.2 to 2.2 out of 5
Process users feedback	Feedback of quality management aware of the project scope, as well as users involved in customer audit handling.	• "*Thanks for an excellent piece of work"* • *"This was definitely needed, and gives clear lines of responsibility both from the customer and company side. I have no further comments to add. Great job!"* • *"A good sound mature process which now needs to become the norm, be added to the reference guide and used throughout."* • *"Thanks to the improvements and the efforts we had several really successful external audit. For example, an audit where we had no findings and other audits where we had only minor findings."*
Process QMS integration	• Revitalizing the practice of using standard audit tracking tools. • Integration in the Consolidated Audit Schedule Approach.	CQATS usage moved from 0 to 1 Collateral integrated in Consolidated Audit forum

Control: Sharing Best Practices

Who will you share this process improvement with?	
1	
2	
3	
How will you let them know?	
1	
2	
3	

Control: Control chart

A Control Chart show is if the process is in statistical control (stable through time)



ЗАКЛЮЧЕНИЕ

СЛЕДВАЩИ СТЪПКИ

Затвърждаване:

- Приложете LSS инструментите в актуалните си работни проекти.
- Огледайте се за възможности за оптимизация и елиминиране на „waste“ във вашите процеси.
- Включете се в съществуващи YB, GB, and BB проектни екипи.
- Продължете да развивате уменията си чрез допълнително обучение и практика.
- Популяризирайте концепцията във вашите организации.

Следващи стъпки:

- Намерете удачна възможност за приложение по проект с отворен код.
- Определете как може да разрешите съществуващ проект или да намалите идентифициран „waste“.
- Имплементирайте своята идея за оптимизация чрез приложение на конкретни LSS инструменти.
- Докладвайте какво сте постигнали в рамките на курсовия си проект.
- Представете постигнатото в рамките на презентация в лабораторно упражнение.

ЗАДАЧА ЗА САМОСТОЯТЕЛНА РАБОТА

Запознайте се с учебните материали за придобиване на ниво White Belt в хранилището на курса.

SIX SIGMA WHITE BELT
CERTIFICATE OF ACHIEVEMENT

Aveta Business Institute does hereby certify that

Hristian Yuriev Daskalov

has completed and has demonstrated proficiency in the curriculum set forth by the S.S.C. and Aveta Solutions guidelines for Six Sigma Certification.

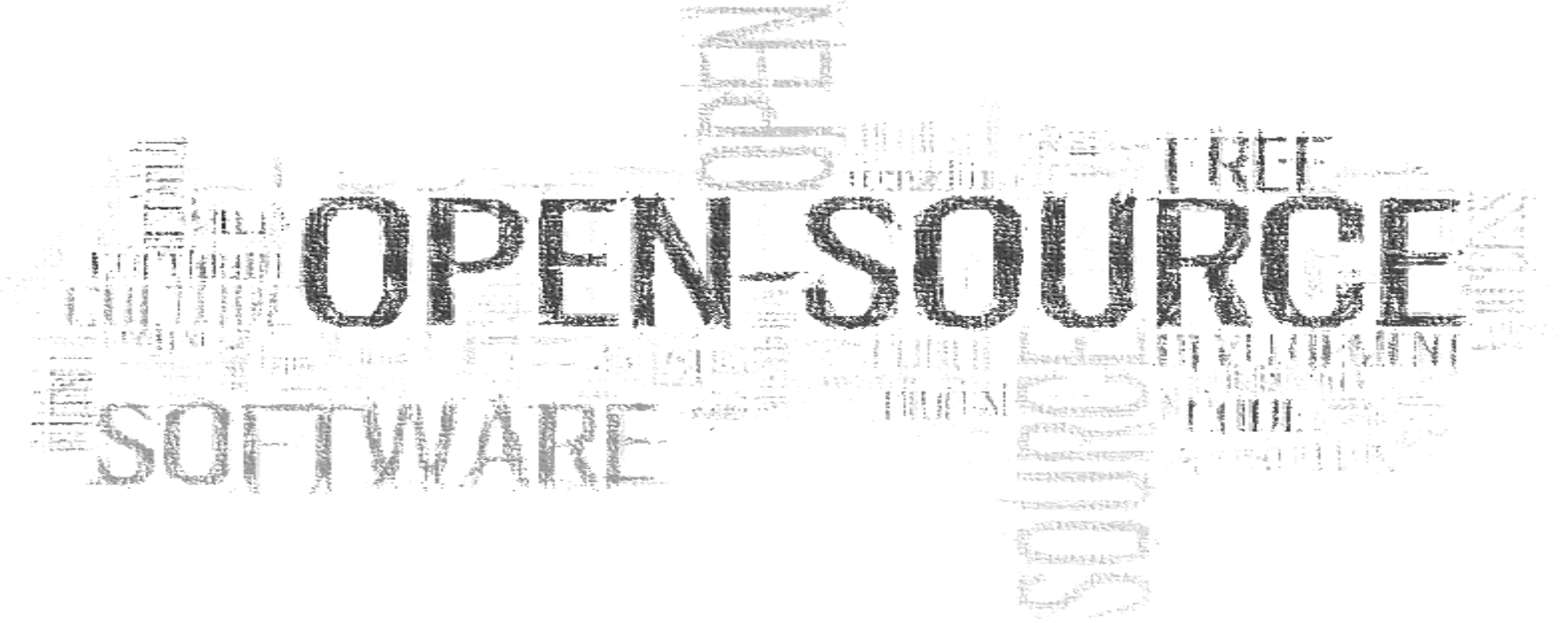
Aveta Business Institute

8/5/2014
Date

Регистрирайте се за безплатно Lean Six Sigla White Belt обучение и сертификация:
https://www.sixsigmaonline.org/lean-six-sigma-white-belt-certification-in-information-technology/

Следващи теми:

Теми № 11, 12: ***Инструменти и практики за бизнес развитие по отворен модел. Конкурентни бизнес предимства на отворения код.***
Модул 3: ***„Бизнес развитие по отворен модел“***




БЛАГОДАРЯ ЗА ВНИМАНИЕТО!

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