Combining Lean, Six Sigma & Agile

Why, and How?

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- 30+ Lean Six Sigma and Agile projects implemented over past five years

I. **Introduction** (What?)

II. **The Case for Change** (Why?)

III. **Three Combined Approaches** (How?)

IV. **Discussion**

I. Introduction (What?)

Let's take a few moments to set expectations:

- How many **Agile practitioners**?

- How many **Lean Six Sigma, BPM or operations** management practitioners?

- Has anyone previously **combined** Lean or Six Sigma process improvement techniques with Agile?

- Are there any **particular problems** which you hope will be addressed in this discussion?
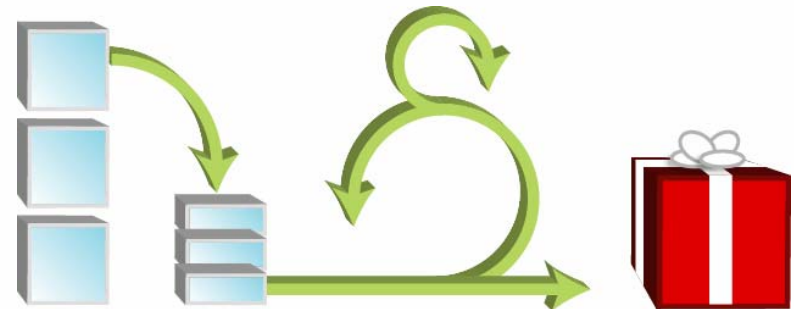
- **Lean Six Sigma** is one of a number of business process improvement methodologies, which shares roots with approaches such as BPM, TQM, SPC and others.
  (Process Focused)

Define

Measure

Analyze

Improve

Control
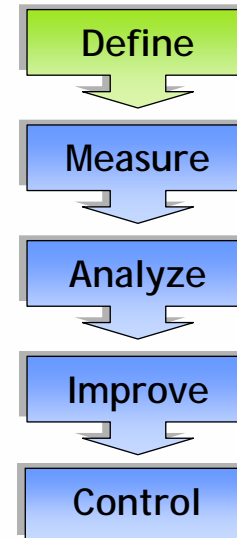
- **Agile** is an iterative and incremental approach to project delivery, encompassing methodologies such as Scrum and eXtreme Programming (XP).
  (Project Focused)

A 5 step approach founded on asking the right questions:

1. **Define**: What is important to the customer?
   - What is their target and acceptable limitations; anything else is considered "defective"

2. **Measure**: What is the frequency of "defects?" How many defects?
   - Capability: How is the process performing for the customers?
   - Entitlement: How good can the existing process be?
   - Gage R&R: How good is the data? Is it reliable?

3. **Analyze**: Why, when and where do the defects occur?
   - Data driven analysis to prove what the root causes are

4. **Improve**: How can we fix the process/critical defects?
   - How can root causes can be addressed?

5. **Control**: How can we ensure the process remains fixed?
   - Develop controls to ensure process improvement is sustained

Key Agile principles are:

Focus on customer value – Employ business-driven prioritization of features.

Iterative & Incremental Delivery – Create a flow of value to customers by "chunking" feature delivery into small increments.

Intense Collaboration – Face-to-face communication via collocation, etc; diversified roles on integrated teams.

Self Organization – Team members self-organize to fulfill a shared project vision.

Continuous Improvement – Teams reflect, learn and adapt to change; work informs the plan.

Agile & Lean Six Sigma have both proven their mettle in the respective domains:

- **Agile Project Execution:** Improved time-to-market, collaboration and customer satisfaction

- **Lean Six Sigma Process Improvement:** Better process controls, higher efficiency and effectiveness

However, they still tend to operate independently.

II. The Case for Change (Why?)

- **Why do we do projects?**
  - a) Deliver to Initial Specifications
  - b) Deliver on Time
  - c) Deliver on Budget
  - d) Increase Revenue
  - e) Avoid Costs
  - f) Improve Service
  - g) Everything but "a"

(Trick Question)

- **To enhance businesses' profitability by:**
  - Providing "**Value**" to external Customers (better service, more revenue generated), *and*
  - Providing "**Value**" to internal Customers (better service, lower cost)

Value is generated by addressing Customers' **most critical and pressing needs.**

- Value, as defined by the Business Customer (Agile)

- Customer requirements (PMI)

- Voice of the Customer/Business, Critical to Quality requirements (Six Sigma)

- Value, Right Product/Time/Price (Lean)

Related, but subtly different perspectives.

How can we improve our capability to deliver Value through projects?

- **Project Execution Improvements:**
  - Delivery speed
  - Code quality
  - Business customer satisfaction

While these are critically important...

- **Business-Focused Improvements:**
  - Impact on business process performance (cycle time, SLA fulfillment, audit compliance)
  - Measurable contribution to strategic initiatives
  - Incremental operational integration & deployment
  - End user satisfaction

These are more often neglected... And even more important.

Some common issues include:

- **At the portfolio level:**
  - Arbitrary and inconsistent project selection criteria
  - Poor alignment of projects across value streams
  - Unfocused approach to risk management

- **Within Agile projects:**
  - No quantification of project value
  - Customer difficulty in providing "grounded" requirements
  - Inconsistent alignment with highest-priority process needs

- **Within Lean Six Sigma projects:**
  - No incremental delivery of business value
  - Limited scope of analysis and opportunity for measurement
  - Insufficient linkage to execution of improvement recommendations

- An explicit linkage from **Customer** *to* **Process** *to* **Execution** is necessary to ensure that the organization is tightly aligned with the real, *changing* needs of its users.

Customers/Users

Business Processes

Lean Six Sigma

Agile

Generate Value

Identify & Define Value

Deliver Value

Consume & React to Value
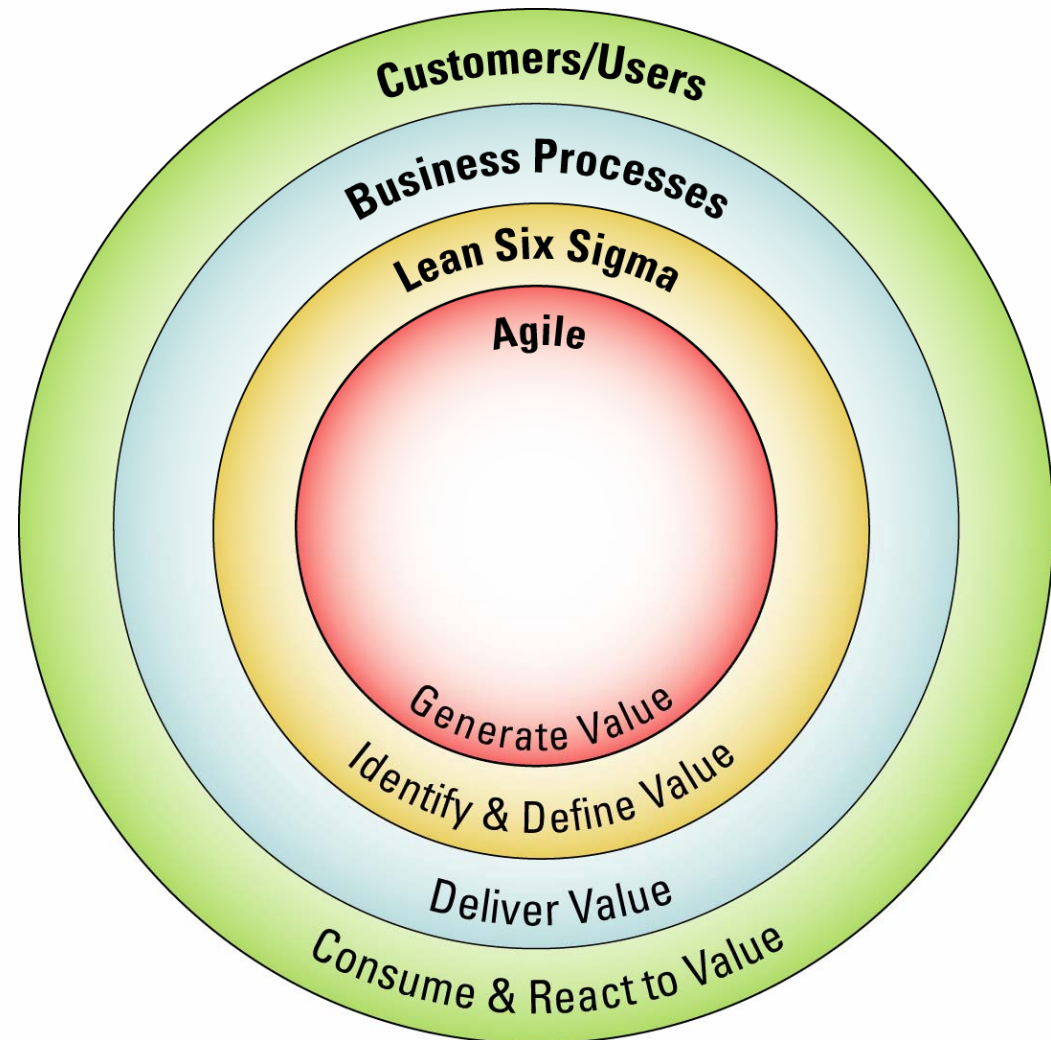
- **Lean and Six Sigma, by *defining the problem*, help to:**
  - Define and quantify Value
  - Identify root causes of business problems
  - Avoid suboptimization by providing full business context
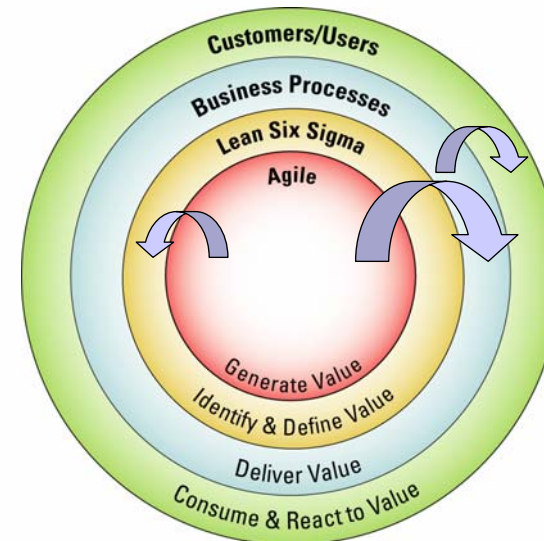 - Align business management with true customer needs

  Do the right projects.
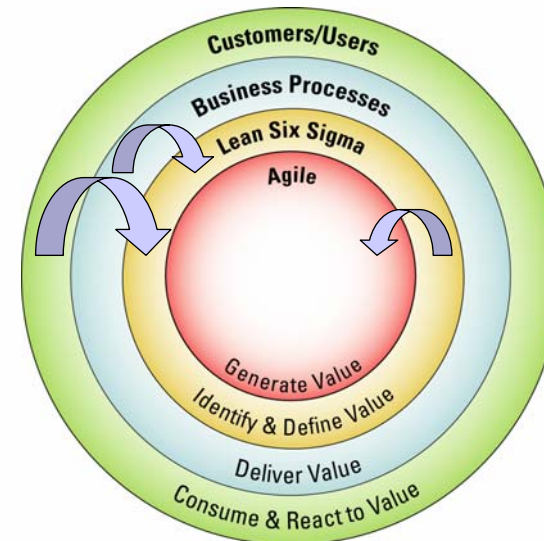
- **Agile, by *crafting the solution*, helps to:**
  - Deliver incremental Value
  - Provide framework for ongoing measurement of results
  - Ensure effective implementation of improvements
  - Align business management with implementation teams

  Do the right projects right.

ccpace

Agile execution of Lean Six Sigma process improvement recommendations can yield:

- **Flexibility & Speed**
  - Direct, continuously updated linkage to true needs of business & customers
  - Ability to handle change beyond initial process analyses
- **Minimized Risk**
  - Iterative development
  - Incremental delivery
- **Better Solutions**
  - Focus and refinement of recommended improvements at the implementation level
  - Ideal platform for innovation and new product introduction
- **More Versatile Teams**
  - Support for whole-of-life product maintenance and continuing development
  - Close coordination between Business and IT

Lean Six Sigma provides a number of complements to Agile project execution:

- **Grounded project vision and clear focus**
  - Product Backlog items with quantifiable Value
  - Product Backlog prioritization criteria
- **Stronger business cases**
  - Quantitative assessment of feature values
  - Clear linkage of IT efforts to business benefits
- **Means to measure success**
  - Key metrics identified for a particular process
  - Measurement and control system in place
- **Directed portfolio design**
  - Select projects by critical customer needs & process constraints
  - Align projects within programs & across functional silos

A Simple Connection

Lean Six Sigma Project
What are the best ways to improve the customer acquisition process?

- Customer Value
- CTQ N
- Time to complete online process
- yN
- Early notification of required information
- Fewer screens
- xN
- Update Web content
- Update UI Flow
- Integrate systems
- r4
- rN

Agile Project(s)
Reduce time to complete online process by 50%

Product Backlog
- Item 1
- Item 2
- Item 3
- Item N

Identify Value & Waste, Provide Recommendations

Deliver Value Fast & Early

III. The Approach (How?)

Status Quo.

Six Sigma Deployment via Waterfall

End Users

Provide needs

Value received

Business Customer

Something is wrong! **Help!**

Value received

Lean Six Sigma Analyst

Never fear, we shall **Define** this problem!

Now, we will **Measure** to find out how bad it is!

Next, let's **Analyze** to find the root causes.

Here are some recommendations to **Improve** the situation.

Now let's ensure the process remains under **Control**.

IT Teams

Solution Development:
Waterfall SDLC, Design for Six Sigma (DFSS)

The Waterfall Six Sigma Approach works like this:

- **Lean Six Sigma projects** determine which problems projects should address, and their broad solutions.

- **Waterfall projects** are spawned in the "Improve" phase to tackle these problems, further define their solutions, and establish process control.

> This has worked for years in some companies… but there is always room for improvement!
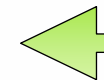
We're going to briefly examine three possible approaches for combining Lean Six Sigma and Agile:

- **Approach 1**: Initial Approach
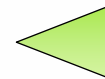
  Low-Level Combination:
  Agile with basic LSS tools

- **Approach 2**: Integrated Approach

  Focused Teams:
  Lean Six Sigma & Agile

- **Approach 3**: Whole of Life

  Death of the Project:
  Platform-based operational approach

All approaches share these goals:

- **Align project portfolios** with true, grounded strategic value generation

- **Accurately measure value generation** and strongly link to strategic operations

- **Improve execution speed** of process improvement initiatives

- **Tighten feedback loops** in process management and improvement efforts

- **Support incremental improvements** with a process designed around iterative delivery

Delivery Focused

Process Improvement Focused

Business Process Management Focused

3. Whole of Life Approach
Death of Projects

2. Integrated Approach
Lean Six Sigma & Agile

1. Initial Approach
Agile w/tools

Maturity

Time

Delivery Focused

Process Improvement Focused

Business Process Management Focused

3. Whole of Life Approach
Death of Projects

2. Integrated Approach
Lean Six Sigma & Agile

**1. Initial Approach
Agile w/tools**

A simple first step when:
- Projects have already been selected and scoped
- Projects affect loosely defined business processes
- Projects live within broader programs
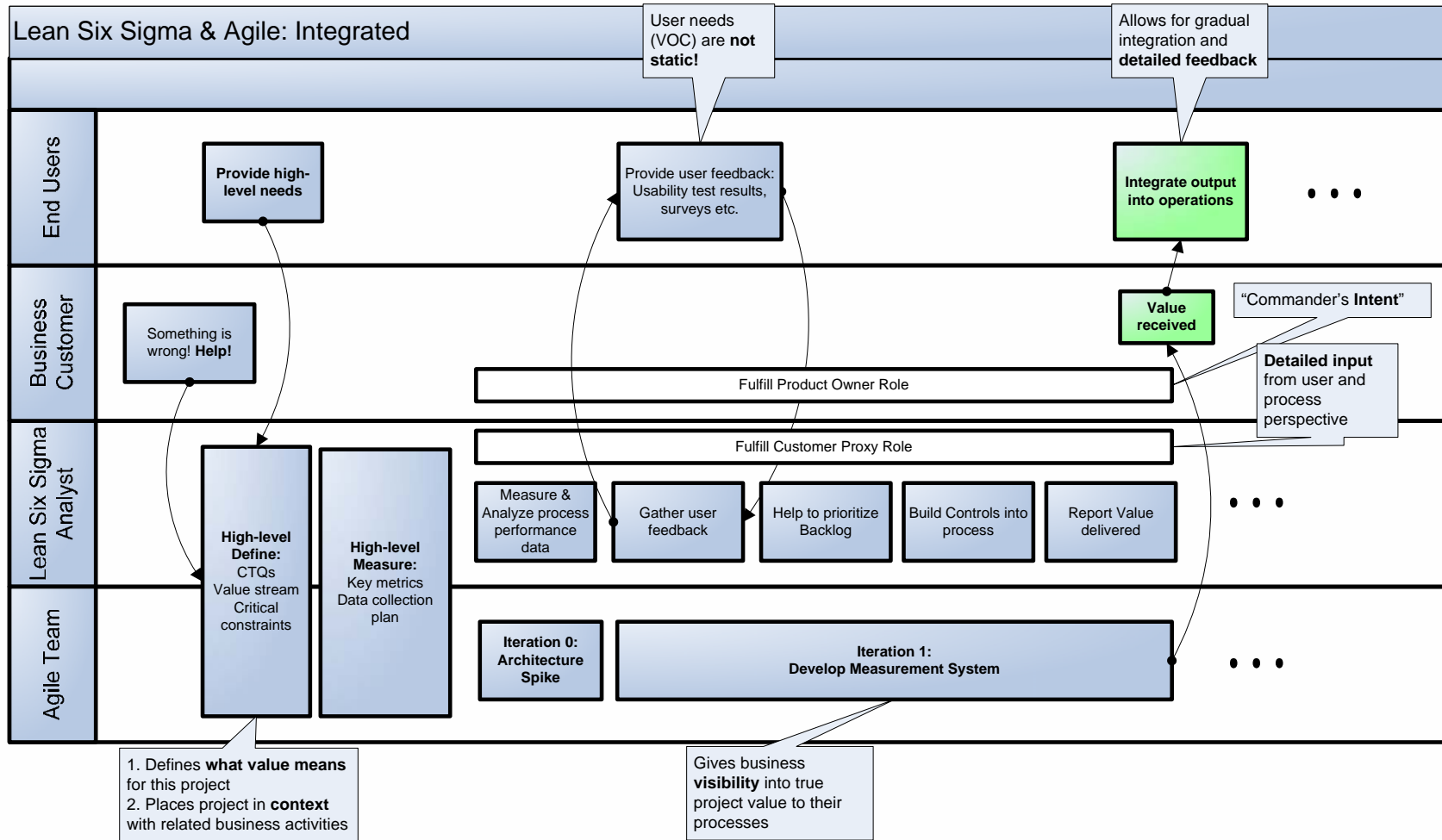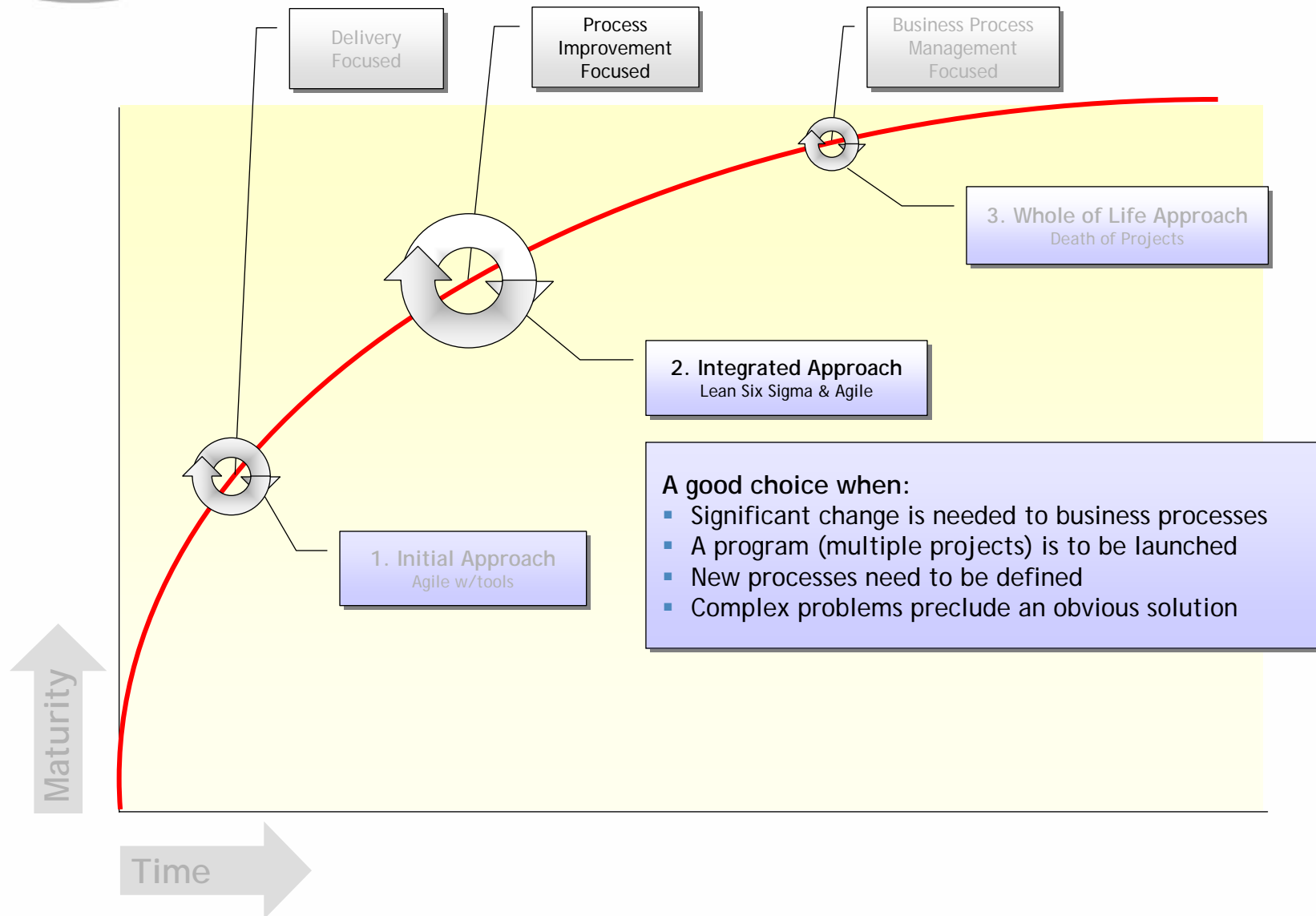- Quantification of project value is desired

Maturity

Time

The Initial Approach works like this:

- Lean Six Sigma analyst facilitates **rapid process definition and measurement exercises** with Agile team, business customer, process performers and End Users (~1 week)

- **During each Iteration**, LSS Analyst:
  - Analyzes current process performance
  - Leads detailed process design work (workflow, business rules, etc.)
  - Quantifies project value based on few key metrics
  - Facilitates feedback from end users and related process owners
  - Acts as customer proxy to team
  - Provides "voice of the process" for Product Backlog prioritization
  - Assists with operational integration of project improvements

- LSS Analyst generally works **1-2 iterations ahead of team**, gradually ramps down involvement as backlog crystallizes
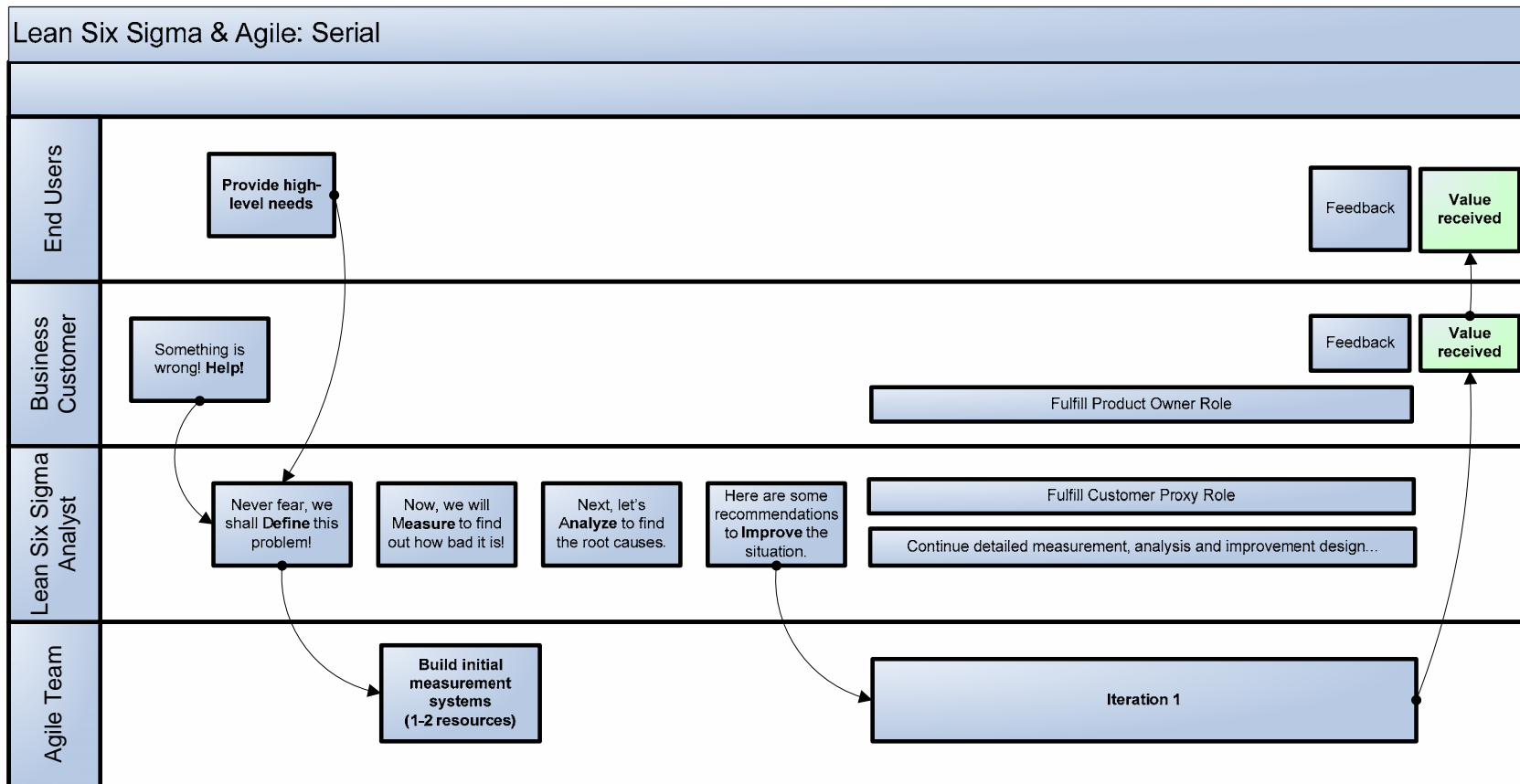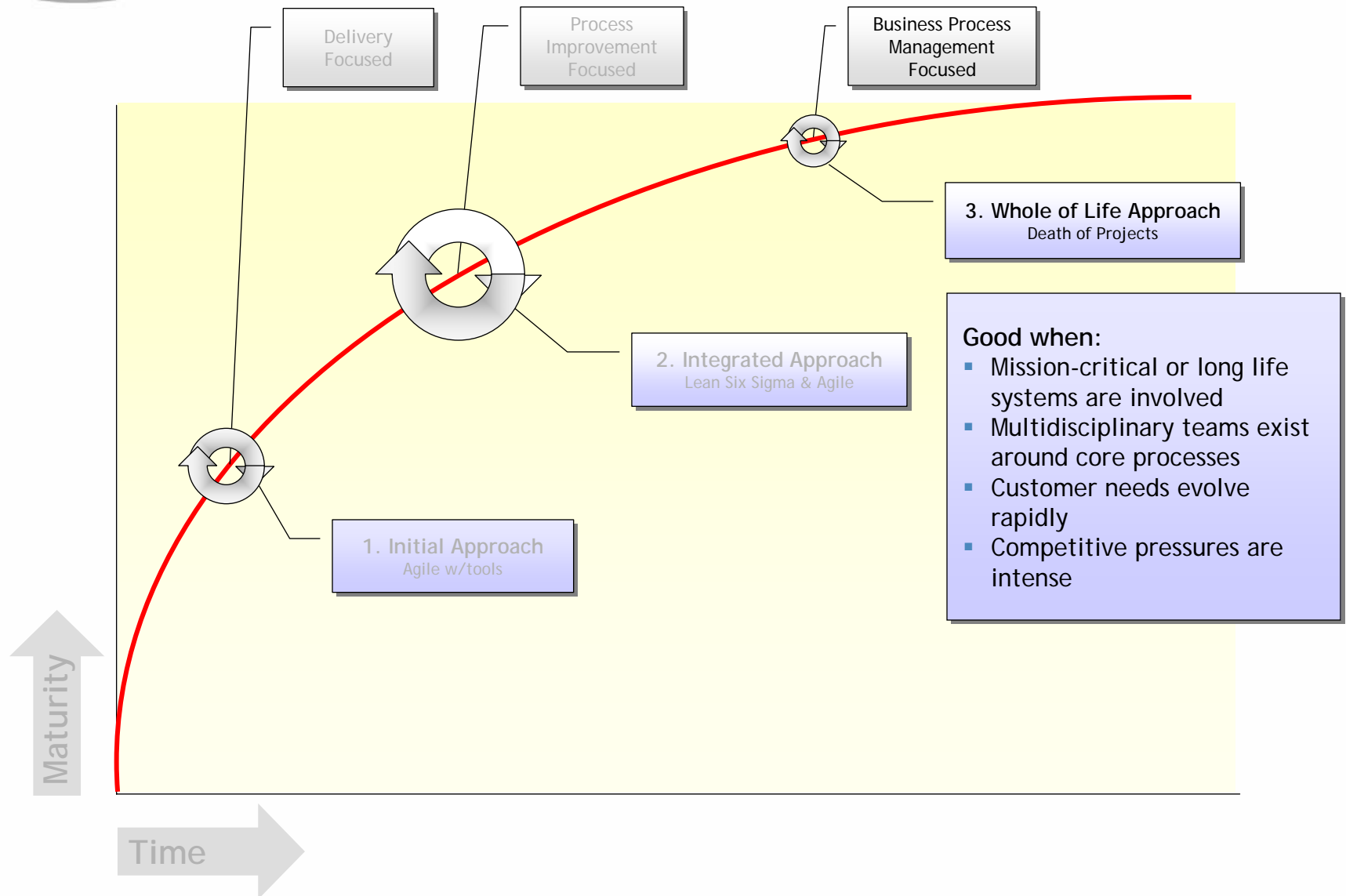
Lean Six Sigma tools, Agile execution.

Lean Six Sigma & Agile: Integrated

User needs (VOC) are **not static!**

Allows for gradual integration and **detailed feedback**

End Users

Provide high-level needs

Provide user feedback: Usability test results, surveys etc.

Integrate output into operations

· · ·

Business Customer

Something is wrong! **Help!**

Value received

"Commander's **Intent**"

Fulfill Product Owner Role

Detailed input from user and process perspective

Lean Six Sigma Analyst

Fulfill Customer Proxy Role

Measure & Analyze process performance data

Gather user feedback

Help to prioritize Backlog

Build Controls into process

Report Value delivered

· · ·

High-level Define: CTQs Value stream Critical constraints

High-level Measure: Key metrics Data collection plan

Agile Team

Iteration 0: Architecture Spike

Iteration 1: Develop Measurement System

· · ·

1. Defines **what value means** for this project
2. Places project in **context** with related business activities

Gives business **visibility** into true project value to their processes

Delivery
Focused

Process
Improvement
Focused

Business Process
Management
Focused

3. Whole of Life Approach
Death of Projects

2. Integrated Approach
Lean Six Sigma & Agile

1. Initial Approach
Agile w/tools

A good choice when:
- Significant change is needed to business processes
- A program (multiple projects) is to be launched
- New processes need to be defined
- Complex problems preclude an obvious solution

Maturity

Time

The Integrated Approach works like this:

- **Lean Six Sigma projects** provide initial definition and analysis of process areas
  - Tackle large, complex process issues
  - Provide grounded business cases and clear focus
  - Provide metrics to define success

- **Agile projects** are spawned in the "Improve" phase
  - Utilize output from LSS projects to form Product Backlog
  - Members from LSS team are involved in execution
  - Adjustments are made as necessary to initial LSS analyses based on exploratory and production data influx
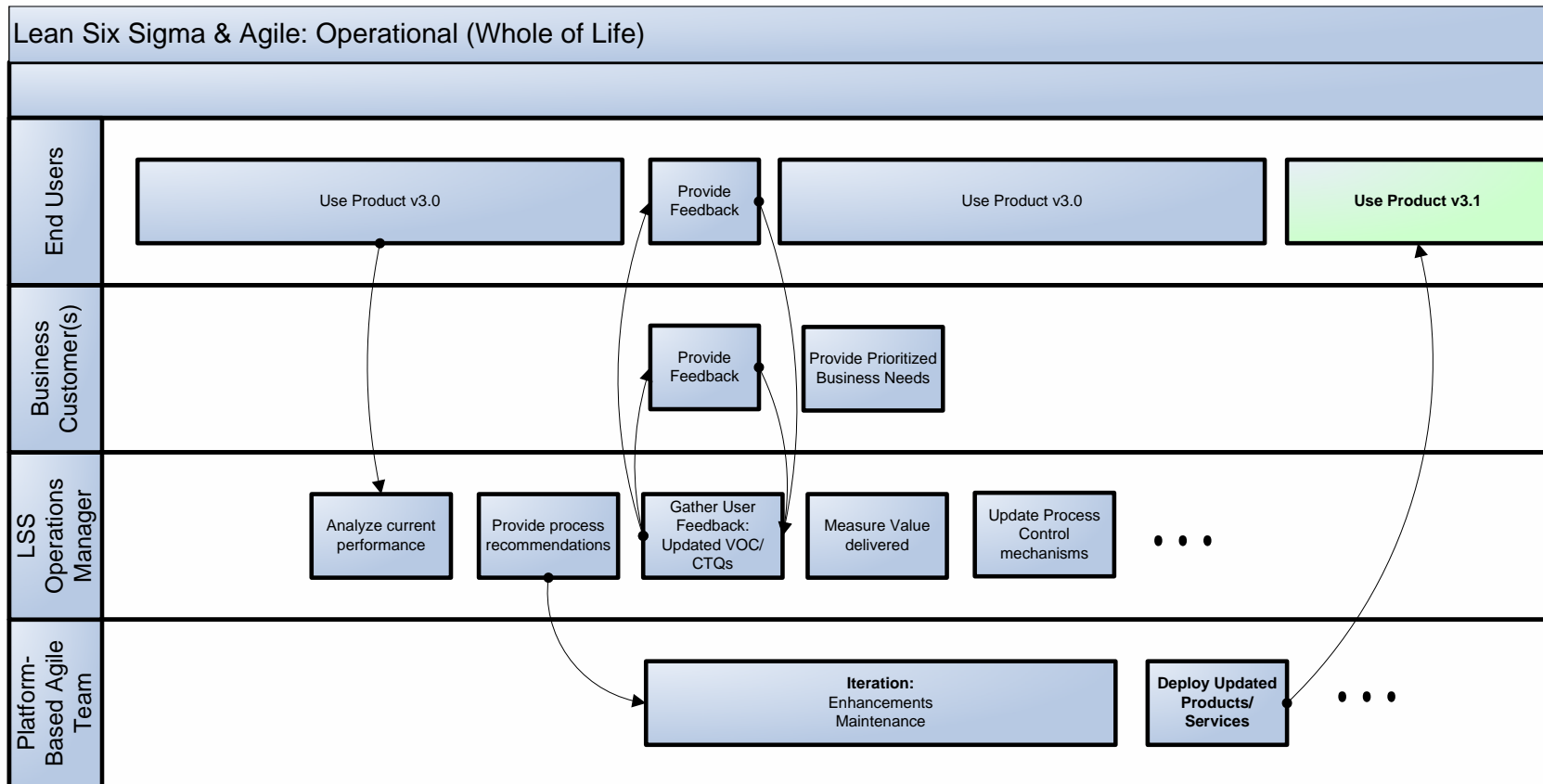
A simple step forward.

Delivery Focused

Process Improvement Focused

Business Process Management Focused

3. Whole of Life Approach
Death of Projects

2. Integrated Approach
Lean Six Sigma & Agile

1. Initial Approach
Agile w/tools

Good when:
- Mission-critical or long life systems are involved
- Multidisciplinary teams exist around core processes
- Customer needs evolve rapidly
- Competitive pressures are intense

Maturity

Time

The Whole of Life Approach works like this:

- **Platform-based teams** execute top-priority tasks in regular cadence
  - Fixed cost
  - Deep business & technical domain understanding

- Ongoing measurement and analysis **drives business**
  - LSS skill set is held by business management
  - Extensive customer experience feedback mechanisms

- Balance between **maintenance** and **new development**

- Ideal for **mission-critical** applications or non-IT **business management**

Who needs projects anyway?

Lean Six Sigma & Agile: Operational (Whole of Life)

End Users

| Use Product v3.0 | Provide Feedback | Use Product v3.0 | Use Product v3.1 |

Business Customer(s)

Provide Feedback

Provide Prioritized Business Needs

LSS Operations Manager

Analyze current performance

Provide process recommendations

Gather User Feedback: Updated VOC/ CTQs

Measure Value delivered

Update Process Control mechanisms

• • •

Platform-Based Agile Team

Iteration: Enhancements Maintenance

Deploy Updated Products/ Services

• • •

Let's take a quick look at some of the specific tools and techniques that we might utilize in a combined approach...

Improve the process for new customers to sign up for financial management services.

- OK, so what's important?
  - **User needs** (intuitive, quick, friendly, attractive)
  - **Business needs** (data capture, user retention, up/cross-sell)
  - **Process needs** (upstream/downstream workflow integration, data integration, business rule implementation)

- So, we need to:
  - Document the existing new account setup processes and supporting systems.
  - Identify and prioritize enhancements to the processes and underlying technical solution based on business and end user needs.
  - Define and implement ongoing metrics that will tell us how the process is performing.

Suppliers

S

Prospect

Mail Room

Inputs

I

Personal
Information

Fund Selection
Information

Client Interaction
Preferences

Financial
Information

Process

P

Enter via specific channel

↓

Enter personal info

↓

Select funds

↓

Enter financial info

↓

Select preferences

↓

Account funding

↓

Detect fraud

↓

Mail account info

Outputs

O

Funded Account

Setup
Confirmation

Prospect
Information
(Personal,
Financial, Fund,
Preferences)

Money

Marketing
Channel
Attribution

Customers

C

Prospect

Fund Managers

Fraud Control

Customer Service

Mail Room

Marketing

This area contains the most customer interaction, and **huge variation**. Also, benchmarks show that it dramatically **lags competitive standards**.

This area presents an obvious opportunity for improving both **internal efficiency** and **customer satisfaction**.

These are some metrics that we could use to gauge how well we're doing. **Which ones tell the story best?**

Current survey data tells us that these are the **most important quality factors** to our Internal & External Customers.

Metric Correlation
(Strong - 9
Medium - 3
Weak - 1)

		# of online dropouts	# of online errors	# calls for help	# of legal interventions	# of control interventions	# of funding interventions	# of service callbacks	Time to complete online process	Time to complete entire process	Time to fund account	Time to respond to request for help	Customer satisfaction rating
External (Customer) Quality													
Expected	Web site is easy to use	9	3	9	1	3	3	9	9	9	3	1	9
Expected	Customer representative is readily available via phone	1	1	1	1	1	1	1	1	3	1	3	9
Exciting	Customer representative is readily available via chat	1	1	1	1	1	1	1	1	3	1	3	3
Expected	Representatives treat me well	1	1	1	1	1	1	1	1	1	1	1	9
Expected	Account options are easy to understand	9	9	1	3	9	9	9	9	3	3	1	9
Expected	Investment options are easy to understand	9	9	1	3	9	9	9	9	3	3	1	9
Expected	Extended information is easy to find	9	9	1	3	9	9	9	9	3	3	1	9
Expected	The process is fast and efficient	9	1	3	1	1	1	3	9	9	9	1	9
Exciting	I know up front what information is required	9	9	3	3	9	9	9	9	3	3	1	3
Exciting	I know up front how much time it should take	9	9	1	3	9	9	9	9	3	3	1	3
Expected	Page response time is good	3	1	3	1	1	1	3	3	3	1	1	3
Exciting	The process is built around my personal goals	3	3	3	1	1	1	3	3	3	3	1	9
Expected	Site is accessible to disabled users	3	1	3	1	1	1	1	1	1	1	1	3
Expected	My data is secure	3	1	1	3	1	1	1	1	1	1	1	9
Exciting	The Web site is visually appealing	1	1	1	1	1	1	1	3	1	1	1	3
Internal Quality													
Expected	Regulatory requirements are met	1	1	1	9	9	9	3	1	1	3	1	1
Expected	Fraudulent accounts are controlled	1	3	1	3	9	3	1	1	1	9	1	1
Exciting	The system is easy to modify and expand	1	1	1	1	1	1	1	1	1	1	1	1
Expected	System is reliably available	3	1	1	1	1	1	1	9	9	9	1	3
	Metric Importance	**85**	65	37	41	77	71	75	**89**	61	59	23	**105**

We could choose to measure many things, but **these few** are the most telling.
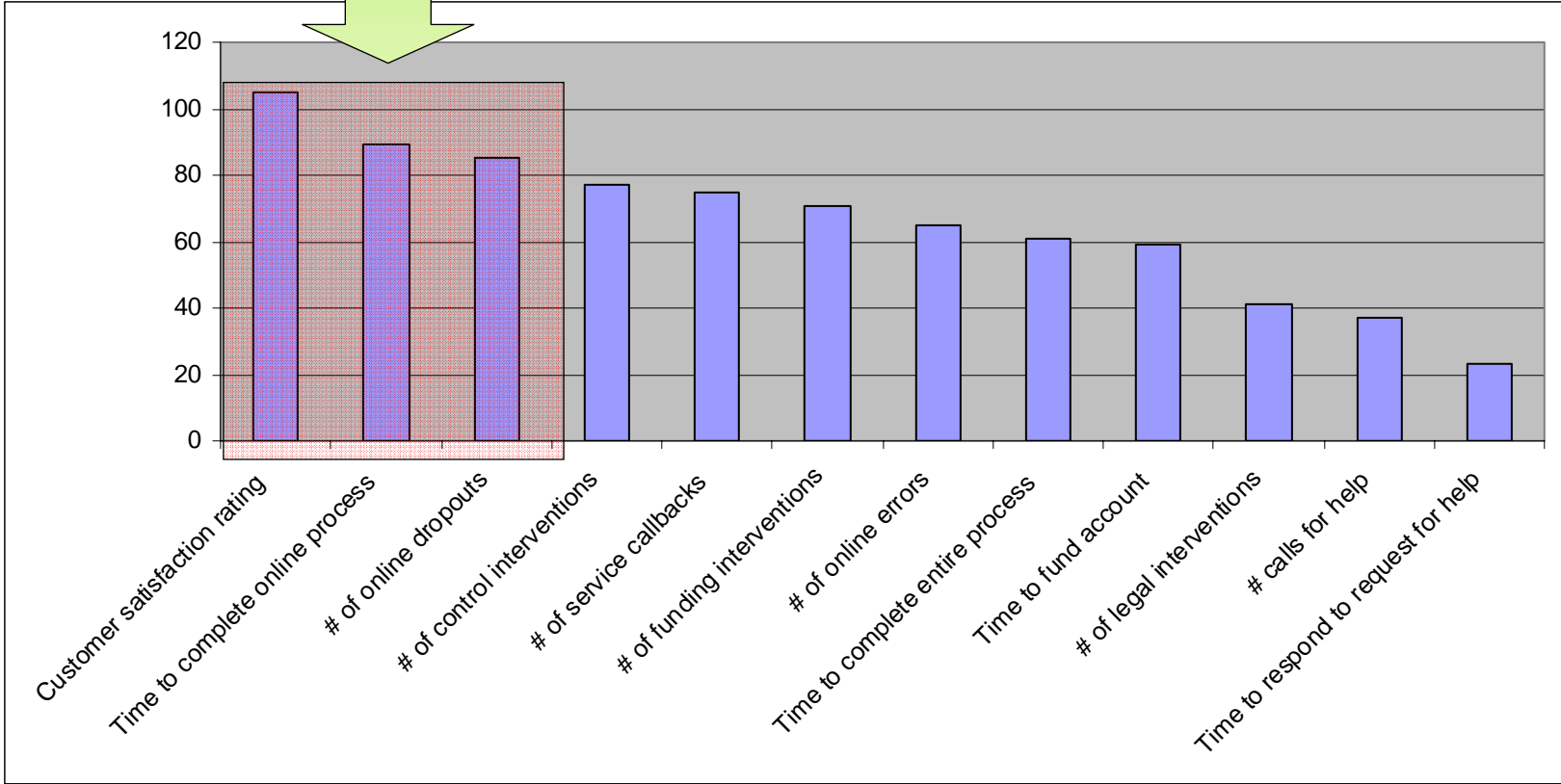
Project Y Metric/Measure	Operational Definition	Performance Target	Tolerance Limits
Time to complete online process	**Elapsed Time** *from* **Login Landing** *to* **Receipt of Final Confirmation** "Elapsed Time" = Absolute difference between Login Landing & Receipt of Final Confirmation times *(Minutes:Seconds)* "Login Landing" = Point in time when prospect reaches login.jsp page *(Minutes:Seconds)* "Receipt of Final Confirmation" = Point in time when confirmation.jsp page is fully loaded *(Minutes:Seconds)*	10 minutes	< 20 minutes

Backlog Prioritization (QFD)

- What Backlog items will contribute most to our defined Value (priorities)?
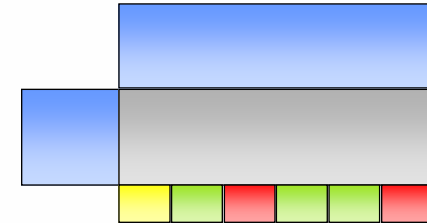
Value Measurement (Process Capability, Analysis)

- How are we doing against our goals so far?
- What are the key factors that are contributing to our success/failure?
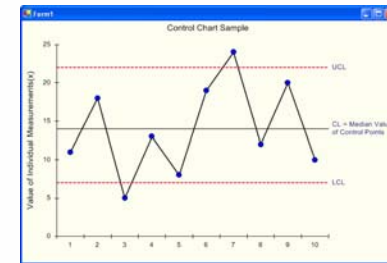
Control Strategy (FMEA, Control Plans)

- What are some of the major risks in our project's host processes that we should consider?
- What is the relative priority of these risks?

Scenario Planning (QFD, Simulation, Prototyping)

- When we have multiple ways to address a problem, which is best?

Current Process	Process Scenario 1	Process Scenario 2
1.0	1.3	1.5

Roles & Responsibilities

Product Owner	• Accountable for success or failure of project
	• Prioritizes the Product Backlog
	• Empowered to make decisions for all customers and users
	• Presents and explains Product Backlog to team
LSS Analyst	• Quantifies project value based on few key metrics
	• Provides "voice of the process" for Product Backlog prioritization
	• Facilitates feedback from end users and related process owners
	• Acts as customer proxy to team
	• Assists with operational integration of project improvements
Scrum Team	• Estimates work level of effort
	• Executes top-priority items on Product Backlog
	• Accountable for meeting sprint/iteration commitments
ScrumMaster	• Responsible for the process
	• Responsible for maximizing team productivity
	• Sets up and conducts meetings
	• Representative to management and team

Gaps	Combined Lean Six Sigma & Agile Solutions
At the portfolio level:	
Arbitrary and inconsistent project selection criteria	▪ Map core processes touched by existing and upcoming projects ▪ Select new projects based on critical process constraints
Poor coordination between related projects	▪ LSS Black Belts coordinate process interactions across projects, especially in different departments within the same value stream
Unfocused approach to risk management	▪ Build risk mitigation factors directly into project portfolio selection criteria ▪ Use Lean Six Sigma tools to discover and control root causes within Agile projects

Gaps	Combined Lean Six Sigma & Agile Solutions
Within Agile projects:	
No quantification of project value	▪ Base project value on extrapolation of key process metrics ▪ LSS Black Belt tracks project value generation
Customer difficulty in providing clear requirements	▪ LSS Black Belt acts as customer proxy, assists with translating high-level goals to effective user stories
Inconsistent alignment with highest-priority process needs	▪ LSS aligns actions with top-priority customer (hence process) needs ▪ Agile supports test-and-learn approach through early operational exposure

Gaps	Combined Lean Six Sigma & Agile Solutions
Within Lean Six Sigma projects:	
No incremental delivery of business value	▪ Use iterative delivery to quickly address "low hanging fruit," quantify value with LSS
Limited scope of analysis and opportunity for measurement	▪ Do coarse definition, measurement & analysis to get top priorities up front, then more granular and focused analysis during each iteration ▪ Analysis takes place in parallel to delivery (LSS Black Belt is looking 1-2 iterations ahead of delivery team)
Insufficient linkage to execution of improvement recommendations	▪ LSS Black Belt ensures that high-level process recommendations are translated into effective implementations ▪ Improvement effectiveness is tested both before (prototyping, spikes) and after (usability testing, process analysis) implementation

Some specific steps that you can try now are noted below.

- **Business Context:**
  - Use high-level mapping tools (SIPOC, Value Stream Map) to "see the whole picture"
  - Use lower-level maps as appropriate to illustrate system interactions with business processes

- **Quantified Value:**
  - Integrate high-level Define and Measure techniques into up-front Agile Discovery Session (~1 week)
    - Determine key process metrics, where they don't exist, then drill down to aligned project metrics
    - Build measurement systems at start of project, refine over time

- **Process & Customer Perspective:**
  - Team with existing process experts to supply Process Coaches to Agile projects
  - Use Process Coaches as customer proxies, and to facilitate end user feedback

IV. Discussion

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