



Six Sigma in a software products environment

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Agenda

- Fiserv introduction
- Introduction of Six Sigma
- How it applies to a software products environment
- Examples/Case Studies
- References

But first a word from my sponsor...

Providing Scale Advantages And Differentiation

The logo for Fiserv, featuring the word "fiserv." in a bold, lowercase, orange sans-serif font.

Financial Strength

\$3.68 Billion Revenue as of 3Q 2008

\$7.75 Billion Market Cap as of 3Q 2008

17.97% Operating Margin as of 3Q 2008

High recurring revenue and strong operating margins

Consistent double digit revenue and earnings growth

Strong free cash flow generation (\$465 Million as of 3Q 2008)

Leading Market Position

Managed Accounts

Transaction Processing

Solutions

Integrated Solutions

Core Processing

Internet Banking

Bill Payment & Presentment

Debit/EFT Processing

Risk Management

By The Numbers

25,000 Employees

250 Locations Around the World

Over 18,000 clients

Over 20 Billion Transactions Processed Annually

Serve All Top 100 Banks, with 6,000 Core Relationships

The logo for Fiserv, featuring the word "fiserv." in a bold, lowercase, orange sans-serif font.

Strategic Framework

Vision

A global leader in transaction-based technology solutions

Mission

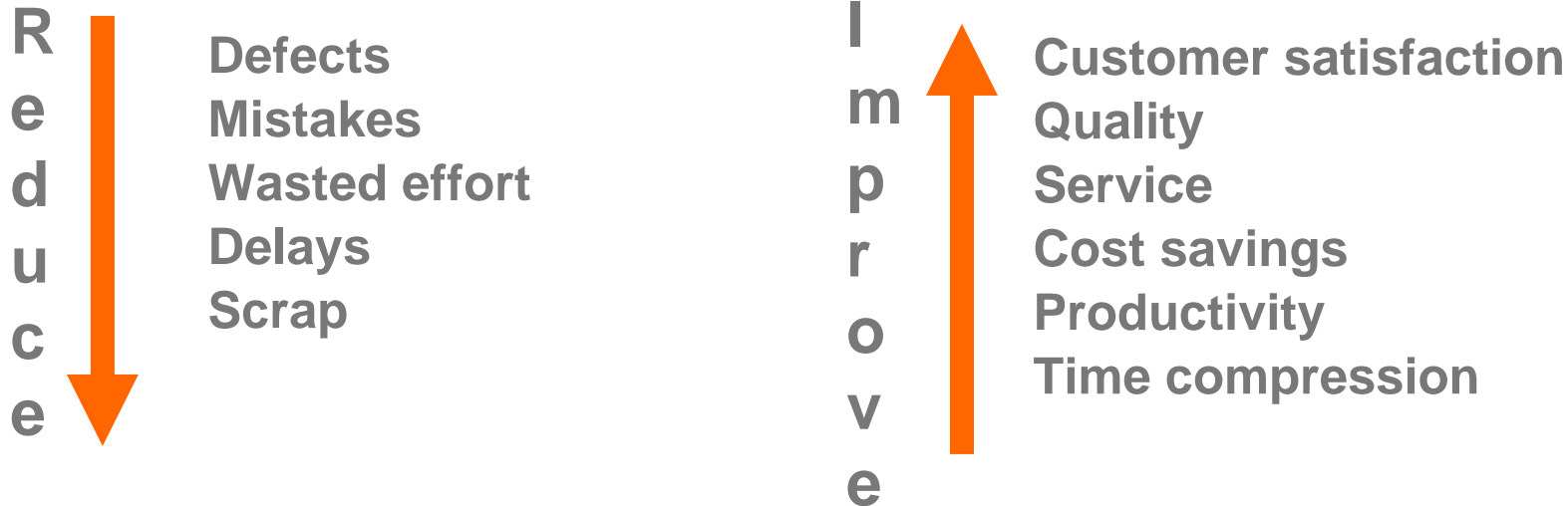
To provide integrated technology and services solutions that enable best in class results for our clients

Values

Clients • Integrity • Respect • Innovation • Teamwork

Introduction and History of Six Sigma

What Does It Do?



Result: Customer expectations met then exceeded

Six Sigma is a process

| | |
|----------------|--|
| Define | Identify what is important to the customer and define the project scope. |
| Measure | Select key characteristics; Define performance standards; Validate a measurement system |
| Analyze | Establish a process capability; Define improvement objectives; Identify variation sources |
| Improve | Screen potential causes for variation; Discover variable relationships b/w causes; Establish operating tolerances |
| Control | Validate a measurement system; Determine the ability to control vital steps; Implement process controls on vital steps |

Six Sigma -- What's it based on?

Customer

Anyone Who **Receives**
Product, Service or Information

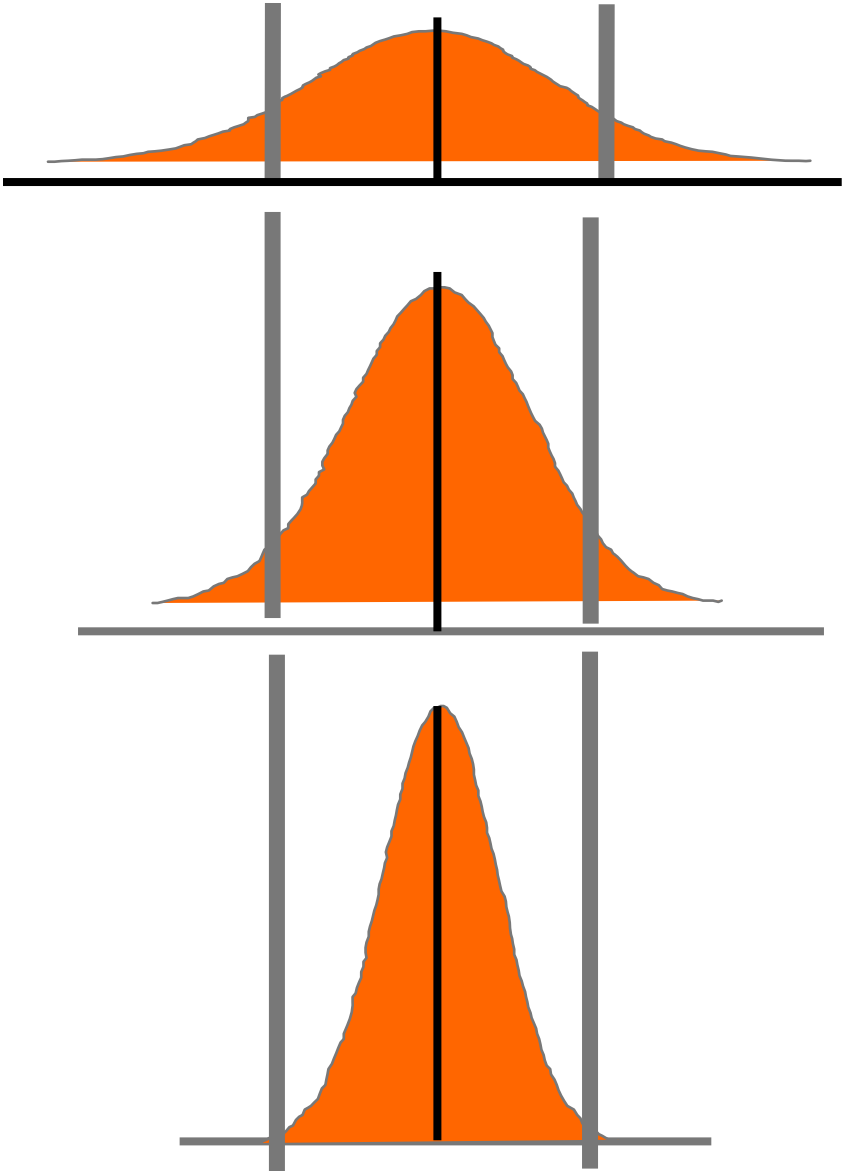
Opportunity

Every **Chance** to Do Something
Either "Right" or "Wrong"

Successes vs. Defects

Every Result of an Opportunity Either
Meets the **Customer Specification** or it
Doesn't

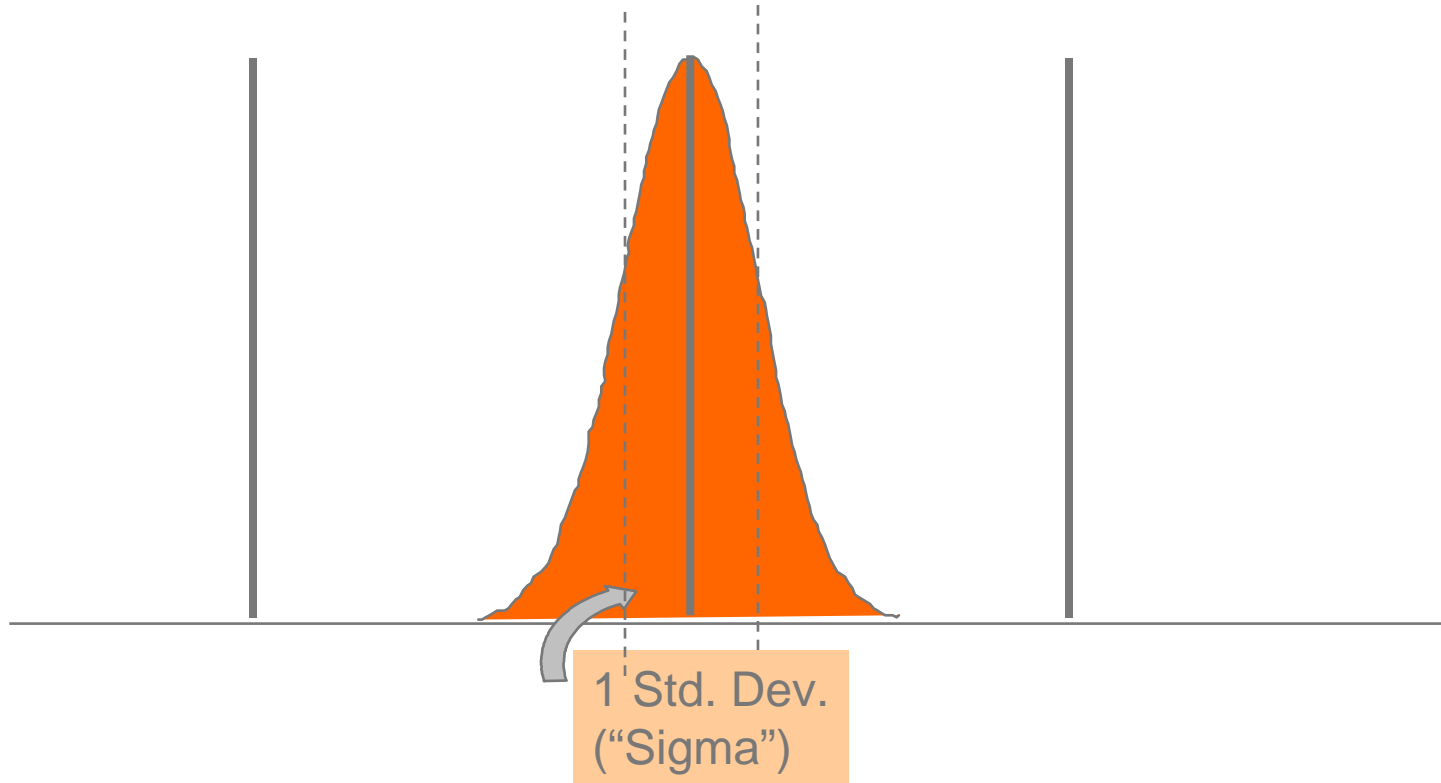
Variation -- less is better:



Less Variation (x's). .
Means fewer defects (y's)
(if centered)

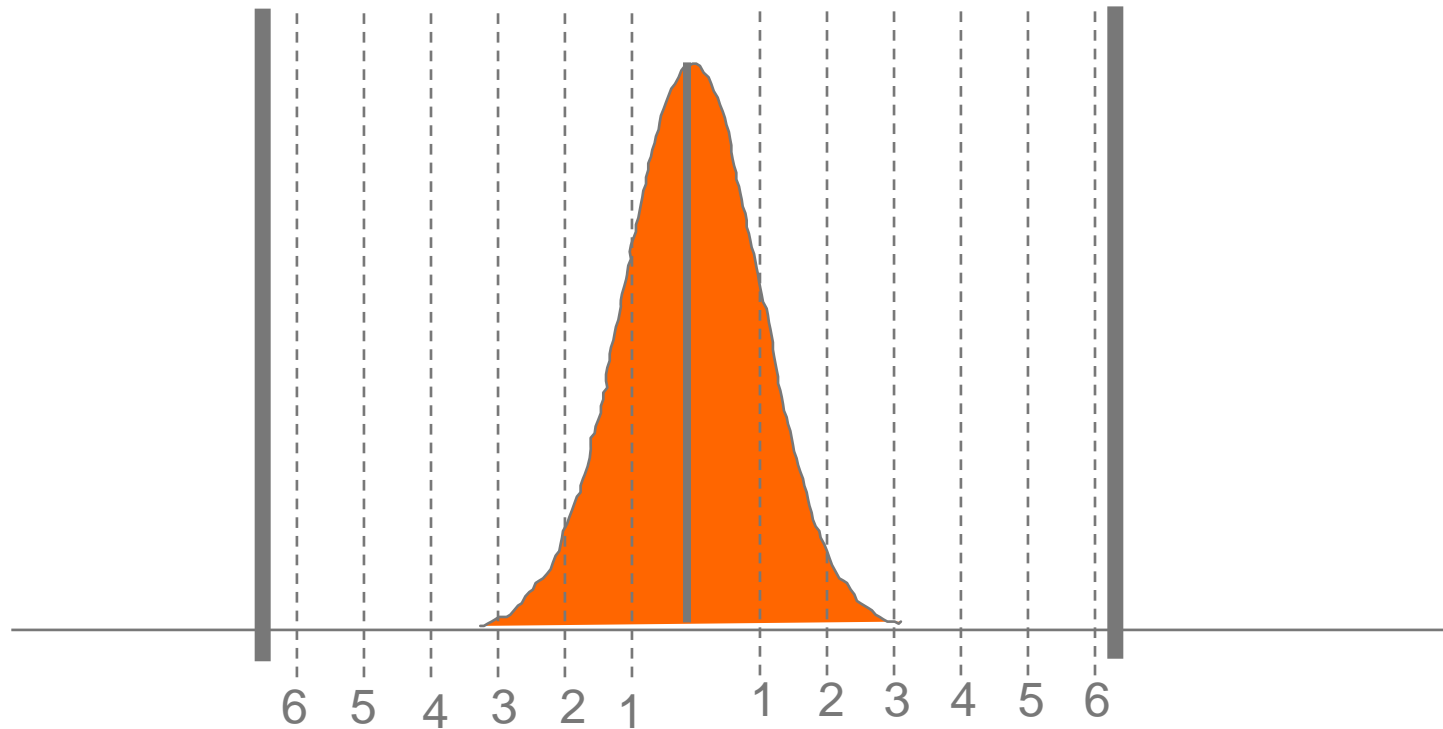
Standard deviation:

A metric that displays variation from it's "target".



One standard deviation around the mean is about 68% of the total "opportunities" for achieving success!

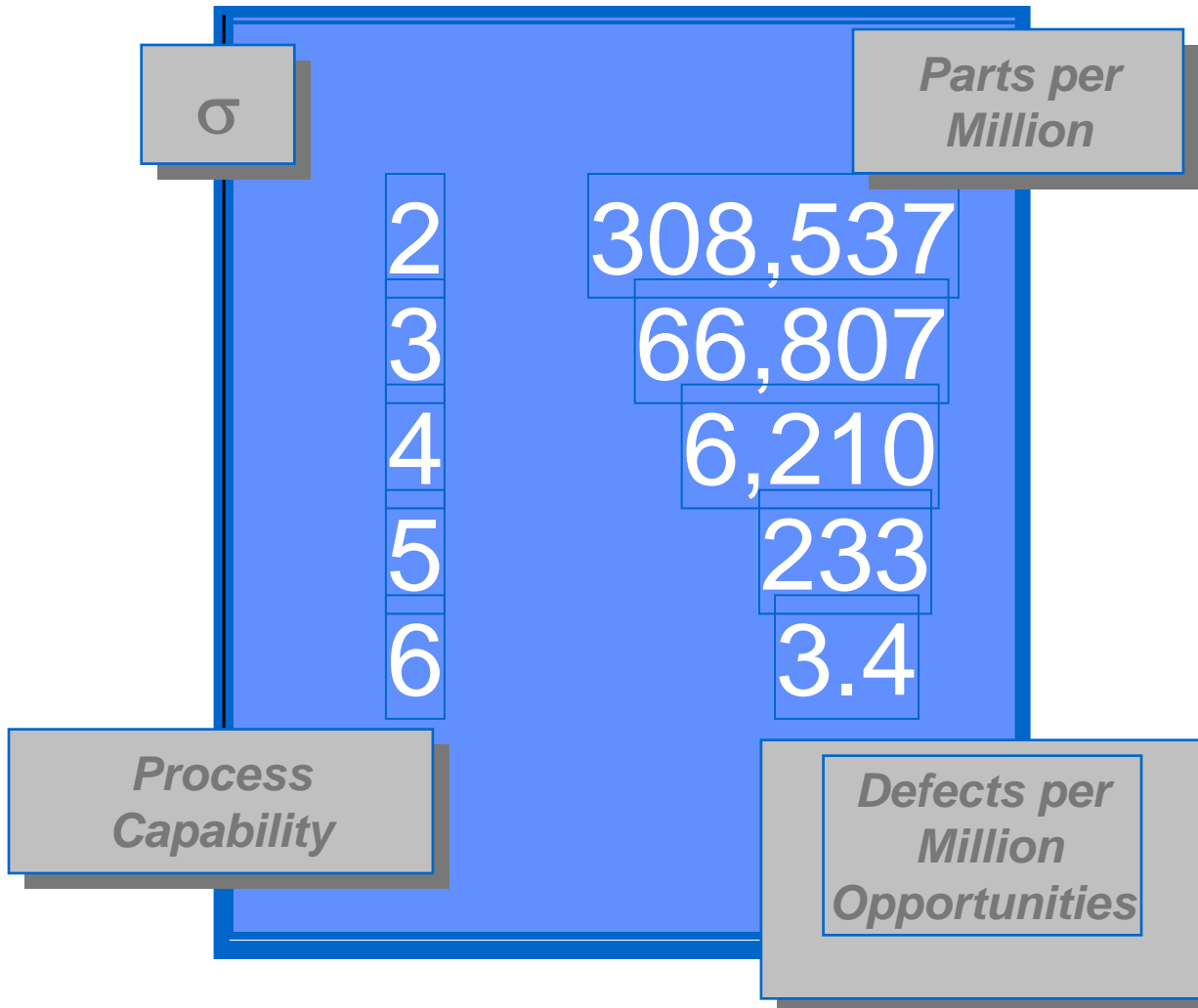
If we can *squeeze* six standard deviations in between our target and the customer's requirements . . .



then: **99.99966%** of our “opportunities” are included!

Six Sigma... the analytical goal:

(DPMO Distribution Shifted $\pm 1.5\sigma$)



Sigma is a statistical unit of measure which reflects process capability. The sigma scale of measure is perfectly correlated to such characteristics as defects-per-unit, parts-per million defective, and the probability of a failure or error.

Isn't 99% Good Enough?

A 99% level of performance would mean:

- **20,000** lost articles of mail per hour by the United States Postal Service
- **5,000** incorrect surgical operations per week in the United States
- **200,000** wrong drug prescriptions each week in the United States
- No electricity for almost **7** hours each month
- **12** Newborns will be given to the wrong parents daily
- **315** entries in Webster's Dictionary will be misspelled
- **3,065** copies of tomorrow's Wall Street Journal will be missing one of the three sections

From the book by Ed Scannell, Games Trainers Play, 2000 And Garden State Focus October 2001 Edition

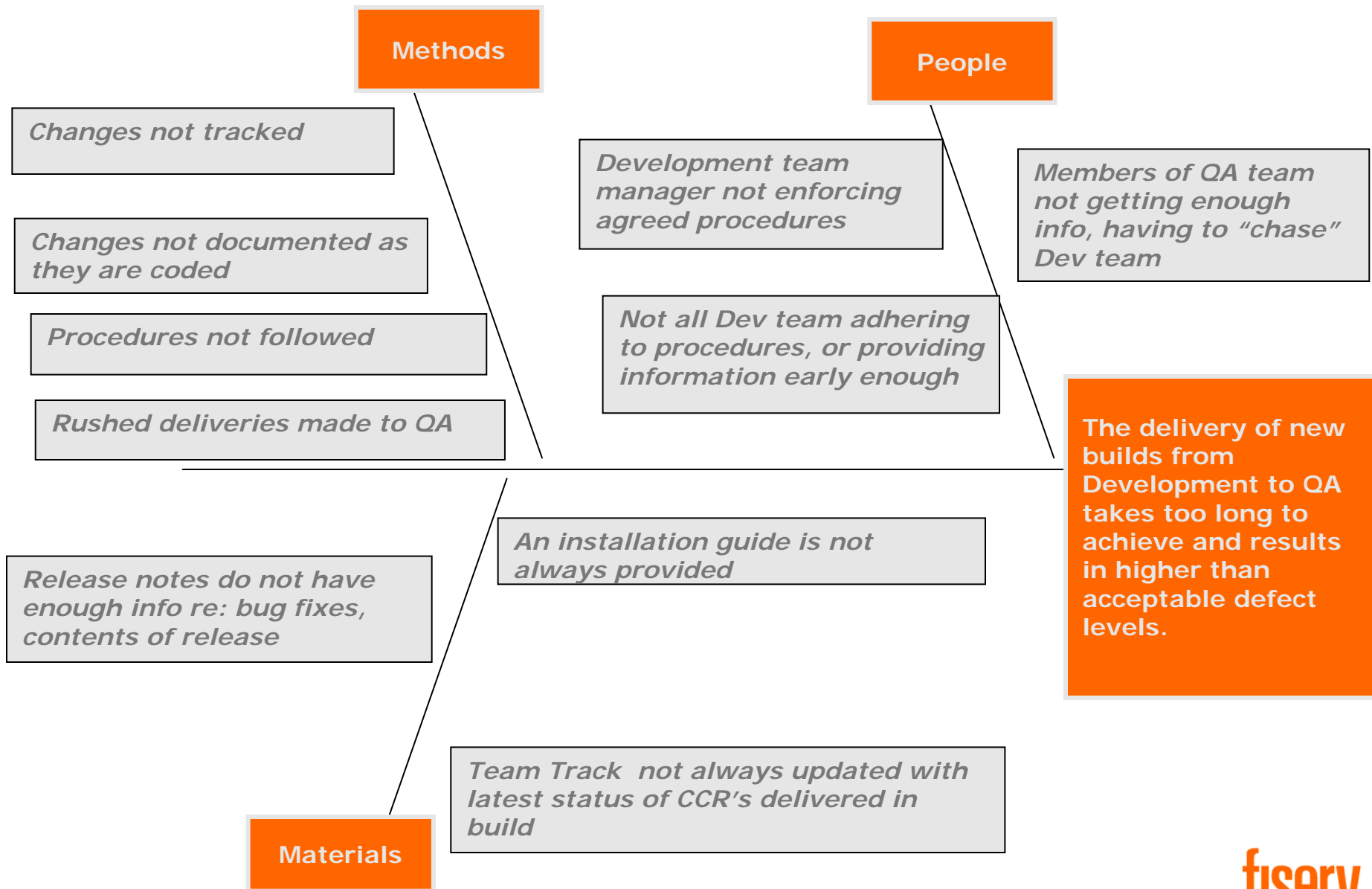
What are some applications to software products?

- Focus on maximizing value-added time in a Systems Development Life Cycle process (time is money) and minimizing re-work and waste
- Reduce bugs – either in production or by phase
- Reduce document revisions – BRDs, FSDs, TSDs, Test Cases, etc.
- Improve business requirements gathering by identifying the critical few items that matter most
- Understand operational performance

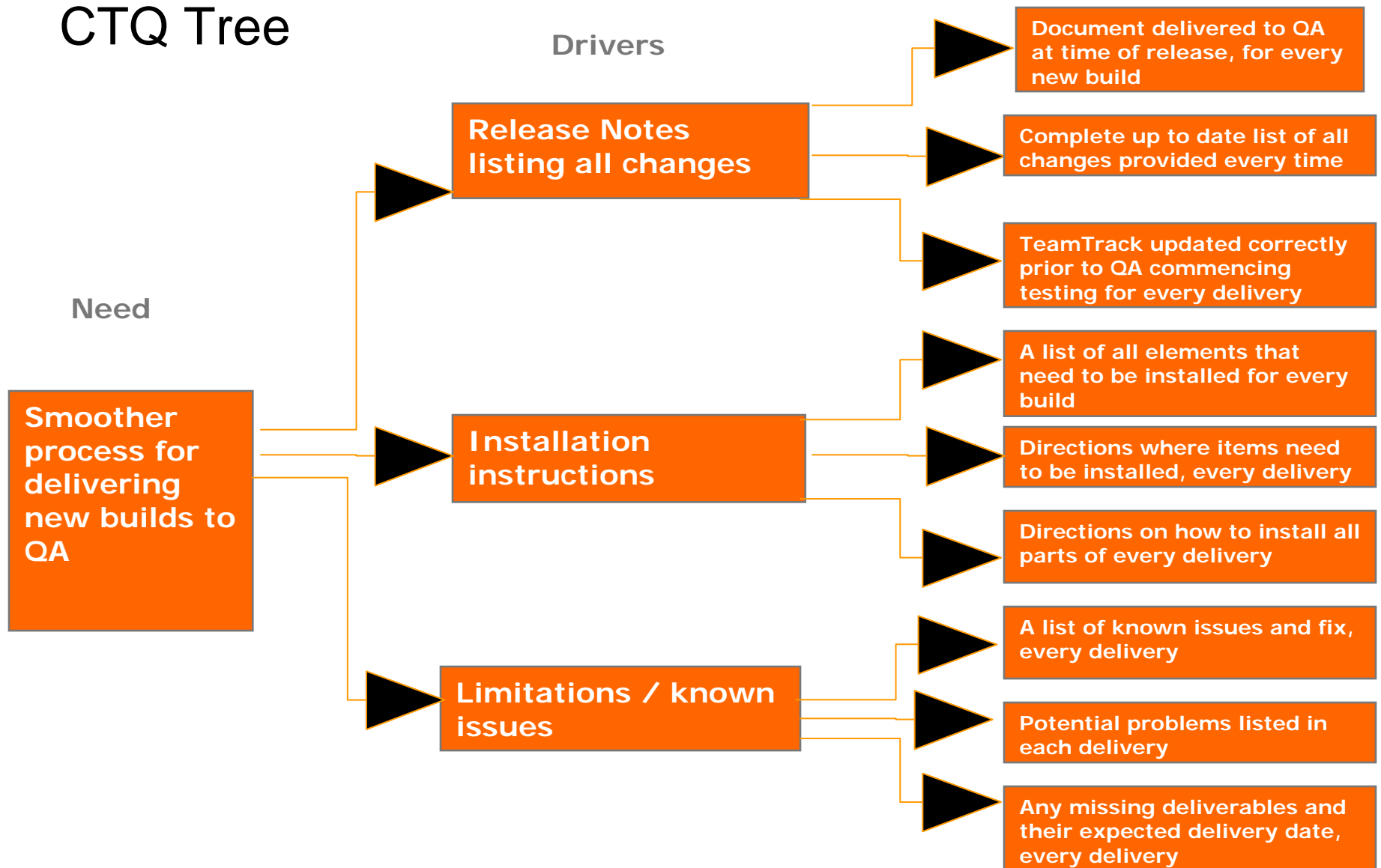
Example 1: Improve turn-over to a QA group

| | |
|---|---|
| What is wrong? | New builds are often delivered from the development team to QA without enough information, such as details of changed functionality and installation instructions. This leads to extra hours spent tracking down this information and extends the cycle time of the QA process. |
| Where does the problem occur? | The problem occurs at the point in the Software Development Life Cycle when a new build is delivered to the QA team from the Development team. |
| When does the problem occur? | This problem occurs when a new delivery of the code is received by the QA team |
| To what extent does the problem occur? | Approximately 90% of new deliveries have this problem |

Cause & Effect Diagram



CTQ Tree



Example 2: Theory of Constraints – 3 Projects

Project 1 **A B C** D E F G **H I J** 20 Weeks

Project 2 **A B C** D E F G **H I J** 20 Weeks

Project 3 **A B C** D E F G **H I J** 20 Weeks

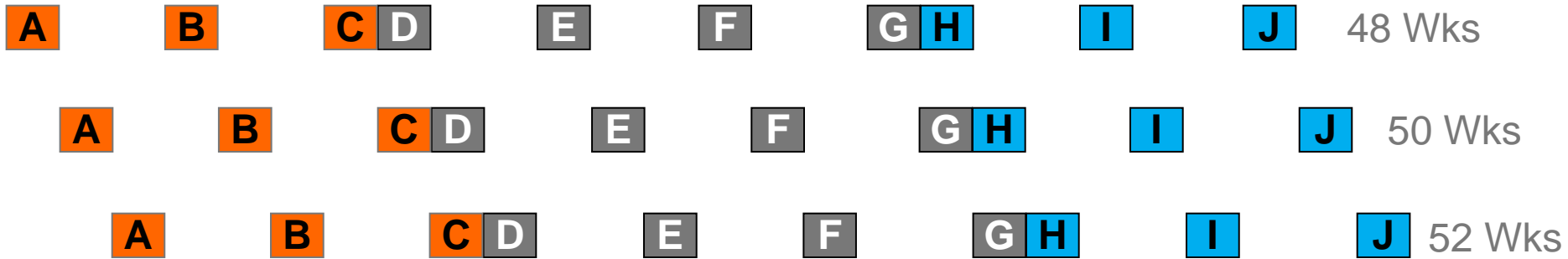
 Resource 1

 Resource 2

 Resource 3

From the book by Kai Yang, Design for Six Sigma for Service

Scenario 1 – Multi-tasking



Scenario 2 – No Multi-tasking



The scenario without multi-tasking had the longest project still finish before the first project in Scenario 1

Example 3: Statistics and the Big Picture

Initial Data Set

| Month | Group A | Group B |
|-----------|-----------|------------|
| January | 246892815 | 365531726 |
| February | 3727620 | 64928143 |
| March | 35333728 | 121037324 |
| April | 14783580 | 120060748 |
| May | 200088057 | 330451936 |
| June | 42873564 | 140971494 |
| July | 2713200 | 17214090 |
| August | 17214744 | 61318874 |
| September | 52820769 | 24431587 |
| October | 204834032 | 198444380 |
| November | 77549408 | 37849317 |
| December | 36868750 | 1261106748 |

The analysis – Pearson product moment correlation coefficient (a.k.a. Pearson coefficient)

Correlations: Group A, Group B

Pearson correlation of Group A and Group B = 0.143

P-Value = 0.658

Implies no statistical significance

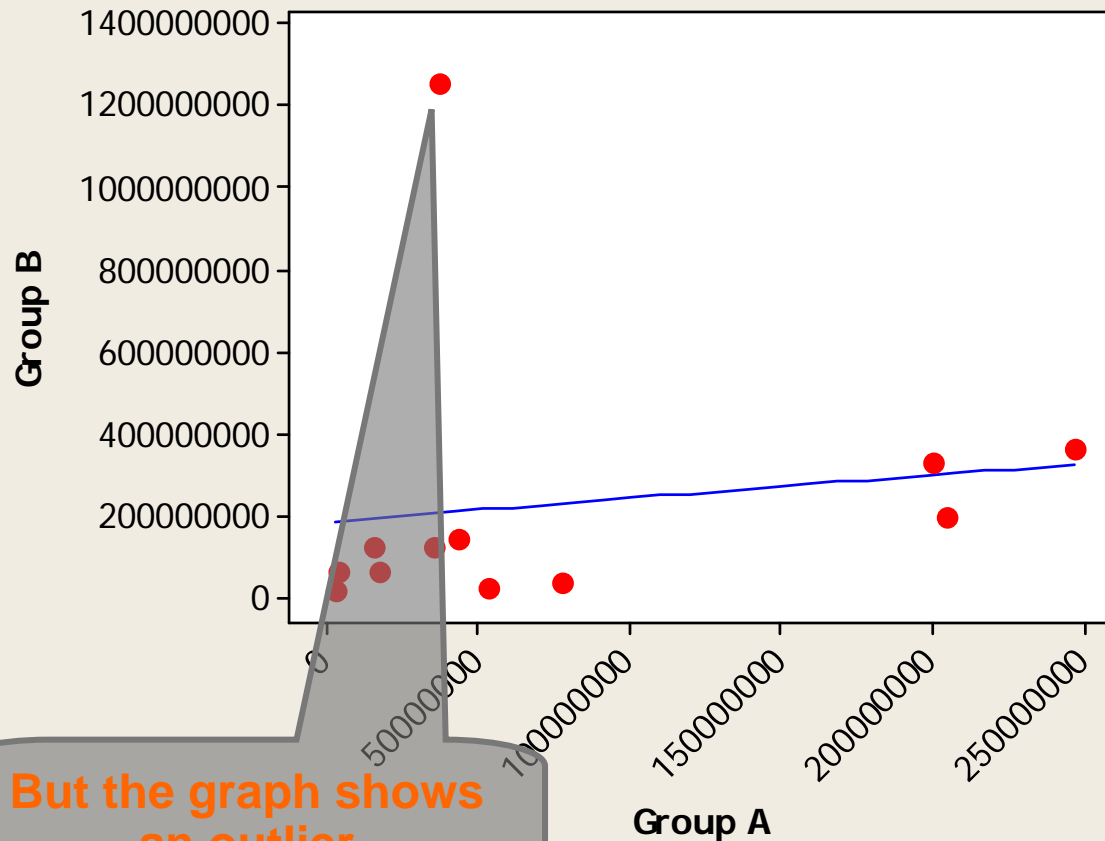
Shows very little correlation

But we should always seek to understand the data graphically and not just mathematically – otherwise we can't see the forest for the trees

A more intelligent review – Regression analysis with a graphic

Fitted Line Plot

$$\text{Group B} = 1.85\text{E}+08 + 0.564 \text{ Group A}$$



| | |
|-----------|-----------|
| S | 357490387 |
| R-Sq | 2.0% |
| R-Sq(adj) | 0.0% |

Again, the numbers don't imply any relationship

But the graph shows an outlier

Re-do without the outlier

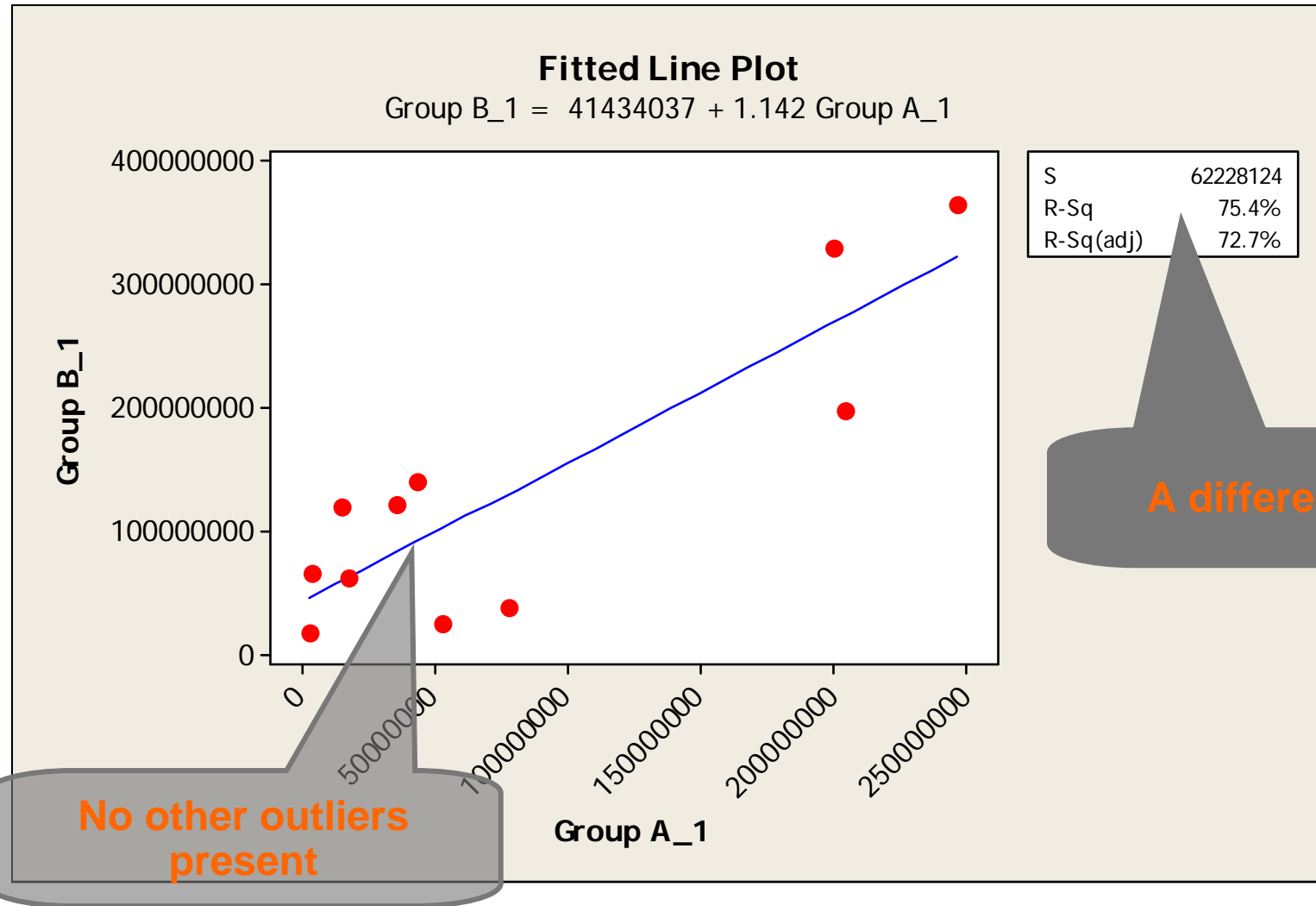
Correlations: Group A_1, Group B_1

Pearson correlation of Group A_1 and Group B_1 = 0.868
P-Value = 0.001

**Implies statistical
significance**

**Shows high
positive
correlation**

The regression analysis shows this as well



Worth examining further if this correlation is not desired

Conclusion

- Six Sigma applied to software products should fit form to function (not all manufacturing best practices apply)
- Apply the methodology and toolset when it adds value to the business outcome and client experience
- Like all tools, Six Sigma exists to assist the business not the other way around - use common sense
- **True** fundamentals of Six Sigma should be honored:
 - Top down leadership
 - Define quality in the eyes of the client – what are they willing to pay for?
 - Define the problem before solutions
 - Data driven decision making – but not paralysis by analysis
 - **Quality** is not a separate function but **a building block of all functions**

References

What is Lean Six Sigma – Mike George, Dave Rowlands, & Bill Kastle

iSixSigma <http://www.isixsigma.com/>; Software and IT channels

- David L. Hallowell
- Bruce J. Hayes

SEI @ Carnegie-Mellon University <http://www.sei.cmu.edu/> (type Six Sigma under search)

ASQ – <http://www.asq.org/six-sigma/index.html>

Thank You!

Questions?