Six Sigma is Possible with R

And Even Better

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The DMAIC Cycle

The Scientific Method

http://electroncafe.wordpress.com/2011/05/04/scientific-process-rage/

The Scientific Method & Six Sigma

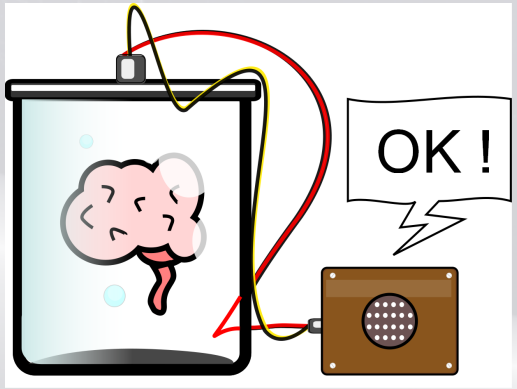
DMAIC Cycle	Scientific Method
Define	Ask a question
Measure	Do some background research
Analyze	Construct a hypothesis
Improve	Test the hypothesis with an experiment
Control	Analyze the data and draw conclusions
	Communicate results

The key to success

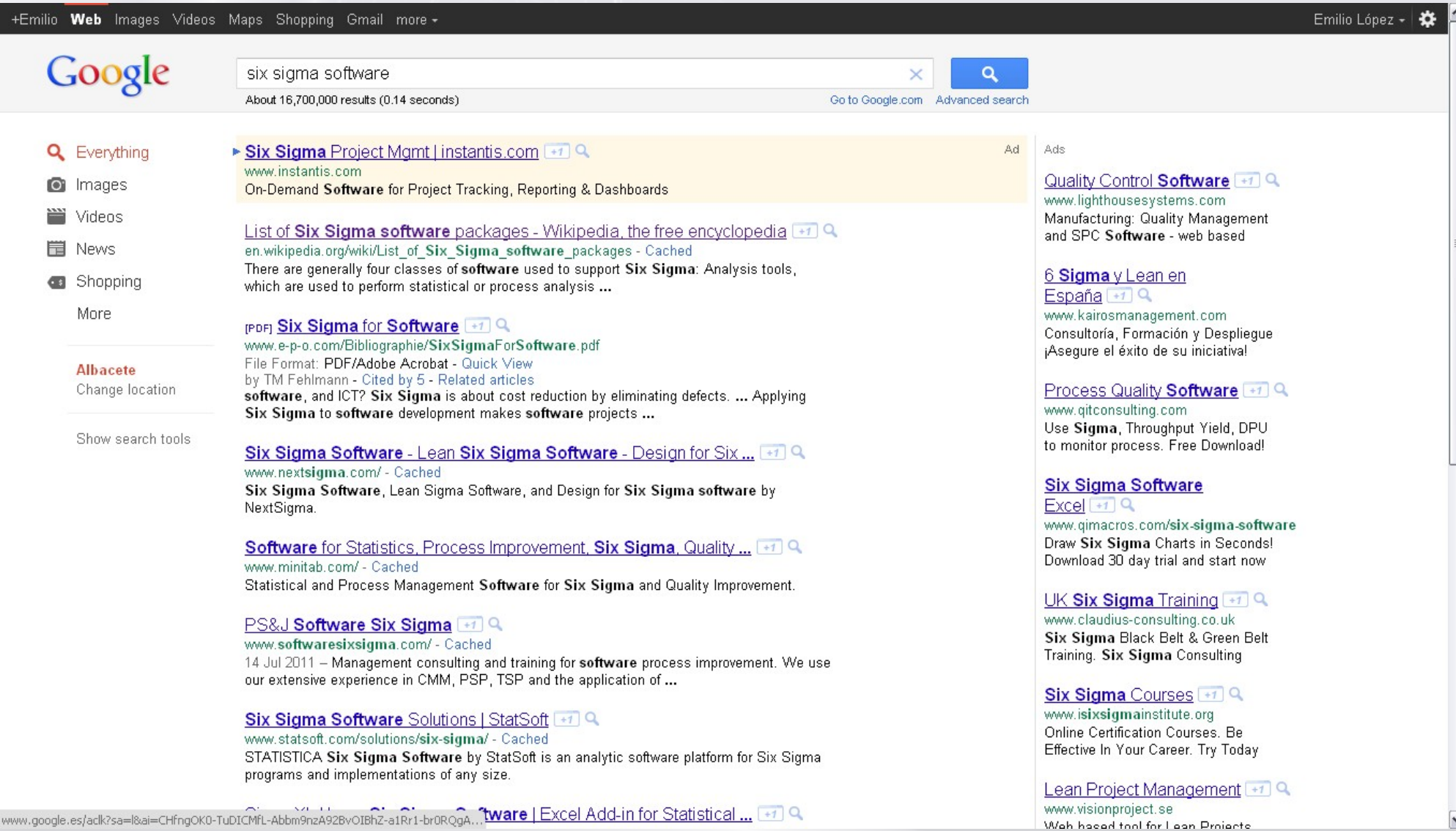
Science is organized knowledge.

Herbert Spencer

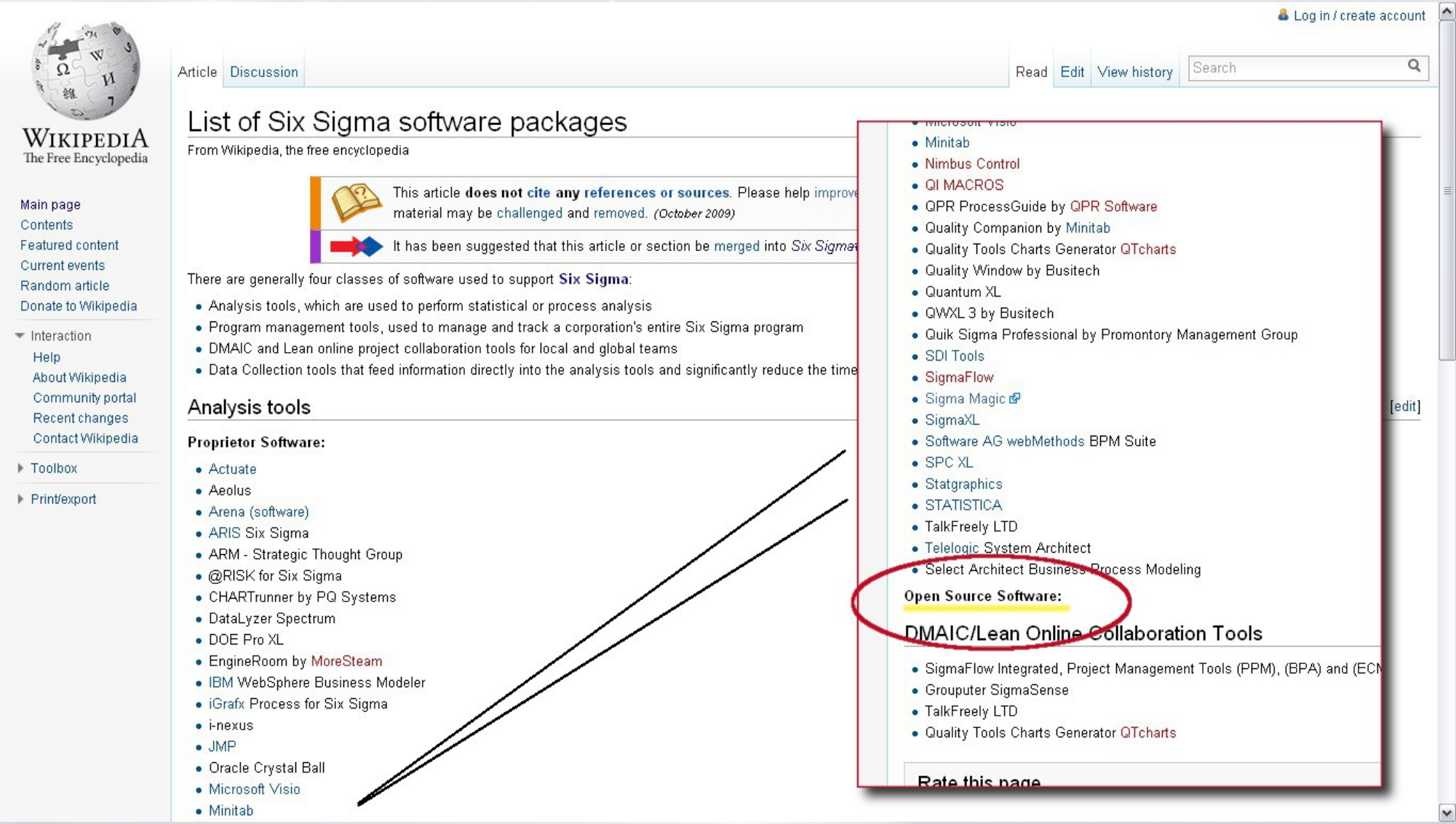
Six Sigma is a quality paradigm which translates the complicated scientific terminology into a simple way to apply the scientific method within every organization.



Six Sigma Software



Six Sigma Software



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List of Six Sigma software packages

From Wikipedia, the free encyclopedia

This article **does not cite any references or sources**. Please help improve material may be challenged and removed. *(October 2009)*

It has been suggested that this article or section be merged into *Six Sigma*

There are generally four classes of software used to support **Six Sigma**:

- Analysis tools, which are used to perform statistical or process analysis
- Program management tools, used to manage and track a corporation's entire Six Sigma program
- DMAIC and Lean online project collaboration tools for local and global teams
- Data Collection tools that feed information directly into the analysis tools and significantly reduce the time

Analysis tools [edit]

Proprietor Software:

- Actuate
- Aeolus
- Arena (software)
- ARIS Six Sigma
- ARM - Strategic Thought Group
- @RISK for Six Sigma
- CHARTrunner by PQ Systems
- DataLyzer Spectrum
- DOE Pro XL
- EngineRoom by MoreSteam
- IBM WebSphere Business Modeler
- iGrafx Process for Six Sigma
- i-nexus
- JMP
- Oracle Crystal Ball
- Microsoft Visio
- Minitab
- Nimbus Control
- QI MACROS
- QPR ProcessGuide by QPR Software
- Quality Companion by Minitab
- Quality Tools Charts Generator QTcharts
- Quality Window by Busitech
- Quantum XL
- QWXL 3 by Busitech
- Quik Sigma Professional by Promontory Management Group
- SDI Tools
- SigmaFlow
- Sigma Magic
- SigmaXL
- Software AG webMethods BPM Suite
- SPC XL
- Statgraphics
- STATISTICA
- TalkFreely LTD
- Telelogic System Architect
- Select Architect Business Process Modeling

Open Source Software:

DMAIC/Lean Online Collaboration Tools

- SigmaFlow Integrated, Project Management Tools (PPM), (BPA) and (ECM
- Grouputer SigmaSense
- TalkFreely LTD
- Quality Tools Charts Generator QTcharts

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R Challenges

Why Not

- Six Sigma uses Statistics.
- Six Sigma is based in the Scientific Method.
- Six Sigma should use R!.

Outstanding advantages

- Every Statistical Tool even in base installation
- Extending possibilities
- Powerful graphics

Packages

qcc Shewhart quality control charts for continuous, attribute and count data

IQCC Builds statistical control charts with exact limits for univariate and multivariate cases.

qualityTools This is a package for teaching statistical methods in the field of Quality Science [...] The focus is on teaching [...]

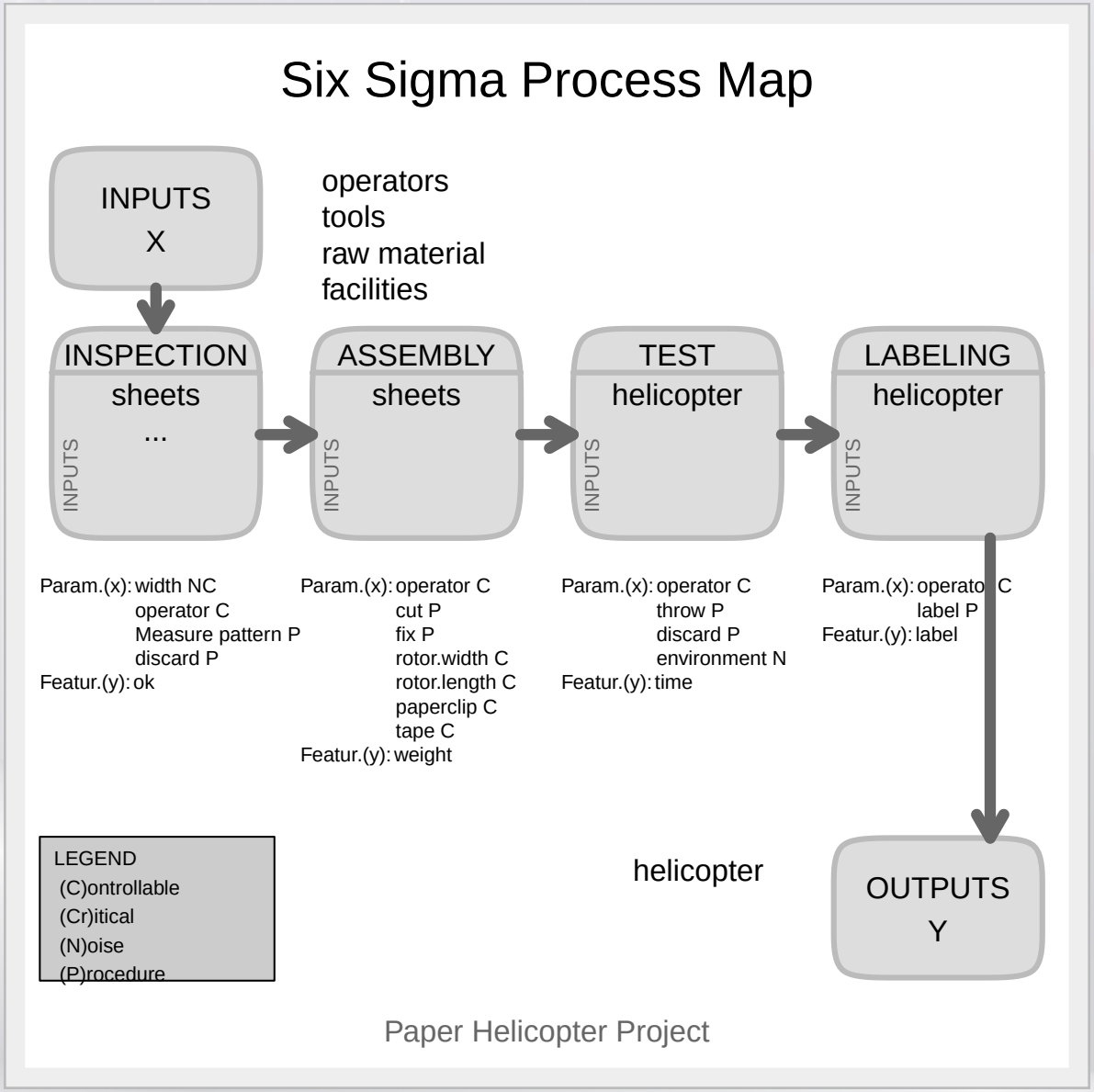
SixSigma Our effort for spreading the R thinking along Six Sigma practitioners.

Six Sigma with R - Springer Use R! Series

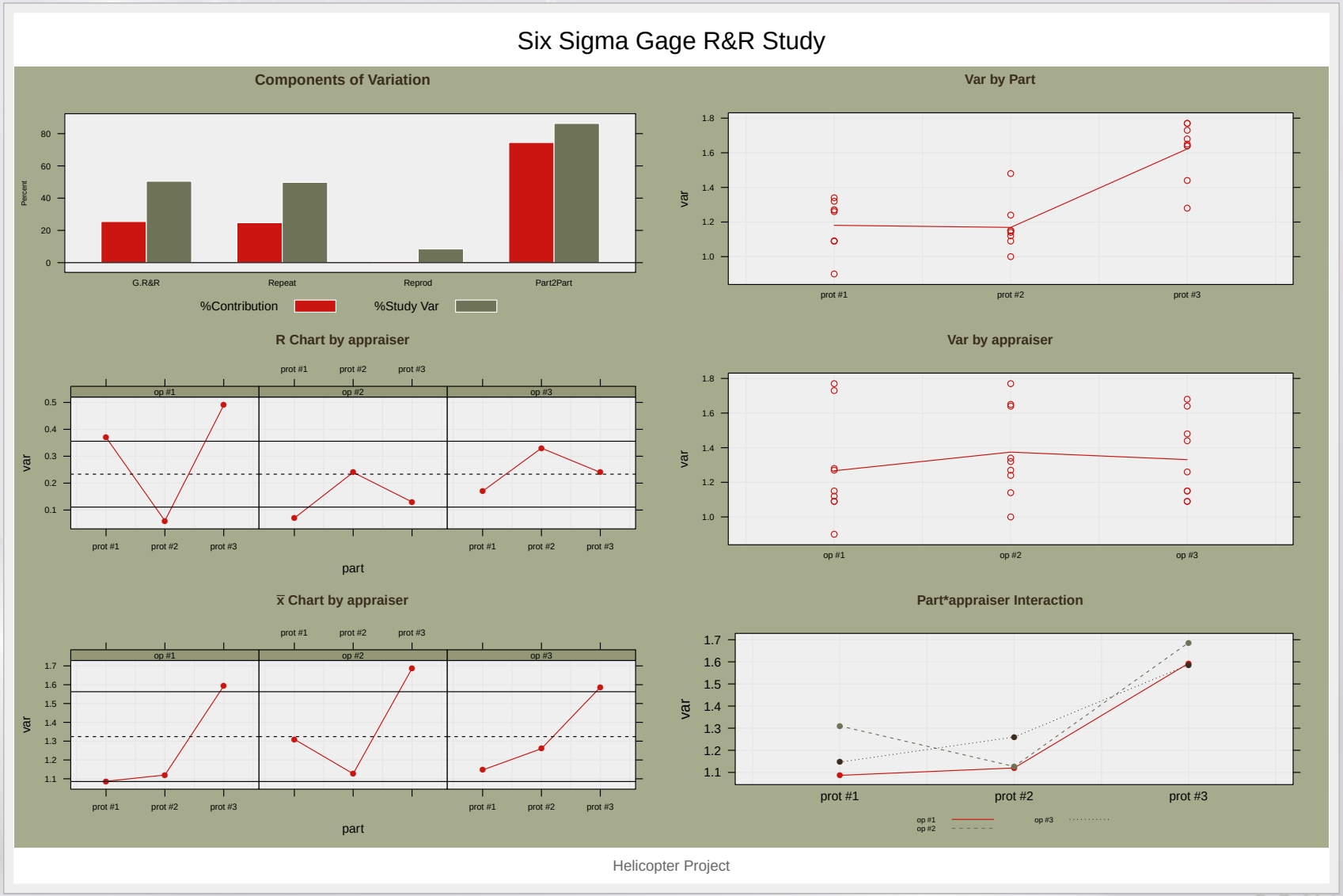
Features

- Title:
  Six Sigma with R
- Due 2012
- 350 pages approx.
- Wide background scope
- Examples, a Case Study and practices

Process Map

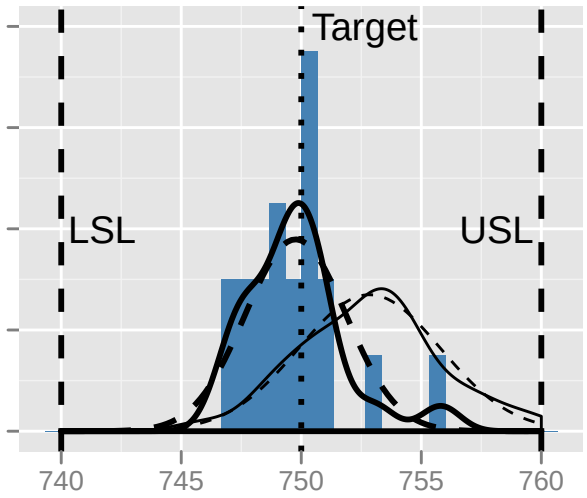

Six Sigma Process Map
INPUTS
X
operators
tools
raw material
facilities
INSPECTION
sheets
...
INPUTS
ASSEMBLY
sheets
INPUTS
TEST
helicopter
INPUTS
LABELING
helicopter
INPUTS
Param.(x): width NC
operator C
Measure pattern P
discard P
Featur.(y): ok
Param.(x): operator C
cut P
fix P
rotor.width C
rotor.length C
paperclip C
tape C
Featur.(y): weight
Param.(x): operator C
throw P
discard P
environment N
Featur.(y): time
Param.(x): operator C
label P
Featur.(y): label
LEGEND
(C)ontrollable
(Cr)itical
(N)oise
(P)rocedure
helicopter
OUTPUTS
Y
Paper Helicopter Project

Gage R&R

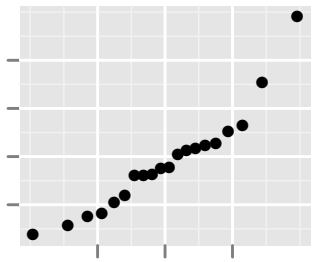

Six Sigma Gage R&R Study
Components of Variation
Percent
G.R&R
Repeat
Reprod
Part2Part
%Contribution
%Study Var
Var by Part
var
prot #1
prot #2
prot #3
R Chart by appraiser
op #1
op #2
op #3
part
Var by appraiser
op #1
op #2
op #3
x̄ Chart by appraiser
Part*appraiser Interaction
Helicopter Project

Capability Analysis

Six Sigma Capability Analysis Study



Check Normality



Shapiro−Wilk Test
p−value: 0.07506

Lilliefors (K−S) Test
p−value: 0.2291

Normality accepted when p−value > 0.05

Density Lines Legend

- Density ST
- Theoretical Dens. ST
- Density LT
- Theoretical Density LT

Specifications

LSL: 740
Target: 750
USL: 760

Short Term **Process**	Long Term
Mean: 749.7625	**Mean:** 752.8443
SD: 2.1042	**SD:** 2.9577
n: 20	**n:** 40
Z_s: 3.14	**Z_s:** 2.42
	DPMO:

Short Term **Indices**	Long Term
C_p: 1.5841	**P_p:** 1.1270
CI: [1.1,2.1]	**CI:** [0.9,1.4]
C_{pk}: 1.5465	**P_{pk}:** 0.8065
CI: [1.1,2.1]	**CI:** [0.9,1.4]

Winery Project

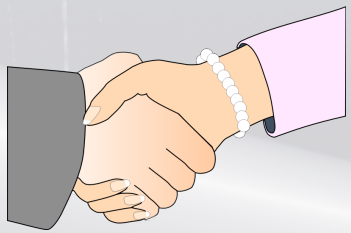
Open Platform for Quality Methodologies

Open Platform for Quality Methodologies

- Improving the European Factory
- FP7 PPP Funding Scheme
- Looking for Partners

Other Projects

We are available for other projects that need partners in this area



Conclusion

Thanks

We hope we will be able to convince Six Sigma practitioners that not only is it possible with R, but it is BETTER with R.

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