Lean (Six) Sigma Training program in detail

August 2008 / V.4,2

Frank Bornhoeft (IBM GBS)
IBM Lean Sigma trainings

- **Location:** all trainings are conducted at **IBM Frankfurt**

- **Green Belt (GB) Training** (6 day incl. Courier simulation. Optional exam)
  dates see internet page

- **Black Belt (BB) Training** (3 x 5 days incl. exam and Courier simulation)
  dates see internet page

- **Courier Simulation (1 day)**
  dates see internet page

- **Registration/ costs**
  Your contact person for registration is Frank Bornhoeft (frank.bornhoeft@de.ibm.com)
  costs for GB participant: 4.000 EUR
  costs for BB participant: 10.500 EUR
  costs for Courier participant: 450 EUR

- **Maximum number of participants** for GB/BB training: 16

- **IBM Lean Sigma Internet page:**

In addition to these standard trainings, IBM offers customers to customize this Lean Sigma training modules for individual requirements.
The modular Lean Sigma service portfolio is aligned with the critical success factors for a Lean (Six) Sigma implementation

<table>
<thead>
<tr>
<th>Relevant Success-factors</th>
<th>Strategy</th>
<th>Structure</th>
<th>Knowledge</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Lean Sigma service portfolio</td>
<td>Strategic Business Assessment</td>
<td>Goal/Incentive system adaptation</td>
<td>Exec Training/ Workshop</td>
<td>Setup program reporting</td>
</tr>
<tr>
<td></td>
<td>Project Selection (Scoping)</td>
<td>Integration with HR (HR development)</td>
<td>Champion Training</td>
<td>Benefit reporting/ tracking</td>
</tr>
<tr>
<td></td>
<td>BB/GB candidate Assessment</td>
<td>Benefit guidelines</td>
<td>Black Belt Training</td>
<td>(Coaching) program management</td>
</tr>
<tr>
<td></td>
<td>Definition of approach</td>
<td>Setup process management</td>
<td>Green Belt Training</td>
<td>Project realization</td>
</tr>
<tr>
<td></td>
<td>Integration with CMMI, ISO and ITIL</td>
<td>Lean Sigma Exam</td>
<td>Yellow Belt Training</td>
<td>Project Coaching</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellow Belt certification</td>
<td>“Courier” Simulation</td>
<td></td>
</tr>
</tbody>
</table>

IBM Lean Sigma Consultants are Six Sigma (Master/ Black Belts) as well as Lean Management Experts. We provide DMAIC, DFSS and DMEDI (Lean) training + coaching.

Green marked service packages are part of our proposal. Yellow marked service packages are included in our Black Belt training.
The Six Sigma Roles

**Sponsor**
- Senior Management/Board
- Assures availability of required resources
- Observes regular program status updates

**Champion**
- Initiator of Lean Sigma Project (Project Sponsor)
- Senior Manager/Board Member
- Assures availability of required resources
- Monitors project progress

**Program Manager**
- Manages Lean Sigma Program Office and Program
- Project support with Lean Sigma Expertise and Methodology
- Manages the Change

**Controller**
- Financial control of the Lean Sigma projects
- Controlling-support in Project definition, selection and project implementation

**Process Owner**
- Own processes
- Take over process after project handover.
- Team member

**Master Black Belt**
- Mentors Black Belt or Green Belt
- Conduct Trainings
- Looks after and support the projects
- Performs as a coach for the project members

**Black Belt**
- Leads Lean Sigma Projects
- Full Time project support
- Is responsible for project planning and execution

**Green Belt**
- Project Lead of small Lean Sigma Projects
- Is member of Lean Sigma Projects
- Is freed up from his daily business for project work (~40%, depending on project workload)

**Yellow Belt**
- Core Team member in Lean Sigma Projects
- Is freed up from his daily business for project work (~20%)
Overview Black Belt training

Week 1:
- DEFINE
- MEASURE
- STATISTICS

Stat. Tool:
- Minitab or SigmaXL

1 day SOFT SKILL

Week 2:
- ANALYZE
- STATISTICS

Stat. Tool:
- Minitab or SigmaXL

1 day SOFT SKILL

Week 3:
- IMPROVE
- CONTROL

Stat. Tool:
- Minitab or SigmaXL

1 day SOFT SKILL

Remark: about 4 weeks project work between each module
# Black Belt Week 1

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFINE</td>
<td>DEFINE</td>
<td>LEAN/Measure</td>
<td>MEASURE</td>
<td>MEASURE</td>
</tr>
</tbody>
</table>
| - Participants introductions  
- Organisation  
- Intro Six Sigma  
- Intro to Define  
- Validate Business Opportunity  
- Process documentation | - Define Customer Requirements  
- Managing the project  
- Preparing a project storyboard  
- Tollgate reviews | - LEAN Management  
- Introduction to Measure  
- Determine What to Measure  
- Intro Minitab | - Manage Measurement  
- Data Display  
- Understanding Variation  
- Statistics exercises | - Determine Sigma Performance  
- Deliverables Measure  
- Test Define + Measure | - Tools & Templates for project work  
- Conclusion |
| SOFT SKILLSs | | | SOFT SKILLSs | |
| - Change Mgmt  
- Team building | | | - Effective Meetings  
- Stakeholder analysis & communication | |
## Black Belt Week 2

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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</thead>
<tbody>
<tr>
<td><strong>ANALYSE</strong></td>
<td><strong>ANALYSE</strong></td>
<td><strong>SOFT SKILLS</strong></td>
<td><strong>ANALYSE</strong></td>
<td><strong>ANALYSE IMPROVE</strong></td>
</tr>
<tr>
<td>- Introduction + Organisation</td>
<td>- Capital Courier Management Simulation Round I + II (+III)</td>
<td>- Coaching</td>
<td>- Non-parametric tests</td>
<td>- Analyse Quiz</td>
</tr>
<tr>
<td>- Intro to Analyse</td>
<td>- Process Stratification</td>
<td>- Personal effectiveness</td>
<td>- Correlation and Regression</td>
<td>- Intro to Improve (X-Y Matrix, RACI, FMEA)</td>
</tr>
<tr>
<td>- Potential Root Causes</td>
<td>- Potential Root Causes</td>
<td>- Leadership &amp; motivation</td>
<td>- Lean Toolbox</td>
<td>- Deliverables Analyse</td>
</tr>
<tr>
<td>- Validate Root Causes</td>
<td>- Validate Root Causes</td>
<td></td>
<td>- Sigma XL/ Minitab Exercise</td>
<td>- Tools &amp; Templates</td>
</tr>
<tr>
<td>- Multiple Variable Analysis</td>
<td>- Multiple Variable Analysis</td>
<td></td>
<td>- Optional: Supply Chain Simulation “Beer Game”</td>
<td>- Conclusion</td>
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Black Belt Week 3

<table>
<thead>
<tr>
<th>Montag</th>
<th>Dienstag</th>
<th>Mittwoch</th>
<th>Donnerstag</th>
<th>Freitag</th>
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</thead>
<tbody>
<tr>
<td>IMPROVE</td>
<td>IMPROVE</td>
<td>SOFT SKILLs</td>
<td>CONTROL</td>
<td>CONTROL</td>
</tr>
<tr>
<td>Introductions/ Organisation</td>
<td>DOE (Design of experiments) introduction</td>
<td>Involve Stakeholder</td>
<td>Validate Solution</td>
<td></td>
</tr>
<tr>
<td>Review Week2 Frankfurt airport case study</td>
<td>DOE</td>
<td>Conflict Management</td>
<td>Plan implement.</td>
<td></td>
</tr>
<tr>
<td>Generate Ideas</td>
<td>DOE case study</td>
<td>Coaching</td>
<td>Implement Solution</td>
<td></td>
</tr>
<tr>
<td>Evaluate and Select Solution</td>
<td>Document Solution</td>
<td>Personal effectiveness</td>
<td>Control Charts</td>
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<td></td>
<td>Project documentation</td>
<td>Implement Dashboards</td>
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<td>Control &amp; Response Plan</td>
<td>Control &amp; Response Plan</td>
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<td>Hand Over to Process Owner</td>
<td>Hand Over to Process Owner</td>
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<td>Project Benefit calculation</td>
<td>Project Benefit calculation</td>
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</tbody>
</table>

- Monitor solution
- Project Closure
- Management summary
- Lessons Learned
- Test/Examen
- Tools & Templates
- Conclusion
Green Belt training in detail (6 days + exam)

Montay
Intro + DEFINE

Tuesday
MEASURE

Wednesday
ANALYSE

Thursday
IMPROVE

Friday
CONTROL

day 1
Courier Simulation

day 2
Exam (optional)

Project certification
As an alternative IBM offers on customer desire the **Green Belt compact training (5 days)**

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEFINE</strong></td>
<td><strong>MEASURE</strong></td>
<td><strong>SIMULATION</strong></td>
<td><strong>IMPROVE</strong></td>
<td><strong>CONTROL</strong></td>
</tr>
<tr>
<td>Participants introductions</td>
<td>Manage Measurement</td>
<td>Courier Simulation Round I</td>
<td>SigmaXL exercises</td>
<td>Project Benefit calculation</td>
</tr>
<tr>
<td>Organisation</td>
<td>Data Display</td>
<td>Intro Analyse</td>
<td>Generate Ideas</td>
<td>Control &amp; Response Plan</td>
</tr>
<tr>
<td>Lean Sigma overview</td>
<td>Determine Sigma Perform.</td>
<td>Determine &amp; validate root causes</td>
<td>Evaluate and Select Solution</td>
<td>Hand Over to Process Owner</td>
</tr>
<tr>
<td>Intro to Define</td>
<td>Intro Analyse</td>
<td>LEAN Management</td>
<td>Validate Solution</td>
<td>Project Docu. and Closure</td>
</tr>
<tr>
<td>Customer Requirements</td>
<td>Determine</td>
<td>SigmaXL</td>
<td>Implement Solution</td>
<td>Examén/Test</td>
</tr>
<tr>
<td>Process Docu.</td>
<td>&amp; validate root causes</td>
<td>exercises</td>
<td>Control Charts</td>
<td>Tools &amp; Templates</td>
</tr>
<tr>
<td>Tollgates</td>
<td></td>
<td></td>
<td></td>
<td>Conclusion</td>
</tr>
<tr>
<td>Intro Measure</td>
<td></td>
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<tr>
<td>Intro SigmaXL + exercises</td>
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</tbody>
</table>

As an alternative IBM offers on customer desire the Green Belt compact training (5 days)
Our Black and Green Belt trainings contain the famous “Courier Simulation”

The Courier Simulation is a one-day simulation that comes as close as you can get to a real life process improvement, Six Sigma or Lean Six Sigma experience. It's fun, hands-on, fast-paced, and is consistently rated by participants as one of their most valuable training experiences. Developed first for General Electric Capital Corporation, the simulation has been enthusiastically received by the world's largest corporations. The Courier Simulation is designed to achieve breakthrough thinking with everyone who is critical to process improvement - from senior executives to salespeople to support staff to the service professionals who deal directly with customers. When working with teams, the first challenge is to get people to believe they can achieve breakthrough improvements, such as reducing a 30 day loan cycle to 2 days. Teams who experience this workshop prove they can do it themselves. Two or three 20 minute rounds represent a production day at the Move It! company. Between the rounds, participants apply techniques and come up with solutions to implement. As in real life, some solutions work and some don't. The importance of thorough analysis proves itself again and again. By the end, teams have amazing improvements in cycle time and usually zero defects. Everyone is excited by the major leaps forward teams have made.

This 1 day training can be ordered separately, e.g. as part of a champion or awareness training.
IBM is able to provide Black Belt and Green Belt trainings with two different statistic tools: Minitab and SigmaXL.

Minitab is first choice for most of the Black Belts. But SigmaXL is less complex, Excel based and very price competitive (<170 USD). Please look at: www.sigmaxl.com
IBM provides tools and templates to ease the application of the Lean Six Sigma methodology in project work.

For each project phase, deliverables are defined. The Champion workbook contains checklists for Champion and Black Belt for tollgate reviews.
<table>
<thead>
<tr>
<th>Define</th>
<th>Measure</th>
<th>Analyze</th>
<th>Improve</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity Identification</td>
<td>Data Gathering</td>
<td>Process Analysis</td>
<td>Solution Identification</td>
<td>Implement &amp; Sustain</td>
</tr>
<tr>
<td>• Funnel</td>
<td>• Output Signal</td>
<td>• Understand process capability</td>
<td>• Root cause – fixes</td>
<td>• Confirmed Improvement</td>
</tr>
<tr>
<td>• Resources</td>
<td>• Improvement Goal</td>
<td>• ID potential Xs</td>
<td>• Process Optimization</td>
<td>• Sustained Improvement</td>
</tr>
<tr>
<td>• Proj Charter/Contract</td>
<td>• Verify criticality</td>
<td>• Process Analysis</td>
<td>• Dashboards/metrics</td>
<td>• Op Mech</td>
</tr>
<tr>
<td>• Timing</td>
<td></td>
<td>• Solution Identification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Lean Tools**
- Value Stream Map
- Lean Assessment Tool (VA-VE-NVA)
- Process Cycle Efficiency
- Process sizing

**Lean Tools**
- Spaghetti Charts
- Observation Matrix
- Takt Time Bar Chart
- 7 Types of Waste
- Flow Analysis/Queuing Theory
- Constraint identification
- Time trap analysis
- Analytical Batch Sizing

**Lean Tools**
- TPM
- 5S
- Line Balancing/Single piece flow
- Process flow improvement
- Replenishment pull
- Setup reduction
- Generic pull/Kanban
- Kaizen
- Poka-Yoke
- Future State Map
- Organization design
- Standard WIP
- Target Sheet

**Lean Tools**
- Big Y … Physical or Visual Change
- Mistake proofing/Poka Yoke … physical Change

**Six Sigma**
- Operational Definitions
- Data Collection Plan
- Pareto Chart
- Histogram
- Box Blot
- Statistical Sampling
- Measurement System analysis
- Control/Run Charts
- Process Capability
- QFD
- FMEA

**Six Sigma**
- Fishbone Diagram
- Descriptive Stats
- Graphical Analysis
- Sampling
- Normality Plots
- Hypothesis Testing
- FMEA
- Benchmarking
- C-E Diagram
- Run Charts
- Correlation/Regression
- ANOVA

**Six Sigma**
- Hypothesis Tests
- Regression
- Pugh Matrix
- Run Charts
- Design of Experiments
- Simulation & Piloting
- FMEA
- To-Be Process Map

**Six Sigma**
- Control Charts/SPC
- FMEA/Risk Mgmt.
- Quality Plan
- Training plan
- Communication plan
- Project replication plan
- Plan-Do-Check-Act cycle
1.0 Define Opportunities

Define Opportunities

<table>
<thead>
<tr>
<th>Objective</th>
<th>Main Activities</th>
<th>Tools and Techniques</th>
<th>Key Deliverables</th>
</tr>
</thead>
<tbody>
<tr>
<td>To identify and/or validate the improvement opportunity, develop the business processes, define critical customer requirements, and prepare themselves to be an effective project team.</td>
<td>▪ Validate/Identify Business Opportunity ▪ Validate/Develop Team Charter ▪ Identify and Map Processes ▪ Identify Quick Win and Refine Process ▪ Translate VOC into CCRs ▪ Develop Team Guidelines &amp; Ground Rules</td>
<td>▪ Project and Team Chartering ▪ SIPOC ▪ Process Mapping Techniques ▪ VoC ▪ CTQ-Tree</td>
<td>▪ Team Charter ▪ Action Plan ▪ Process Maps ▪ Quick Win Opportunities ▪ Critical Customer Requirements ▪ Prepared Team</td>
</tr>
</tbody>
</table>
2.0 Measure Performance

Objective
To identify critical measures that are necessary to evaluate the success meeting critical customer requirements and begin developing a methodology to effectively collect data to measure process performance. To understand the elements of the six sigma calculation and establish baseline sigma for the processes the team is analyzing.

Main Activities
- Identify Input, Process and Output Indicators
- Develop Operational Definition & Measurement Plan
- Plot and Analyze Data
- Determine if Special Cause Exists
- Determine Sigma Performance
- Collect Other Baseline Performance Data

Tools and Techniques
- Basic Statistics
- Metrics
- Cause & Effect Matrix
- Sampling
- Measurement System Analysis
- Yield Calculation
- Process Capability
- Control Charts

Key Deliverables
- Input, Process and Output Indicators
- Operational Definitions
- Data Collection Formats and Plans
- Baseline Six Sigma Performance
- Productive Team Atmosphere
## 3.0 Analyze Opportunity

### Objective
To stratify and analyze the opportunity to identify a specific problem and define an easily understood problem statement. To identify and validate the root causes that assure the elimination of "real" root causes and thus the problem the team is focused on.

### Main Activities
- Stratify Process
- Stratify Data & Identify Specific Problem
- Develop Problem Statement
- Identify Root Causes
- Design Root Cause Verification Analysis
- Validate Root Causes
- Enhance Team Creativity & Prevent Group-Think

### Tools and Techniques
- Process Analysis (Lean, CoPQ, Mudas, 6s)
- Ishikawa
- Pareto
- Hypothesis testing
- Regression Analysis
- Design of Experiments
- Presentation Techniques
- Conflict Management
- Self Management

### Key Deliverables
- Data Analysis
- Process Maps
- Potential Root Causes
- Validated Root Causes
- Problem Statement
## 4.0 Improve Performance

### Objective
To identify, evaluate, and select the right improvement solutions. To develop a change management approach to assist the organization in adapting to the changes introduced through solution implementation.

### Main Activities
- Generate Solution Ideas
- Determine Solution Impacts: Benefits
- Evaluate and Select Solutions
- Develop Process Maps & High Level Plan
- Develop and Present Storyboard
- Communicate Solutions to all Stakeholders

### Tools and Techniques
- Out of the box thinking
- Design of Experiments
- Creativity tools
- Value Stream Mapping (Lean)
- Poka Yoke
- Running Pilots
- Implementation Planning
- Brainstorming Techniques

### Key Deliverables
- Solutions
- Process Maps and Documentation
- Implementation Milestones
- Improvement Impacts and Benefits
- Storyboard
- Change Maps

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![Diagram](https://via.placeholder.com/150)

**Cost Benefit Analysis**

<table>
<thead>
<tr>
<th>Solution</th>
<th>Cost (A)</th>
<th>Benefit (B)</th>
<th>Benefit/Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>$5,000</td>
<td>$10,000</td>
<td>2</td>
</tr>
<tr>
<td>Option 2</td>
<td>$2,000</td>
<td>$5,000</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Gantt Chart (Pilot)**

![Gantt Chart](https://via.placeholder.com/150)
## 5.0 Control Performance

### Objective
To understand the importance of planning and executing against the plan and determine the approach to be taken to assure achievement of the targeted results. To understand how to disseminate lessons learned, identify replication and standardization opportunities/processes, and develop related plans.

### Main Activities
- Develop Pilot Plan & Pilot Solution
- Verify Reduction in Root Cause Sigma Improvement Resulted from Solution
- Identify if Additional Solutions are necessary to Achieve Goal
- Identify and Develop Replication & Standardization Opportunities
- Integrate and Manage Solutions in Daily Work Processes
- Integrate Lessons Learned
- Identify Teams Next Steps & Plans for Remaining Opportunities

### Tools and Techniques
- Stakeholder Management
- Change Management
- FMEA
- Control & Response Charts
- Process documentation
- Project Handover

### Key Deliverables
- Process Control Systems
- Standards and Procedures
- Training
- Team Evaluation
- Change Implementation Plans
- Potential Problem Analysis
- Pilot and Solution Results
- Success Stories
- Trained Associates
- Replication Opportunities
- Standardization Opportunities