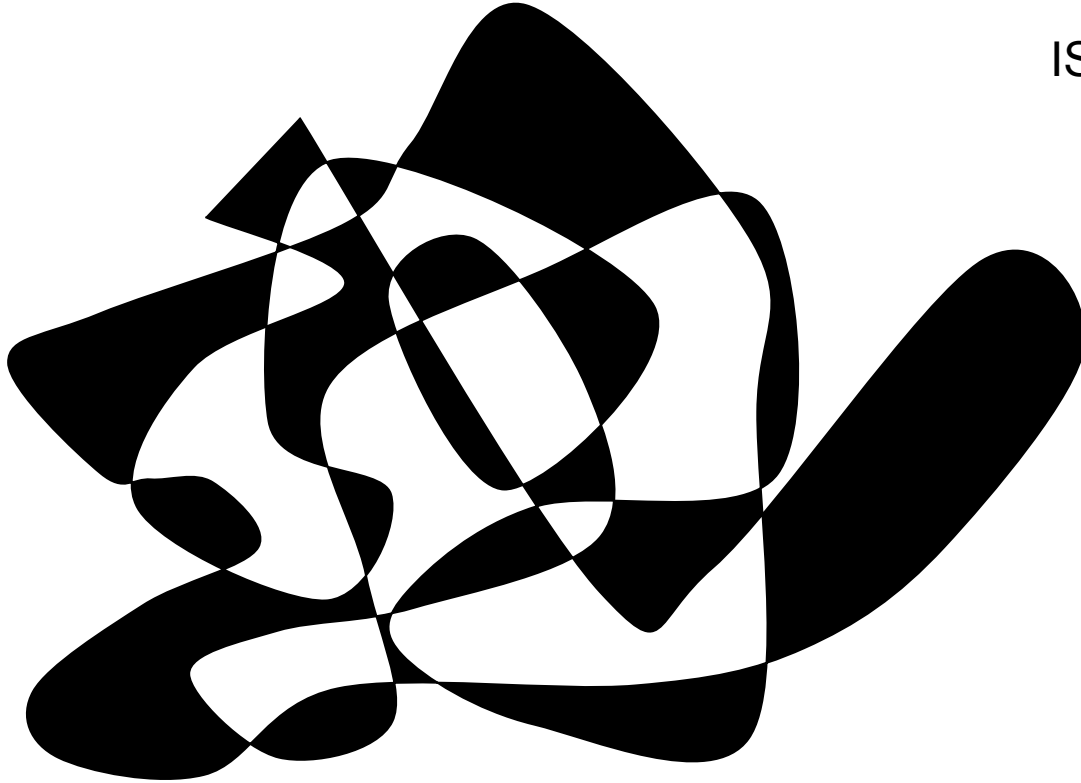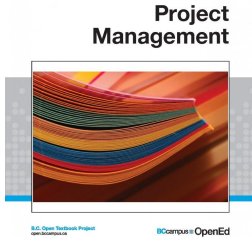# Advanced Project Management

IS 594, Section PJ

**Foundations I**

# History of Project Management

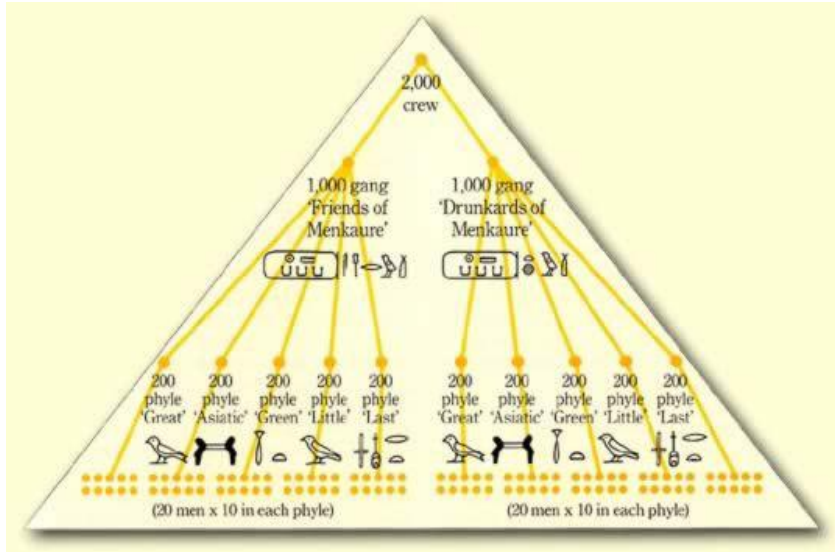**From Adrienne Watt, *Project Management* book**

A diversity of methodologies: Phased (waterfall approach), Agile, Open Working.

**Before the 20th Century:**

- large planned projects (pyramids and other monuments, irrigation systems, warfare, railroad network construction).

**20th Century:**

- Frederick Taylor created Scientific Management of industrial processes.

- Henry Gantt developed a bar-chart approach to illustrating timing of project tasks and progress.

**Egyptian Pyramid workforce organization**
http://www.touregypt.net/featurestories/pyramidworkforce.htm



Amazonian Geoglyphs,
Stonehenge (England)

# History of Project Management (con't)

**From Adrienne Watt, *Project Management* book**

**Mid-20th Century:**

- CPM and PERT methodologies identified the importance of task sequences, task dependencies and the concept of the critical path.

- Project Management Body of Knowledge (PMBOK). Managerial point-of-view.

**21st Century:**

- increasing recognition of project management as a specialized set of skills applicable to many different industries.

- project involvement as a source of career development and opportunity.

# Controlled Vocabularies

Quest for a ground source of truth. Examples include: dictionaries, subject headings, Wikipedia stubs, LLM vocabularies.

**Library Science:** Library of Congress subject headings.

**Wikipedia:** process of disambiguation.

**Natural Language Processing:** predefined set of terms → ensures consistency in representing single, multiple languages.

**Strategic thinking
(structural approaches)**

Strategy relative to advantages and limitations.

Optimization with respect to error, variation.

# SWoT:
# Strengths, Weaknesses, Opportunities, and Threats

## SWOT ANALYSIS

| | Helpful<br>to achieving the objective | Harmful<br>to achieving the objective |
|---|---|---|
| **Internal origin**<br>(attributes of the organization) | Strengths | Weaknesses |
| **External origin**<br>(attributes of the environment) | Opportunities | Threats |

**S**trengths: what are my strengths? What are my opponent's strengths?

**W**eaknesses: what are my weaknesses? What are my opponents weaknesses?

**O**pportunities: what opportunities are available to me? What opportunities am I missing out on?

**T**hreats: what are threats to my goals? How do I overcome these threats?

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Variations on **SWOT**:

**PEST** analysis:
political, economic, socio-cultural and technological.

**Five Forces Framework:**

1,2) bargaining power of suppliers and buyers.

3,4) threats from new entrants, substitutes.

5) industry rivalry.

**Two different strategies to approach SWOT analysis:**

Matching strategy: match strengths to opportunities.

Weaknesses strategy: convert threats into strengths or opportunities.

**Which of these are strengths, weaknesses, opportunities, threats?**

*"cost structure, source of profits, competencies, product differentiation, degree of vertical integration, responses to industry developments"*

# Defining the Scope of Your Project

**From Ben Cotton, *Project Management for Open Source Project* book**

Eisenhower Matrix: binary decision matrix. Each item is **urgent**/**not urgent**.

MoSCoW prioritization method: decision matrix where each item is "**m**ust have", "**s**hould have", "**c**ould have", and "**w**on't have".
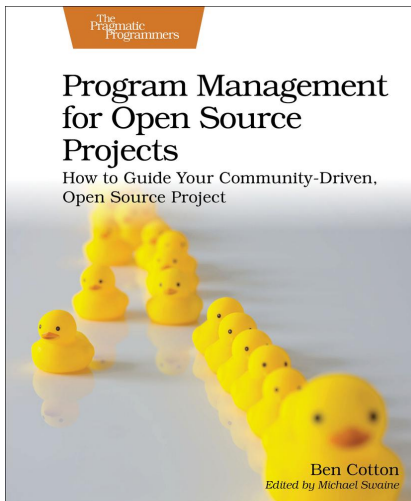
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Principles and trade-offs:

- usability/capability (refine or expand issues).

- differentiation/catch-up (drill down issue or finish before starting next issue).

- expand community (growth for new collaborators).

- reward long-suffering (prioritize perpetually ignored issues).

# Six σ (sigma)

Developed by Bill Smith from Motorola in 1986. Ford has extensively implemented this method in their manufacturing process.

- identify and mitigate causes of defects and process variation.

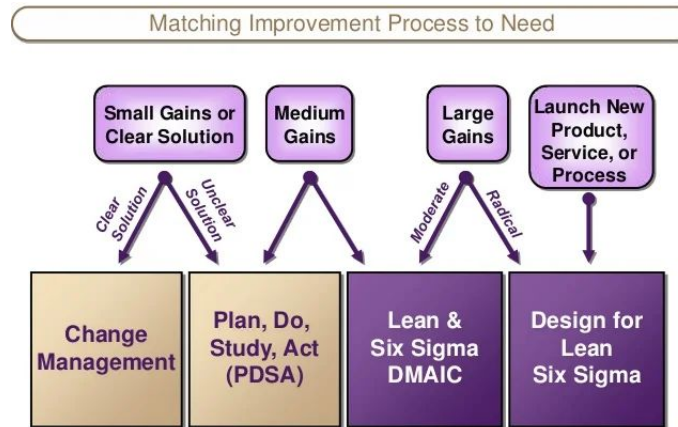- continuous improvement to reduce the error rate: Six Sigma = 3.4 defects per million observations.
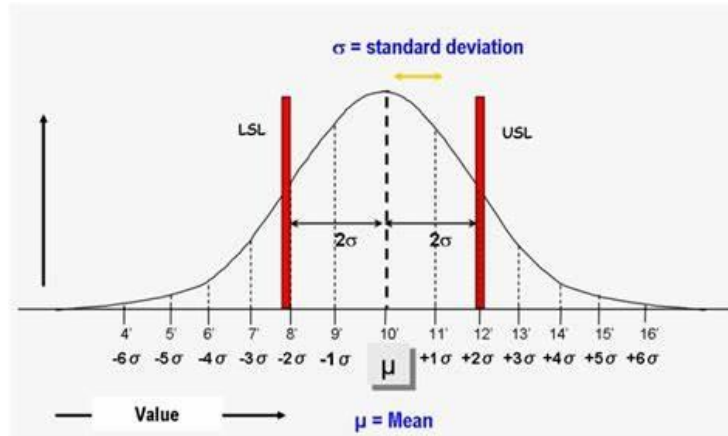


Allow only the most extreme events (black swans) as the process error.
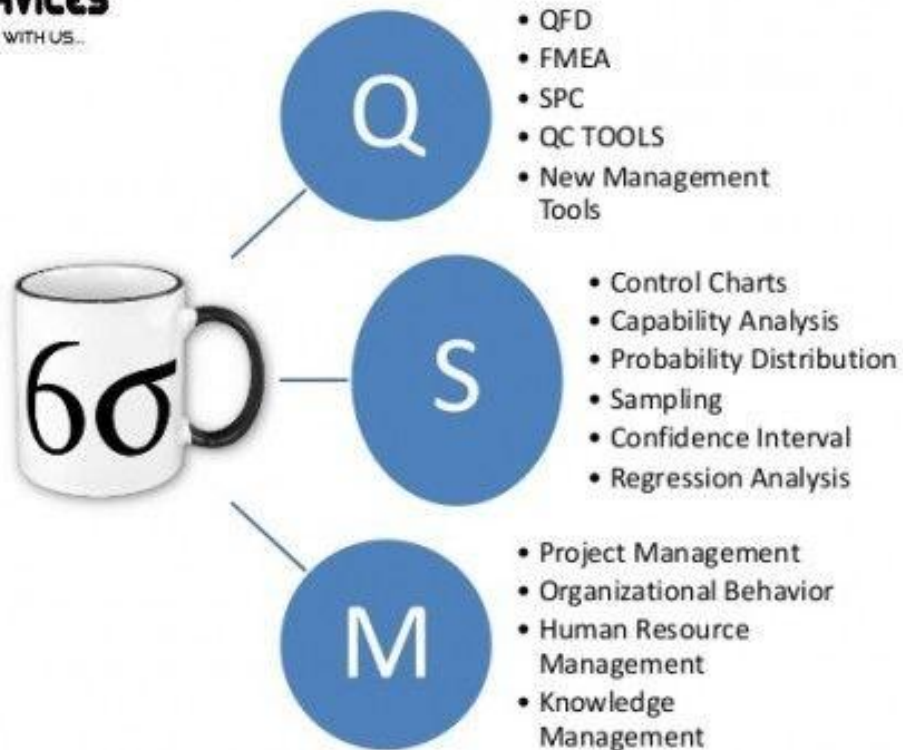
**How to minimize your error rate?**
Define the process, measure the outcomes, analyze process of an error rate.

**Improve the process!**
Evaluate process and/or product design, validate irregularities in the process/product, improve the process.



Matching Improvement Process to Need

# SIX SIGMA TOOLS

**Q**
- QFD
- FMEA
- SPC
- QC TOOLS
- New Management Tools

**S**
- Control Charts
- Capability Analysis
- Probability Distribution
- Sampling
- Confidence Interval
- Regression Analysis

**M**
- Project Management
- Organizational Behavior
- Human Resource Management
- Knowledge Management

HB SERVICES
FLOURISH WITH US..

6σ

# Lean Practices



**Work to Perfection**
The complete elimination of waste so that all activities create value for the customer by breakthrough and continuous improvement projects

**Specify Value**
Define **value** from the customers' perspective and express value in terms of a specific product or service

**Implement Pull**
Nothing is done by the upstream process until the downstream customer signals the need, actual demand **pulls** product/service through the value stream

**Map the Value Stream**
**Map** all of the steps... Value added and non-value added... that brings a product or service to the customer

**Establish Pull**
The continuous **flow** of products, services and information from end to end through the process

**8 Waste**
**D**efects
**O**ver-production
**W**aiting
**N**on-Utilization of talent
**T**ransportation
**I**nventory
**M**otion
**E**xcessive-processing

5
1
4
2
3

# Strategy and Optimization approaches:
# SWOT, Six Sigma, and Lean

Comes from the factory or office floor of large organizations (management imperatives, competitive markets, etc).

Statistical/Game-theoretic analogues: sigma = variance, strategy → optimization algorithms.

Six Sigma and Lean strive for efficiency. But sometimes error and variation are good!

# Improvisational Method of Project Management

Improvised work and consider how they can be used to assist in the effective resolution of ambiguity and complexity in projects.

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- **socialization** (group-based activity) and **prototyping** (improvisation and new product development).

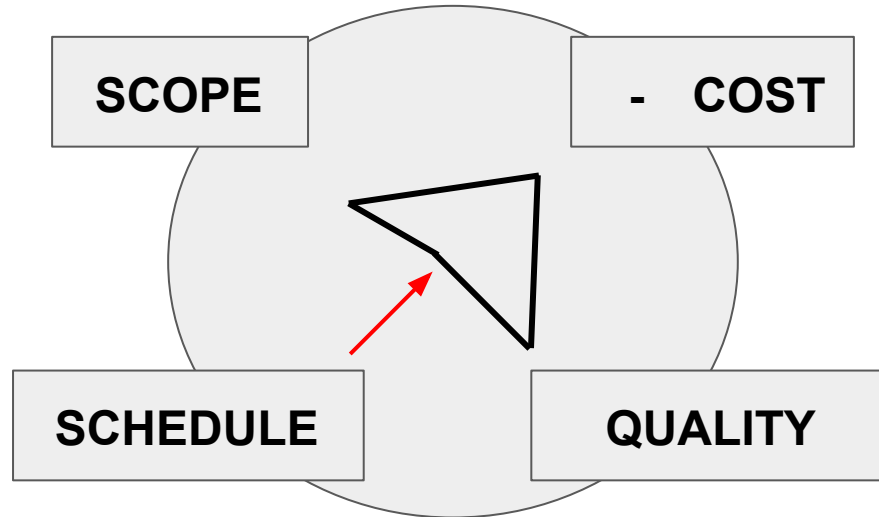**Improvisation:** "convergence of composition and execution".

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**Adaptation:** previously successful interventions or improvised routines to assist in resolving emerging requirements.

**Innovation:** individuals leverage previous practice and existing routines to solve organizational                                                                                              problems.

**Compression:** shortens intended timescales in order to deliver or resolve problems in less time.

**Learning:** outcome from successful, and indeed from unsuccessful, improvisation (forms a library of previous interventions).