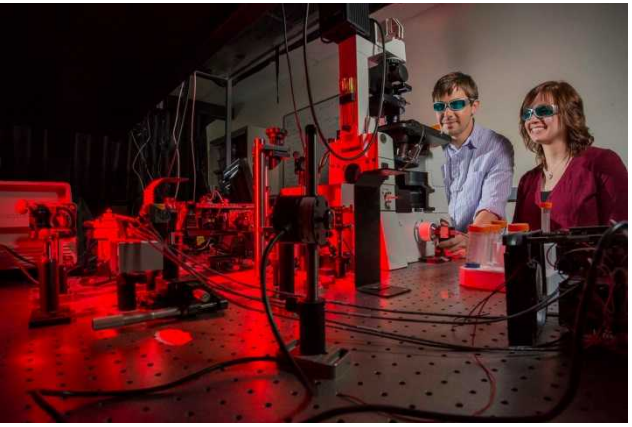
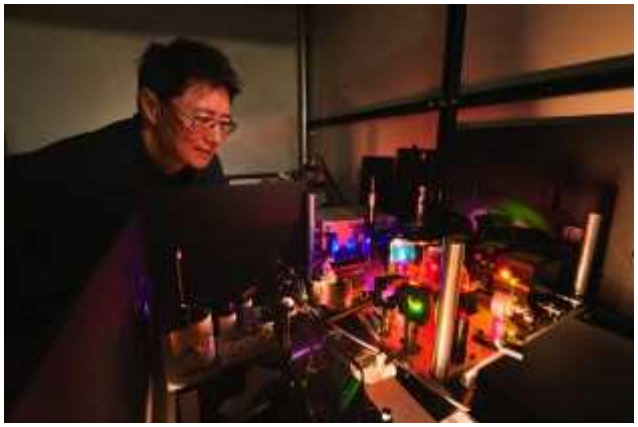
SAND2016-8345C

Exceptional service in the national interest

Sandia National Laboratories





A Systems Approach to Data Visualization

David Sais - Lean Six Sigma Black Belt

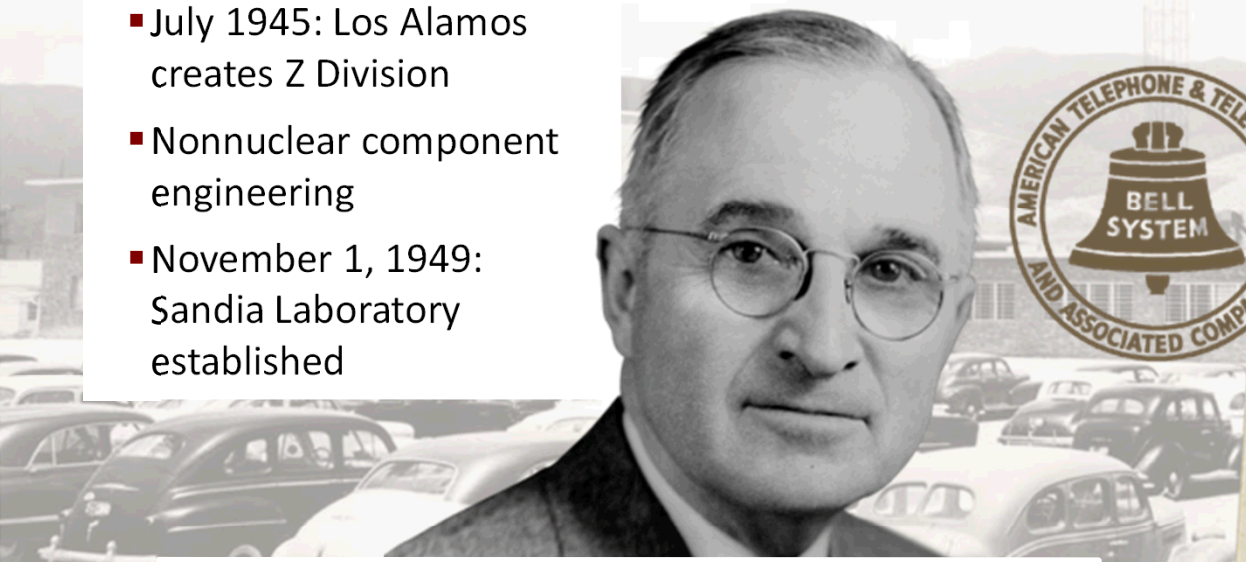
U.S. DEPARTMENT OF ENERGY | NNSA

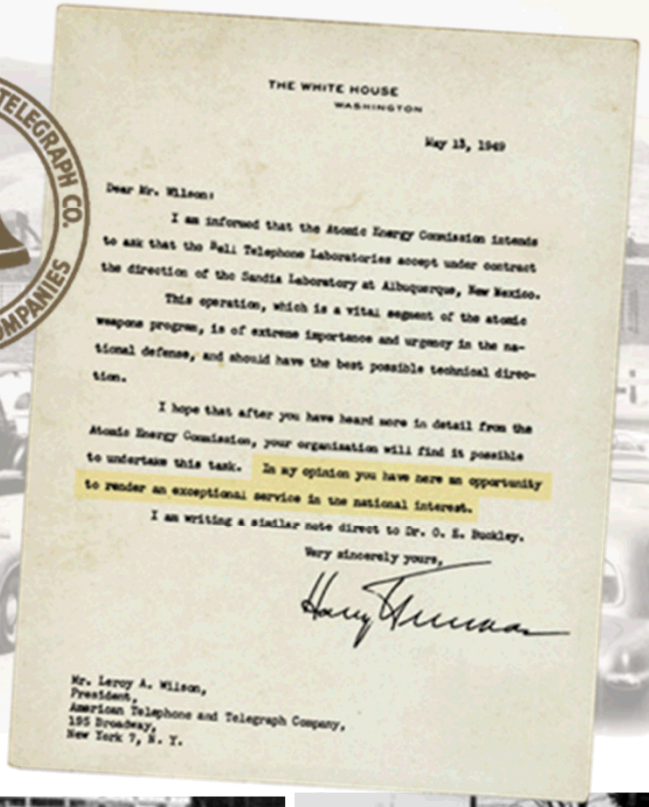
Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND No. SAND#518123

Sandia's History

Exceptional service in the national interest

- July 1945: Los Alamos creates Z Division
- Nonnuclear component engineering
- November 1, 1949: Sandia Laboratory established





THE WHITE HOUSE
WASHINGTON

May 13, 1949

Dear Mr. Wilson:

I am informed that the Atomic Energy Commission intends to ask that the Bell Telephone Laboratories accept under contract the direction of the Sandia Laboratory at Albuquerque, New Mexico.

This operation, which is a vital segment of the atomic weapons program, is of extreme importance and urgency in the national defense, and should have the best possible technical direction.

I hope that after you have heard more in detail from the Atomic Energy Commission, your organization will find it possible to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.

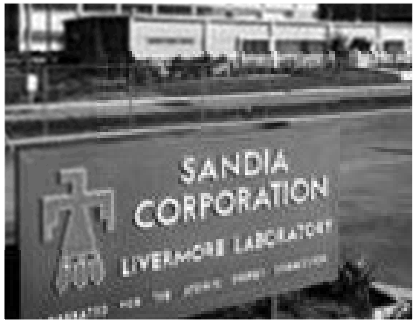
I am writing a similar note direct to Dr. O. E. Buckley.

Very sincerely yours,

Harry Truman

Mr. Leroy A. Wilson,
President,
American Telephone and Telegraph Company,
195 Broadway,
New York 7, N. Y.

to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.



Sandia Sites

Sandia National Laboratories

Albuquerque, New Mexico

Livermore, California

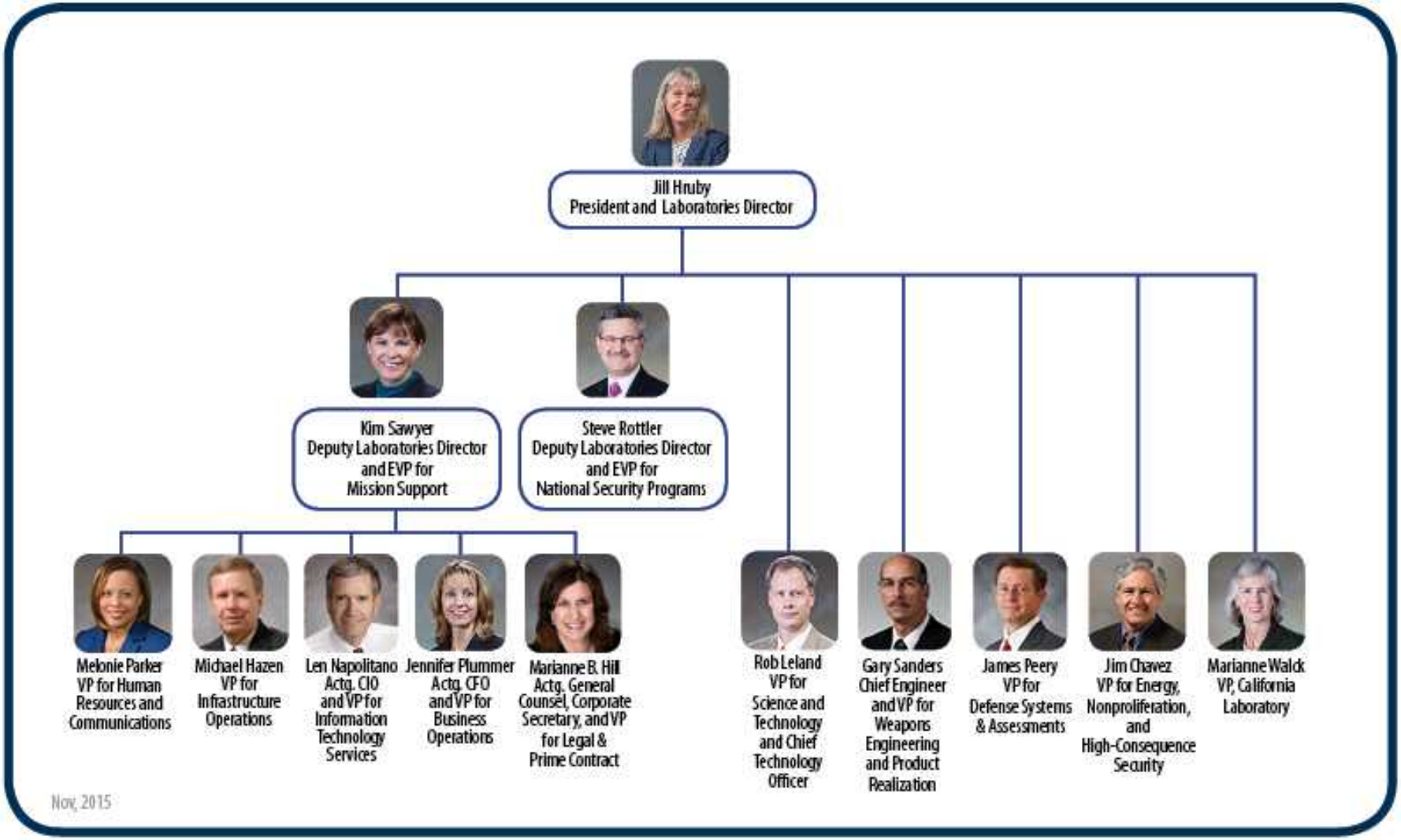
Kauai, Hawaii

Waste Isolation Pilot Plant, Carlsbad, New Mexico

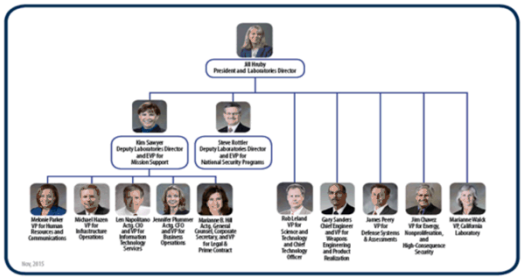
Pantex Plant, Amarillo, Texas

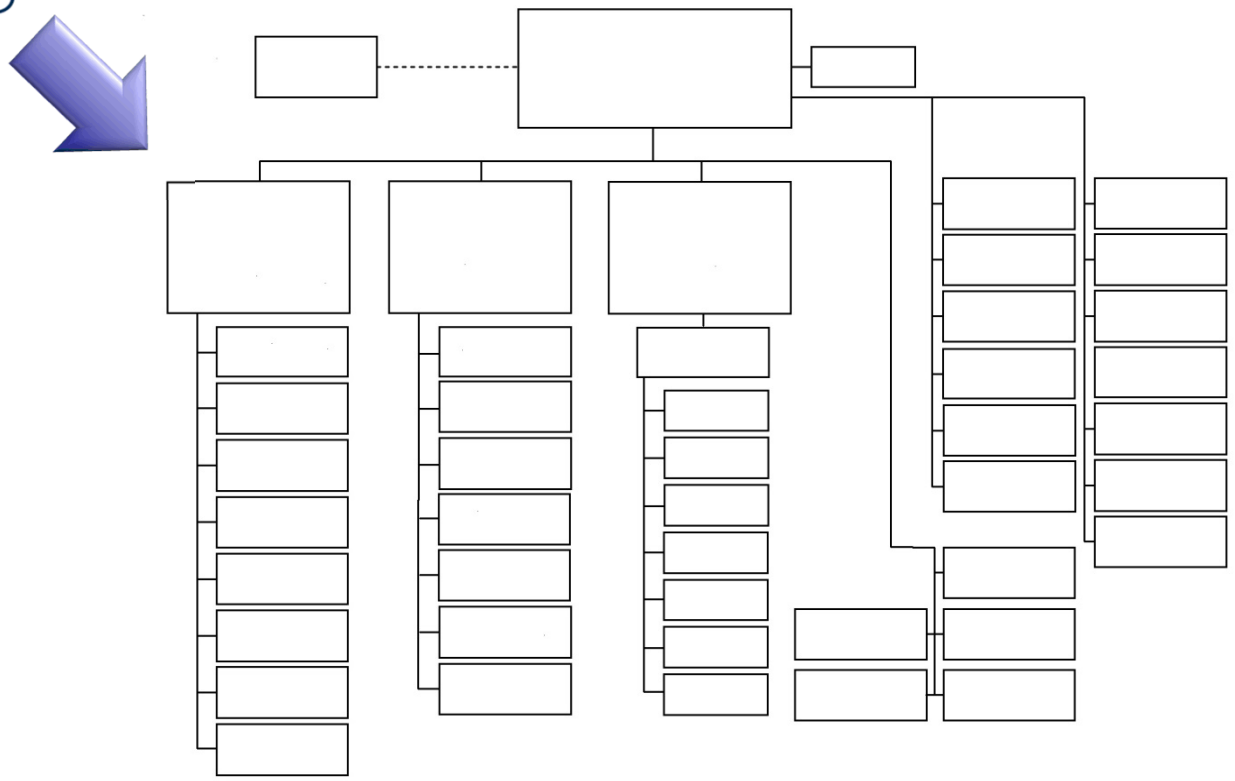
Tonopah, Nevada

Sandia's Organization Chart



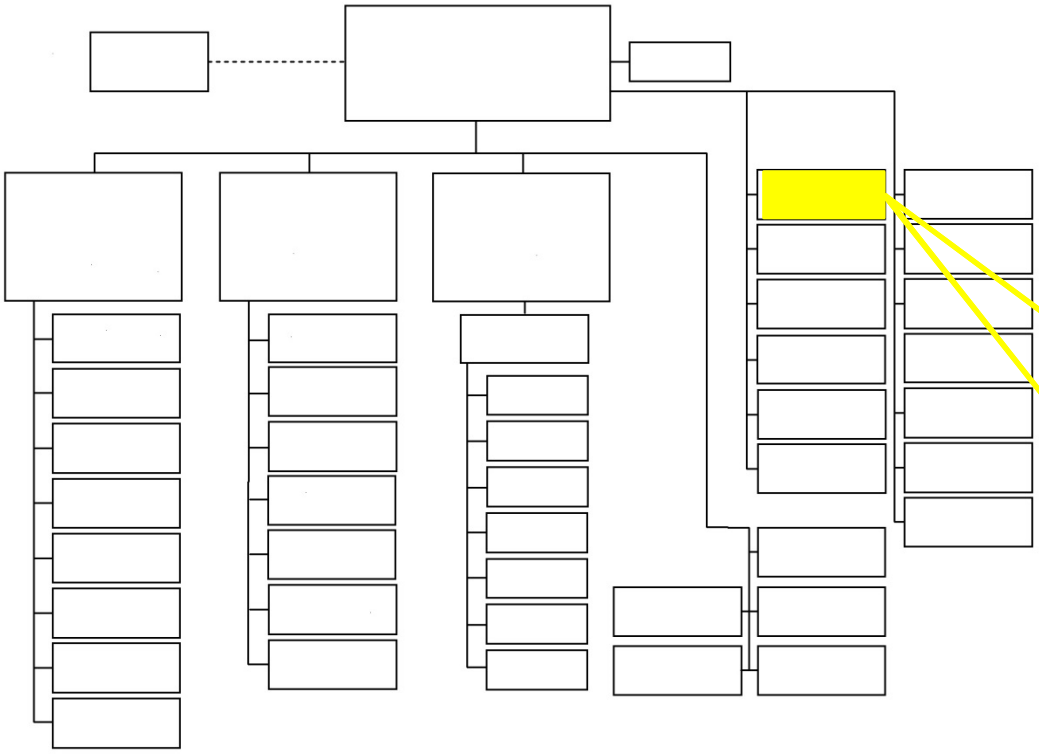
The Organization Decomposed





My Hypothesis

I can analyze and manage this as a system for several applications

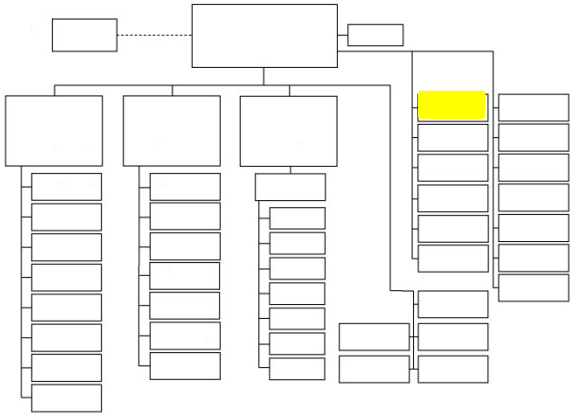


Components of the system

- Strategy/Structure Alignment
- Functional Contribution
- Clarity and Contribution of Individual Roles
- Clarity and Structure of Reporting Relationships
- Appropriate Span of Control and Number of Organizational Levels
- Appropriate Management/Leadership and Technical Skills
- Effective Coordination
- Appropriate Supporting Systems

Our Department's Lean Six Sigma training initiatives align with these components

Experiment:
Lean and Six Sigma Training and Facilitation Support



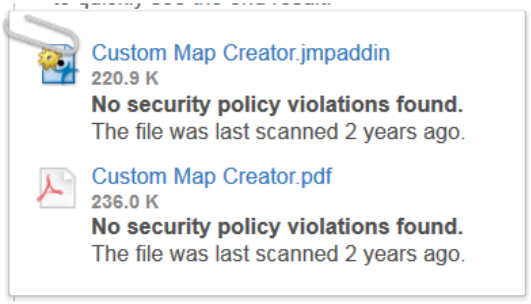
Lean Six Sigma Department
Background, Roles, and Responsibilities

- Sandia has been on the Lean and Six Sigma (LSS) journey for more than 12 years.
- We started embracing this methodology shortly after Lockheed Martin deployed the LM21 Program.
- Our LSS Black Belts are highly trained on probability and statistics.
- We use JMP as the tool to perform statistical analyses.

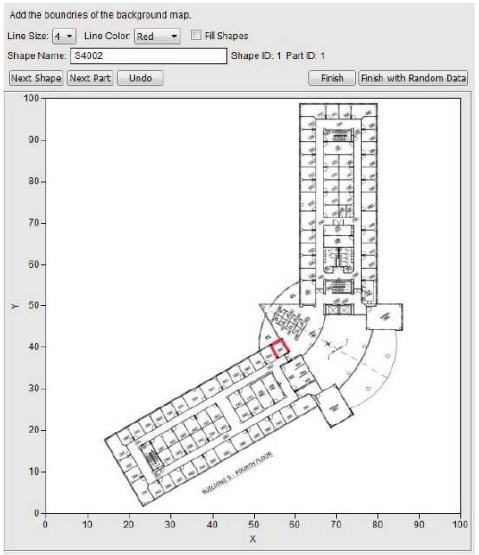
- Sandia LSS Overview
  - Resources:
    - 7 MBBs
    - 42 BB Certified
    - 31 BB Trained
  - Main Responsibilities:
    - Drive continuous improvement and problem solving in their organizations
- LSS Department Overview
  - Resources:
    - 5 full time LSS Black Belts
  - Main responsibilities:
    - Lab-wide LSS activities
    - Training: Intro to LSS, LM21 Green Belt Training, and LM21 Black Belt Training
    - Maintain and improve Sandia's LSS infrastructure: LSS Website & LSS Database
    - Mentor GBs and BBs
    - Mentor leadership on LSS
    - Interactions with parent company Lockheed Martin
    - Development of BB skills: Monthly Lunch & Learn, Annual LSS Summit
    - Report accomplishments (cost savings, cost avoidances)

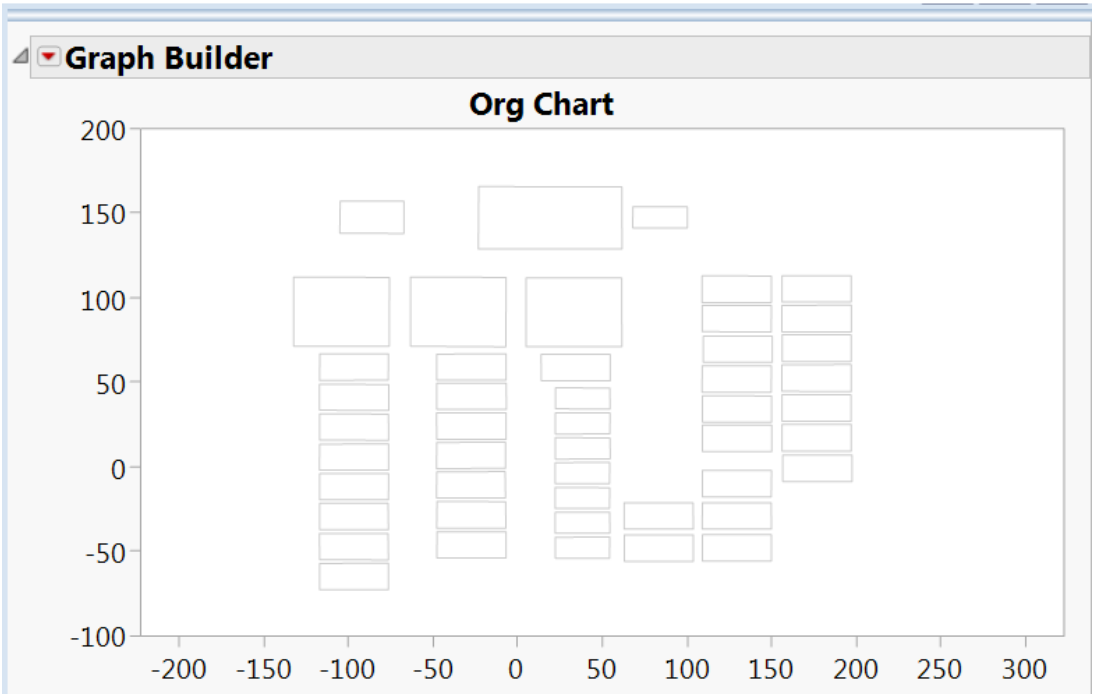
Modeling in JMP for System Analysis

Sandia National Laboratories



https://community.jmp.com/docs/DOC-6218





2/0 Cols

	Shape ID	Name
1	1	2
2	2	2500
3	3	9500
4	4	
5	5	
6	6	
7	7	
8	8	

	Shape ID	Part ID	X	Y
1	1	1	-104.7259	156.710775
2	1	1	-104.91493	137.807183
3	1	1	-66.918715	137.618147
4	1	1	-66.918715	156.710775
5	1	1	-104.7259	156.710775
6	2	1	-132.23062	111.814745
7	2	1	-132.23062	70.9829868
8	2	1	-75.708885	70.9829868
9	2	1	-75.519849	111.625709
10	2	1	-132.23062	111.814745

Copyright (c) 2010, SAS Institute Inc., Cary, NC, USA, All Rights Reserved

JMP Demonstration

Sandia National Laboratories

- Baseline the Current State.
- Assess three scenarios from a Systems Perspective.
  - Scenario 1 – call for assistance
  - Scenario 2 – support project initiative
  - Scenario 3 – deploy training initiative
- Integration of JMP local data filter and JMP application builder for automating the discovery process.
- Simulation modeling for predictive analytics.

Other Applications

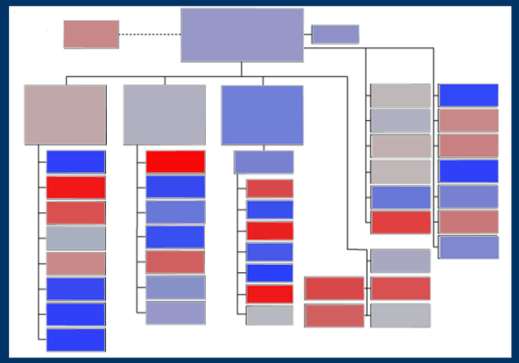
- Once the organizational chart is established from a system's perspective, there are many other applications for this model.
    - Hiring / Employee Retention
    - Safety / Injury Rate
    - Diversity
    - Generations in the workforce
    - Project savings (cost savings / cost avoidance)
    - Project findings / leveraging best practices
    - Skillsets / Capabilities
    - Overtime allocation

Conclusion – My takeaways from this journey.

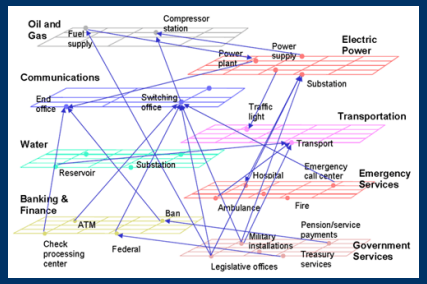
Sandia National Laboratories

Utilize Systems Thinking

Make the Data Visual

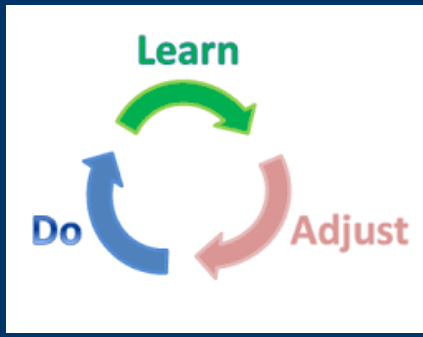


Automate / Simulate / Run "what if" scenarios



Understand the components and their interdependencies

Be Agile
Report out and collect feedback



Sandia National Laboratories

Thank You!