

Lacrosse Analytics: Improving Efficiency

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Why?

- Both of us have a lot of lacrosse knowledge, both having played in high school and Quinn being a member of the varsity team here
- The team has not been as successful as they could have been in the past
- Both of us thought it would be very interesting to analyze what factors led to the teams wins and efficiency

What?

- Analyzing the 2018 men's teams data from the online website and variables collected on HUDL
- We plan on using our knowledge of the game and statistics to figure out what factors have a statistically significant effect on efficiency
 - We defined efficiency as goal differential = goals forward-goals against
- We want to find out which variables increase the teams goal forward output and decrease the opponents goals against
- Once we find the relationships between the variables, our goal is to implement different remedies to the issues that we will reveal the team is facing

SIPOC

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Suppliers- Union Men's Lacrosse Players and Coaches

Inputs- Ball, sticks, goals, field, equipment.

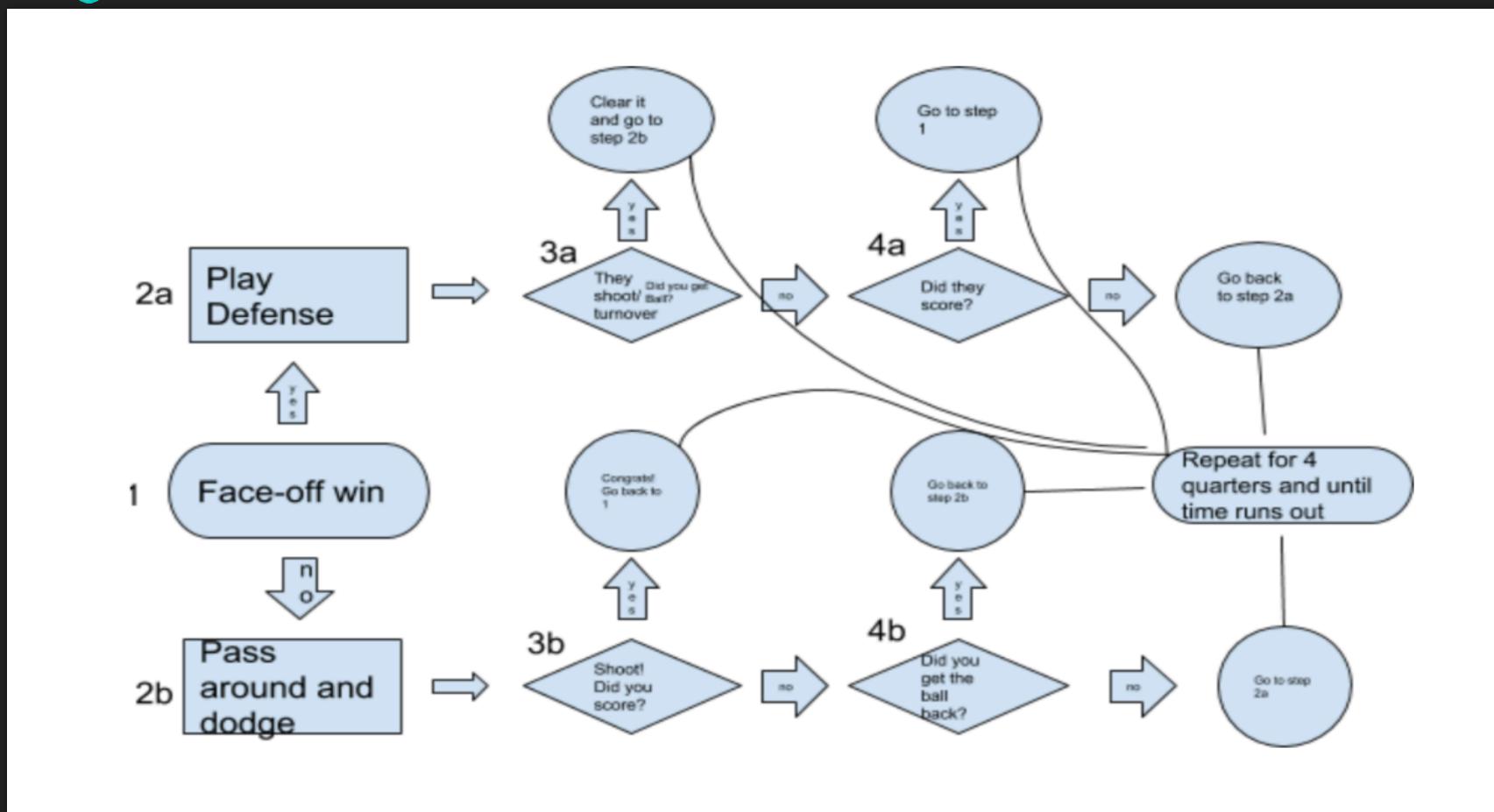
Process-

1. Win possession on face-off
2. Retain possession and get ball into box
3. Find open man
4. Shoot again
5. If it doesn't go in get possession back
6. Shoot again
7. Other team has ball
8. Play defense
9. They shoot, we get ball back or they score and take another faceoff

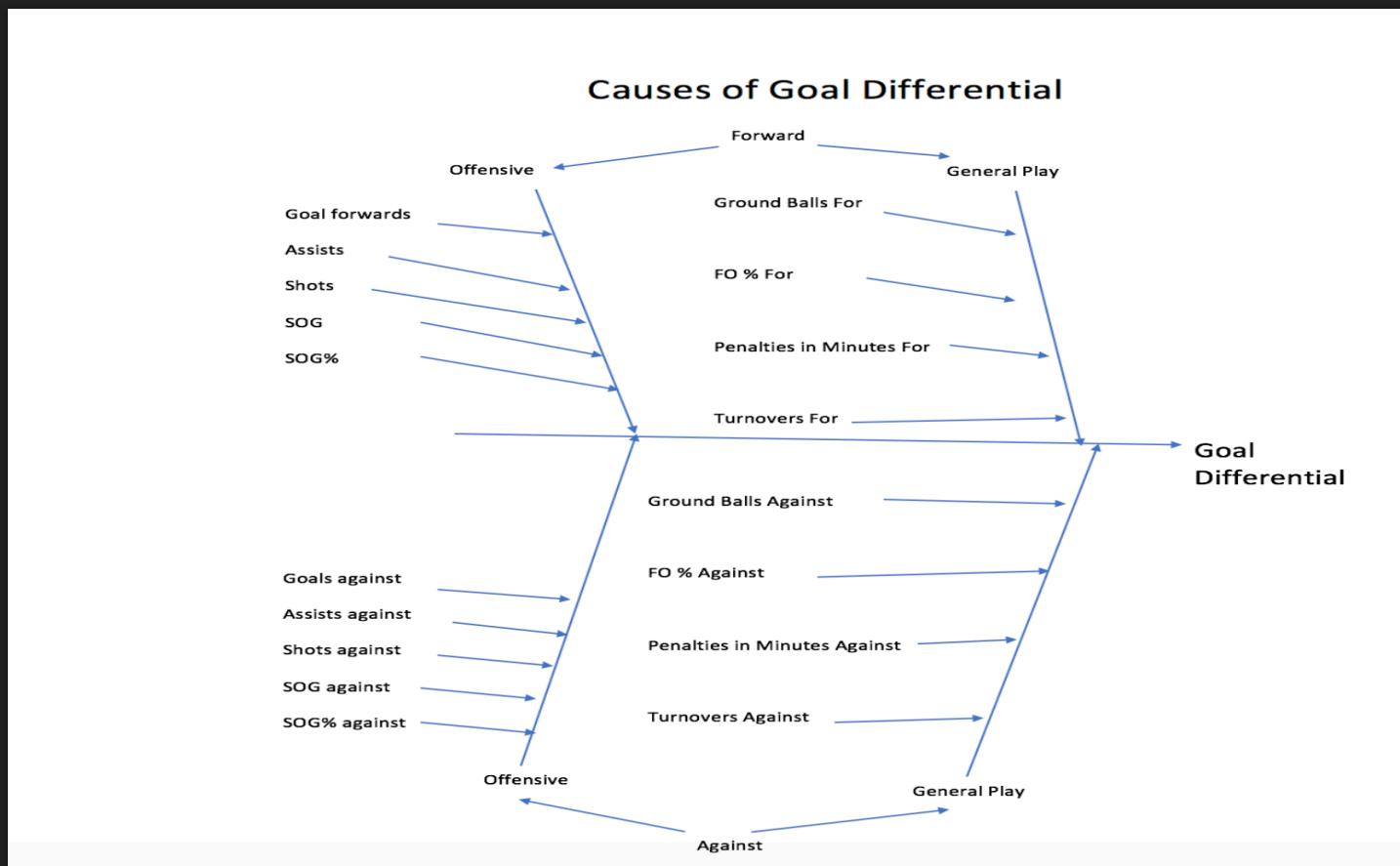
Outputs- Goals for the team (GF) and goals against the team (GA). Main output will be efficiency (E). $E = GF - GA$

Customers- Union Men's Lacrosse Players, Coaches, and Fans

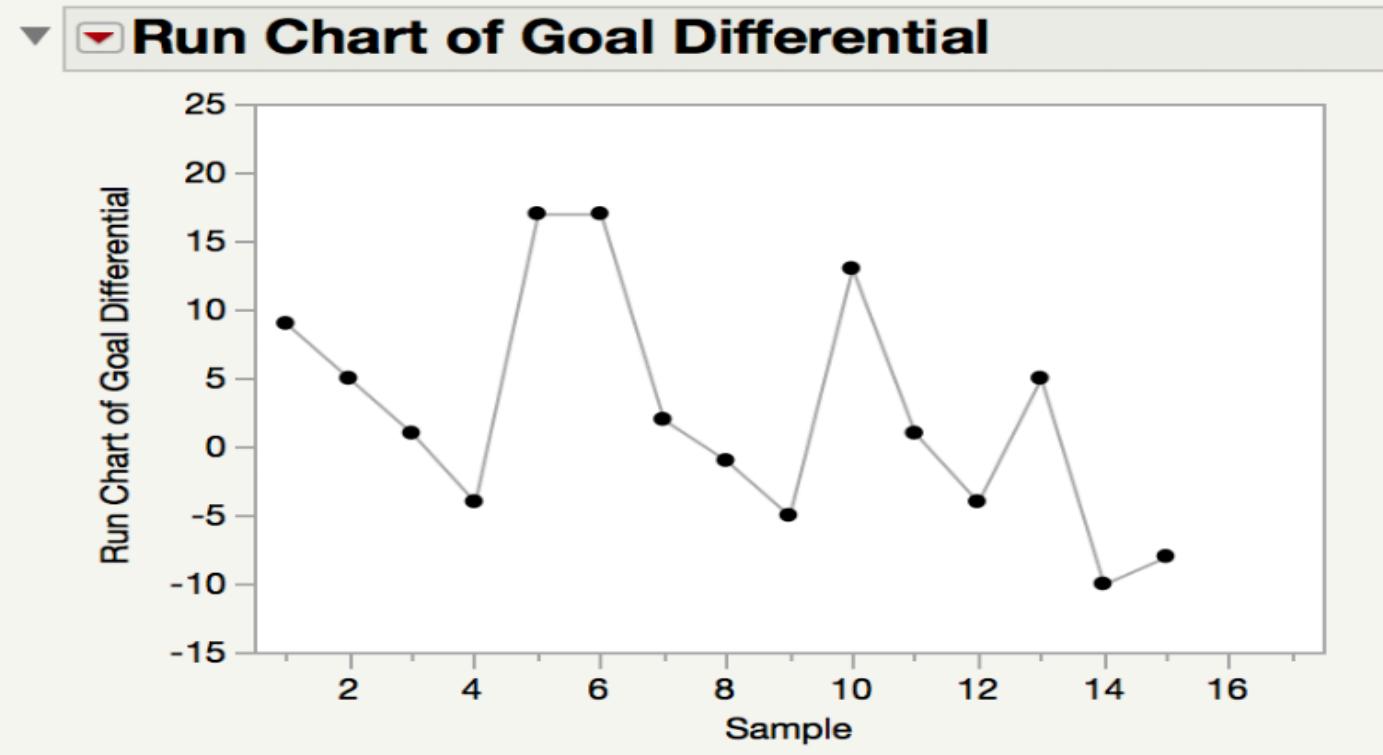
FLOWCHART



Fishbone Diagram

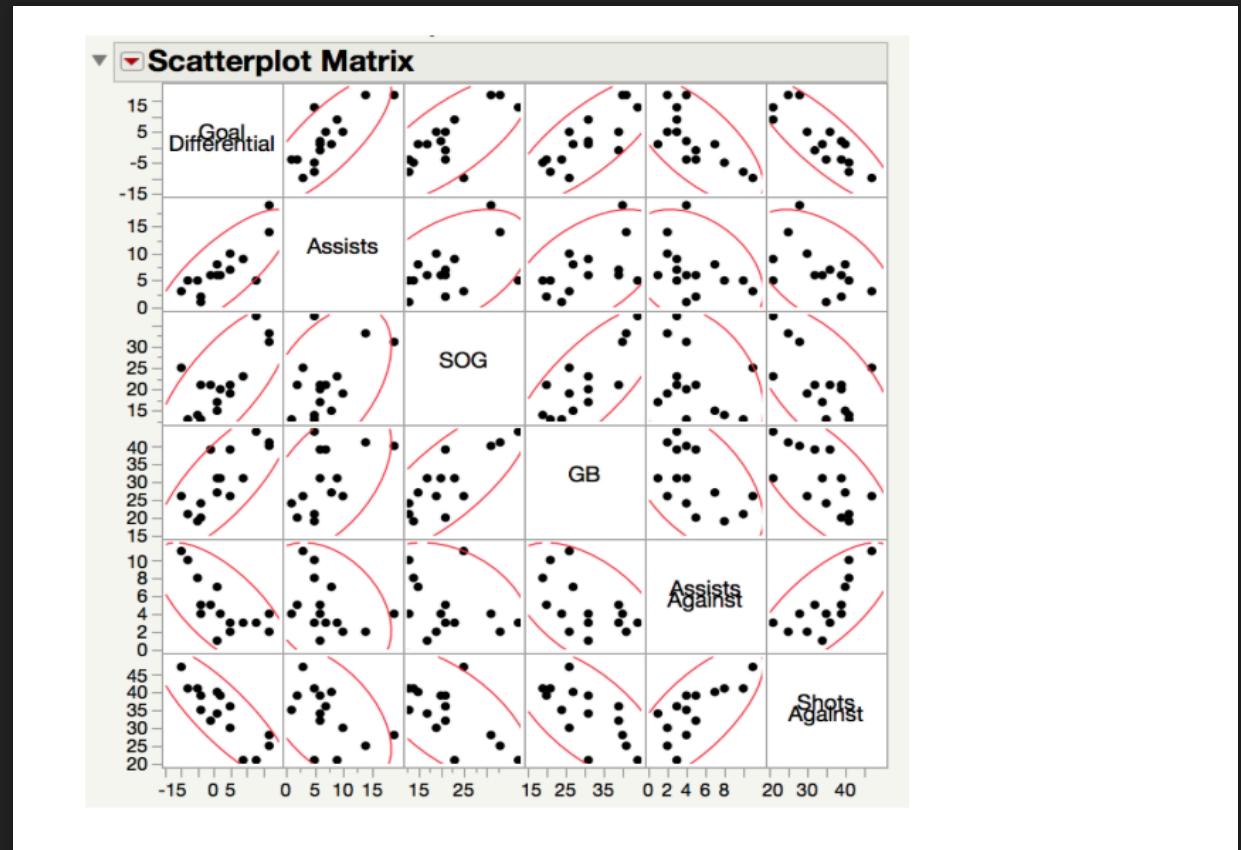


Process Stability



Scatterplot Matrix

- We used the scatterplot matrix and the output from it to conclude that assists, shots on goal, ground balls, assists against, and shots against were the most important variables



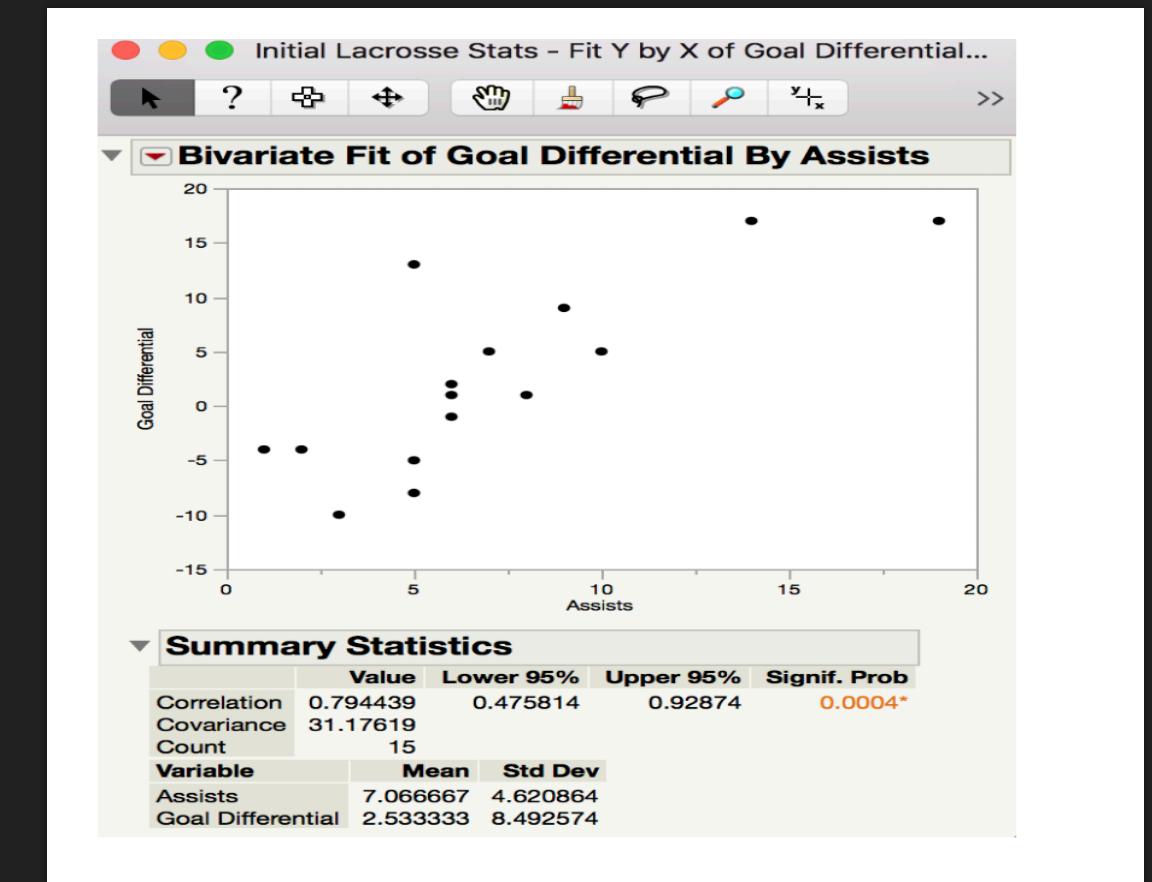
Assists Effect on Goal Differential

Hypothesis Testing:

Null hypothesis: Assists do not have an affect on goal differential

Alternative hypothesis: Assist do have an affect on goal differential

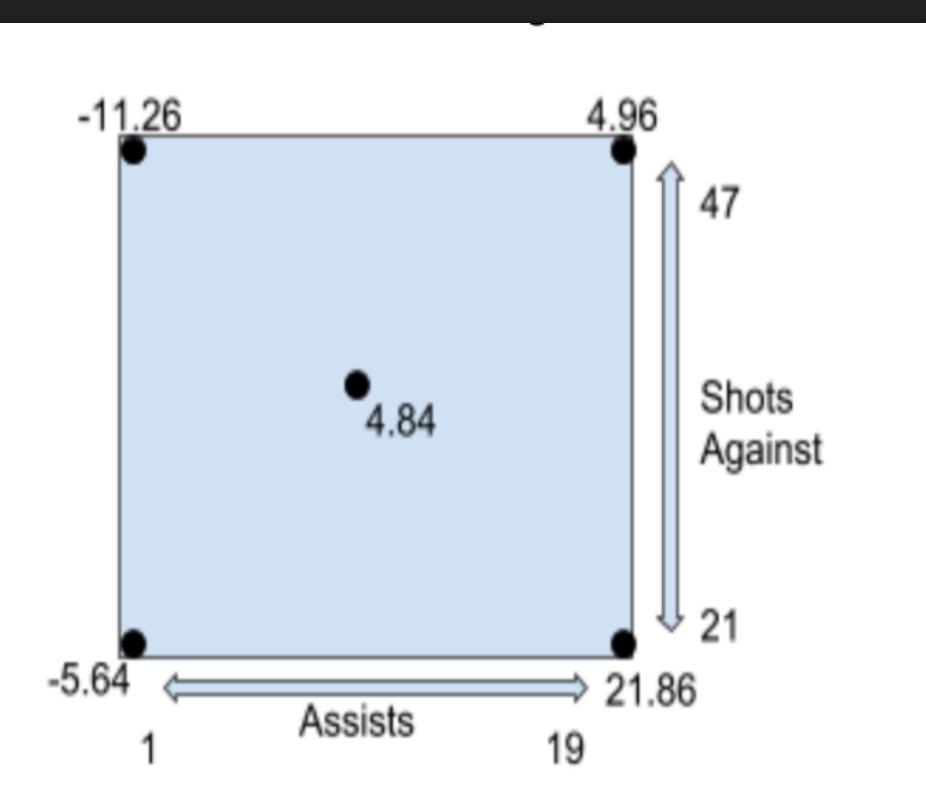
$$\alpha = .05$$



Designed Experiment

- JMP Regression output for assists, shots against, and goal differential
- Goal Differential = $18.394 + .901(A) - .655(SA)$

| Parameter Estimates | | | | | | |
|---------------------|-----------|-----------|---------|---------|-----------|-----------|
| Term | Estimate | Std Error | t Ratio | Prob> t | Lower 95% | Upper 95% |
| Intercept | 18.394044 | 5.051529 | 3.64 | 0.0034* | 7.3877085 | 29.400379 |
| Assists | 0.9013851 | 0.202109 | 4.46 | 0.0008* | 0.4610281 | 1.3417421 |
| Shots Against | -0.655123 | 0.121079 | -5.41 | 0.0002* | -0.91893 | -0.391315 |



Conclusions

- Assists and shots against have the most direct affect on goal differential
- Optimal situation for a high goal differential is a lot of assists and low shots against
- Experiment reaffirmed many of the clichés coaches say to their teams
 - Team, passing offense
 - Defense being of utmost importance
- Future Steps
 - Remedies to get high assists: stressing of passing, teamwork when scoring, looking for the open man, and running drills to simulate assist situations
 - Remedies to get low shots against: emphasis of defensive techniques such as footwork, angle, and leverage. Not allowing employees to get shots off. Possibly implementing different defensive schemes.