## PROPOSAL SUMMARY

### Project Title:
Biomechanics of Sport: Mechanics of the Elbow and UCL during Pitching

### Lead University:
Denver

### Principal Investigator:
Kevin Shelburne

### Team Members:
Brad Davidson, Paul Rullkoetter

### Budget:
$35k

### Problem Statement:
- Epidemic of ‘Tommy John’ surgeries in all levels of baseball to repair torn ulnar collateral ligament
- No previous work to acquire high speed, biplane radiography of elbow and shoulder at peak loading during throw

### Objective(s):
- High speed stereo radiography imaging of the elbow during pitching
- Estimates of ligament (UCL) loading and strain

### Deliverables:
- Pilot experimental data
- Basic musculoskeletal model of the arm for estimates of muscle and joint loading at the shoulder and elbow
- Final report
No previous known measurements during advanced pitching using combined biplane radiography at joint (elbow or shoulder) with whole-body kinematic measurement
TECHNICAL SUMMARY

research • deploy • train • evaluate
• Relative position at shoulder and elbow determined via two planes
• Estimates of joint and ligament mechanics
• Musculoskeletal models of dynamic activity
• Traditional gait lab measurements have been used for evaluation of shoulder/elbow mechanics in sport
• No measurement of in vivo bony motion at shoulder/elbow during high speed activity
• No direct estimates of UCL mechanics
PROJECT PLAN: STATEMENT OF WORK & TIMELINES

- Subject recruitment and IRB – Q1
- Subject measurement – Q2
- Post-processing of biplane radiography data, gait lab data (whole body kinematics, force plates, electromyography) – Q3
- Basic musculoskeletal modeling of the arm, estimates of muscle, joint, and UCL loading – Q4