

The following presentation was given at:

SCAF Workshop
**“The SCAF 2018 Cost Estimating
Challenge”**

Tuesday 24th April 2018
Aerospace Bristol

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SCAF – Cost Estimating Challenge 2018

Introduction - Team



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3 years at Babcock

Babcock International - at a Glance

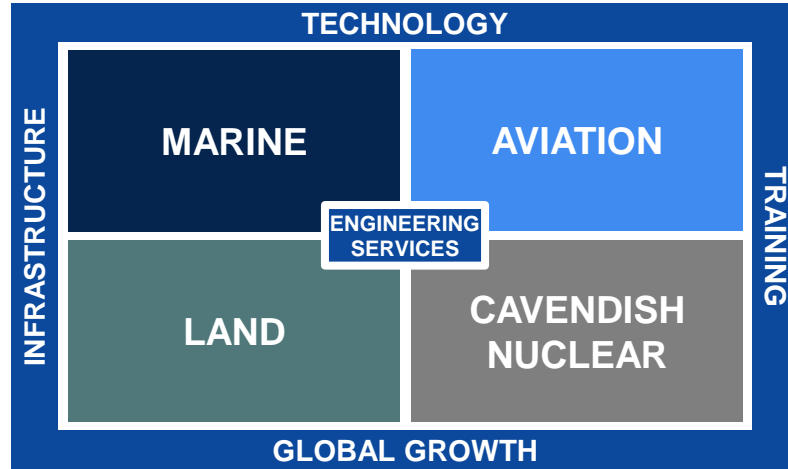


A
**leading
engineering
services**
company

Employing a workforce
of over **35,000**
skilled personnel

Order book and pipeline of
c £30 billion

Operations in over **25** countries across
six continents



Established
in **1891**

Revenue of over
£5.2 billion
In FY 17

listed on the
London Stock
Exchange

Trusted to deliver
services that are
complex, critical
and **bespoke**

Agenda

Problem Brief

Project Plan

Research and Data Collection

Planned Approach

Analysis

Cost Model

Risk and Uncertainty

Validation and Verification

Conclusion

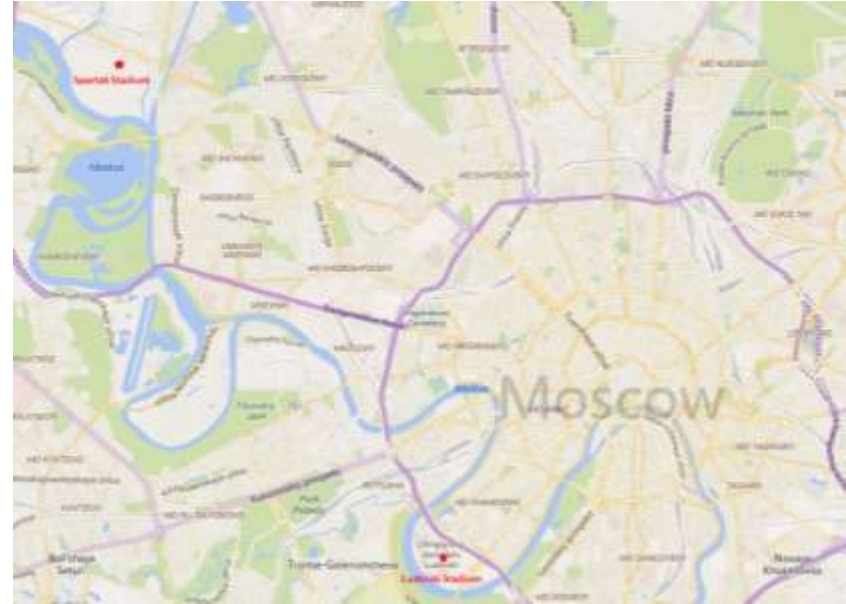
Problem Brief

“The challenge is to gather cost and size data and then generate the cost of providing security at this event.”

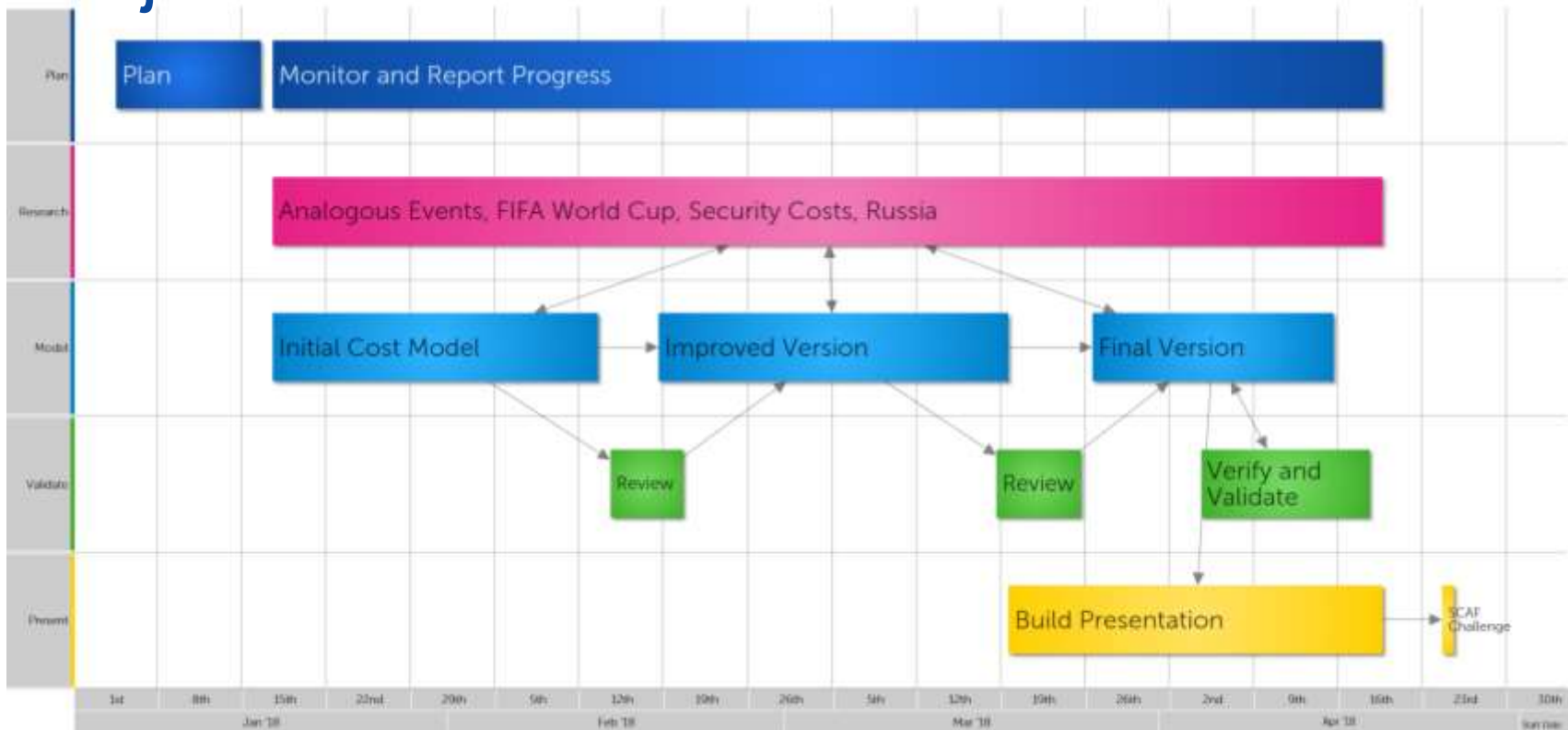
Key Points:

- A target to home and international terrorists
- It is anticipated that the Russia will deploy the most advance technologies and resources to safeguard the game.
- First World Cup ever held in Eastern Europe
- Any estimates should be based at 2018 economics,
- The operational life is from 14 June to 15 July 2018

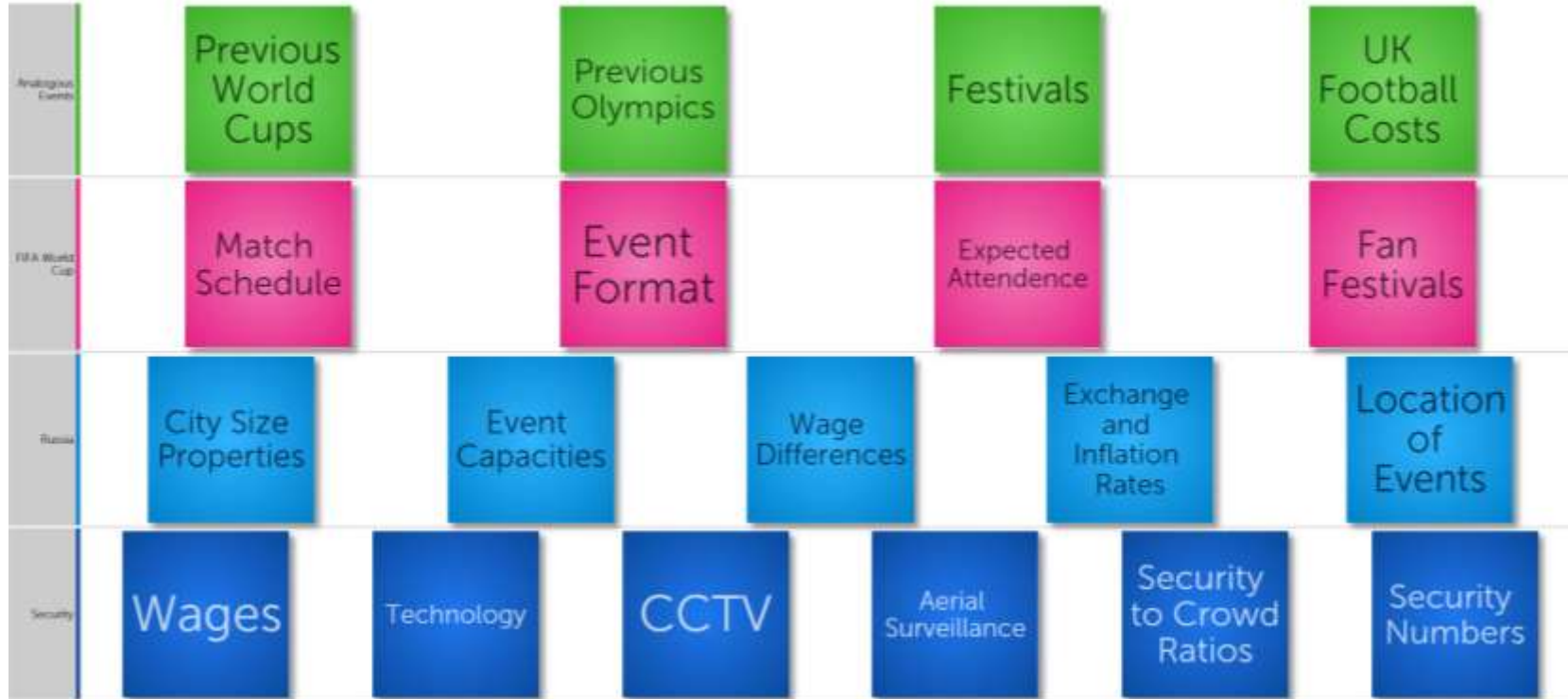
Background - Russia



Project Plan



Research and Data Collection



Research – Analogous Events

Research:

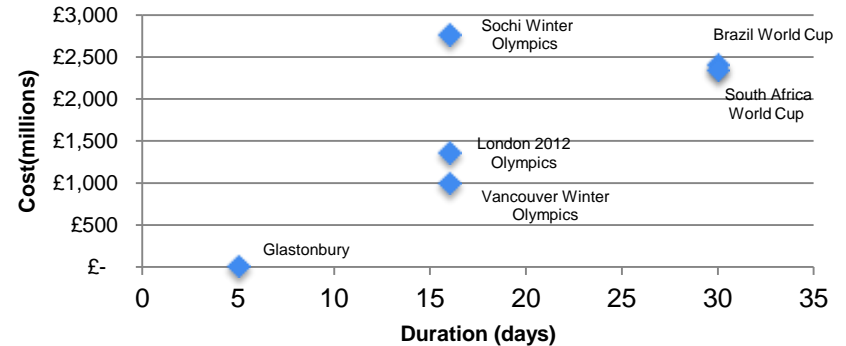
- Security costs for previous Olympics, World Cups and festivals
- Attendance and duration data of the event

Normalising:

- Costs have been inflation adjusted to 2018
- Converted to GBP (2018)

Comments

- Lack of correlation of Cost and Attendance ($R^2 = 0.01$)
- Moderate correlation of Cost and Duration ($R^2 = 0.67$)
- Research of similar events could not find detailed breakdown of the security cost, just either a summary cost or reports of specific expenditure



Scope Evolution

Initial Version

- Fan Festivals, Stadium and City locations
- Stewards
- Policing
- Aerial Surveillance

+

Improved Version

- CAPEX Assets
- Specialized Personnel
- Security Guards

+

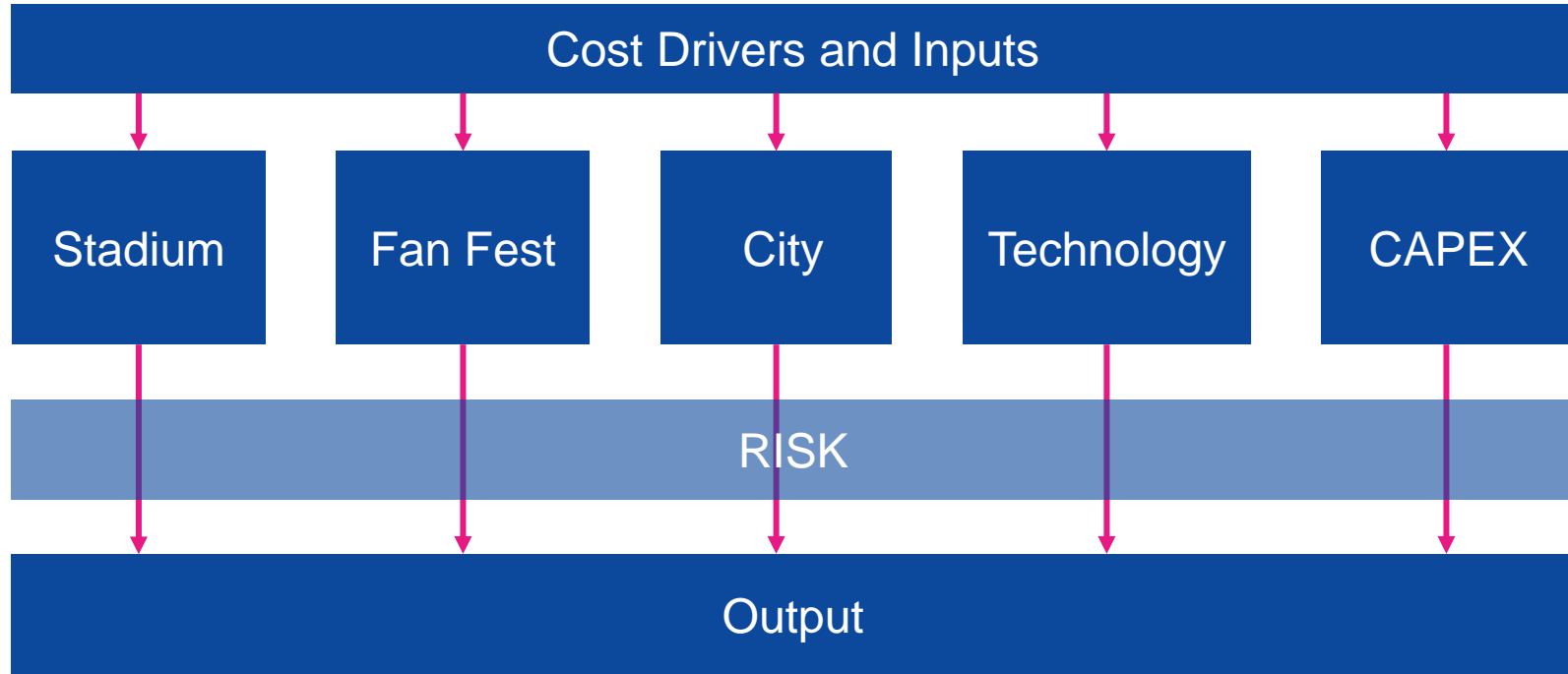
Final Version

- Team Security
- Biometrics
- Facial Recognition
- Risk

Key Out of Scope

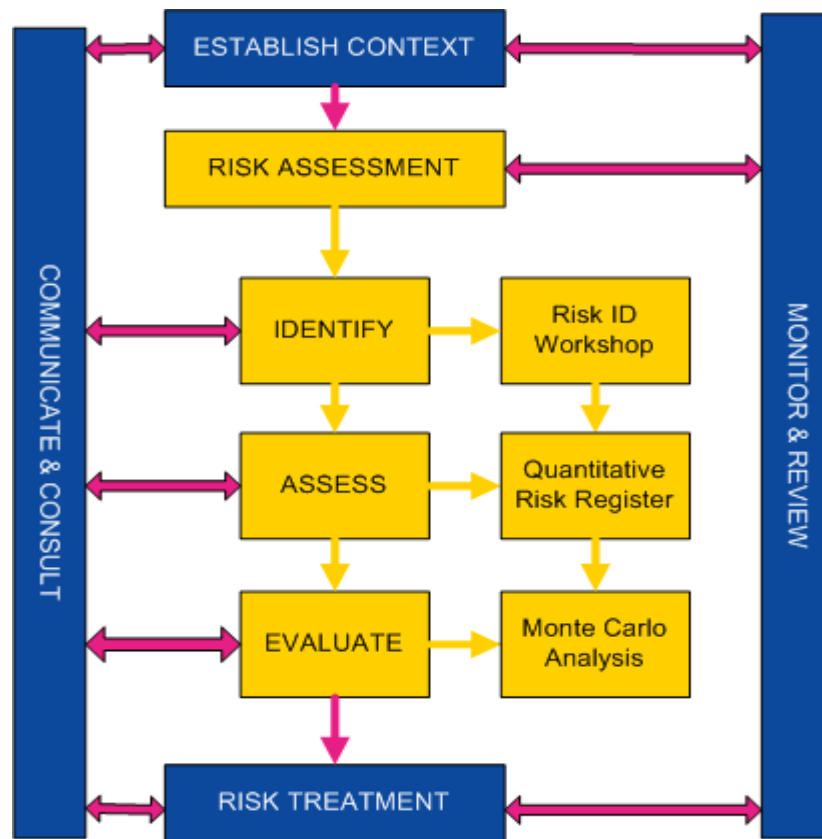
- Infrastructure
- Security Planning
- Military Assets
- Transportation
- Cyber Security

Cost Model Structure



Risk Process

- Aligned to ISO 31000:2009
- Focus on the 'Risk Assessment' pathway:
 - **Identify**
 - Risk workshop to identify key threats and opportunities
 - **Assess**
 - Qualitative and Quantitative assessment of probabilities and pre mitigated cost impacts
 - **Evaluate**
 - Monte Carlo Analysis of threats and opportunities
 - P50 pre-mitigated outturn costs included in total price



Risk Requirements

- **Identify threats and opportunities**
- **Establish Basis of Estimate (BoE) for post mitigated impacts**
- **Identify and cost mitigation/response actions**

Outputs

- **Fully costed risk register**
- **Monte-Carlo P50 value for threats**
- **Monte-Carlo P50 value for opportunities**

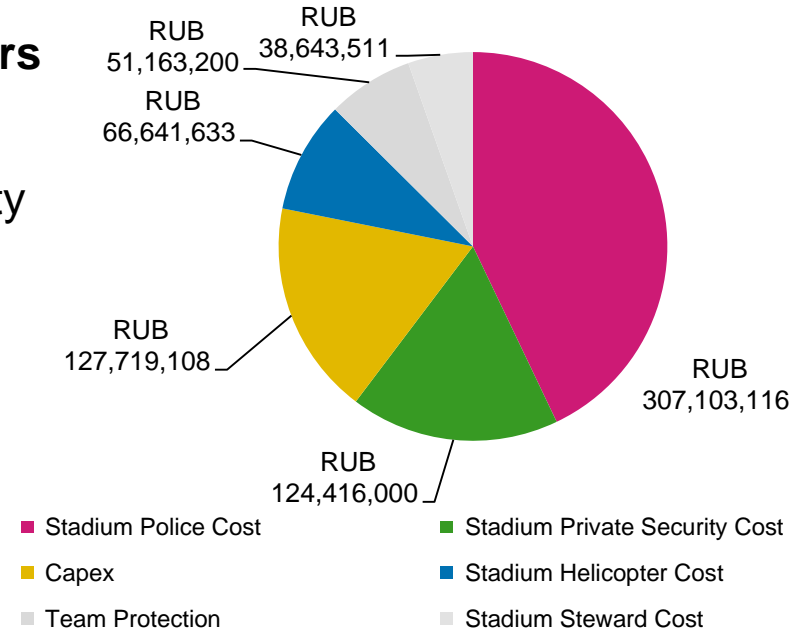
Stadia Costs

Assumed Key Cost Drivers

- Russian Stewards Ratios
 - Supervisory Staff
 - Search Personnel
 - Stadium Stewards
 - Additional Stewards
- Aerial Surveillance
- Policing
- Stadium Capacity
- Gates
- X-Ray and Handheld Scanners

Adjustment Factors

- Match Day
- Match Popularity
- Location Wage



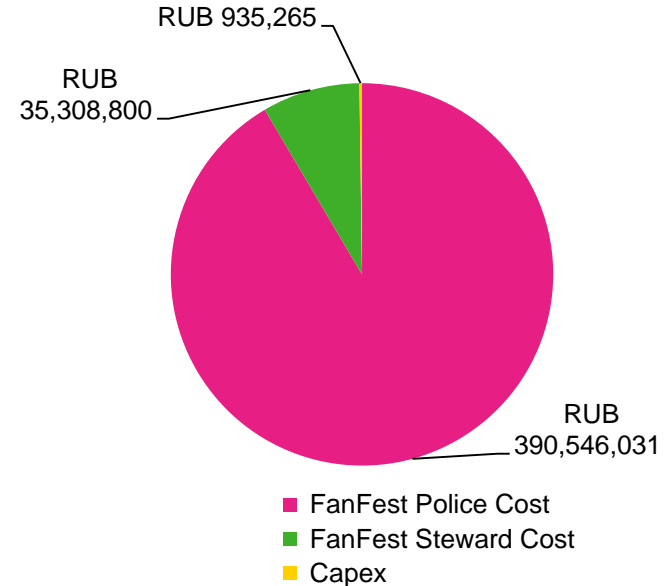
Fan Festival Costs

Assumed Key Cost Drivers

- Russian Steward Ratio
 - Stewards
 - Additional Stewards
- Policing
- Fan Fest Capacity
- Duration of Festival
- Handheld Scanners

• Adjustments

- Match Day
- Popularity
- Location Wage



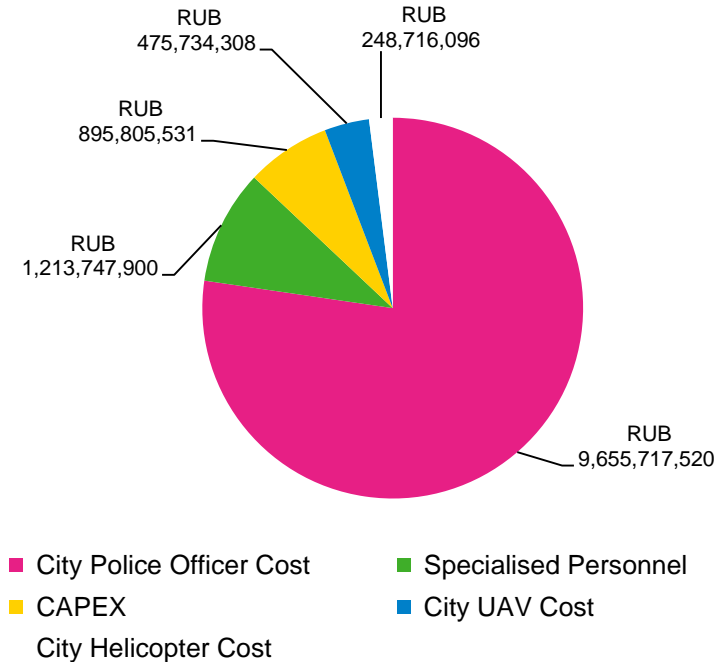
Additional City Costs

Assumed Key Cost Drivers

- City Wide Policing attributed to the World Cup
- Patrol Costs
- Helicopters
- UAV Surveillance
- Specialised Personnel
- Team Protection
- Warships
- Fencing

• Adjustments

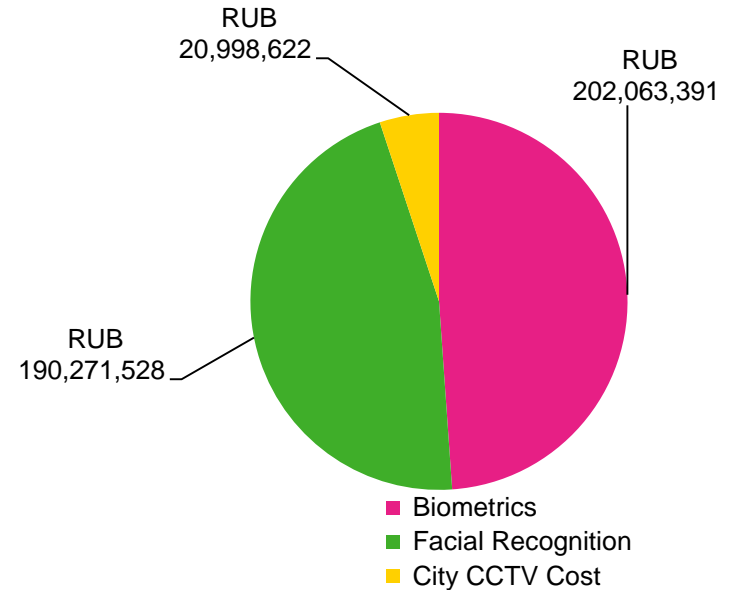
- Match Day
- Popularity
- Location Wage



Technology Costs

Assumed Key Cost Drivers

- Biometric scanners and software
- Facial Recognition Software
- CCTV Cameras



Capital Expenditure

- Analogous approach to estimate large asset purchases
 - No total list of Capex for security of an event could be found
 - Research shows it is used as an opportunity to “replenish resources” or to provide a legacy
 - Scaled from Cape Town to all 11 Russian Cities:

Total: RUB 4.90 Billion / £ £62.3 Million

Asset procurement costs for Cape Town in the 2010 South African World Cup. ordered :

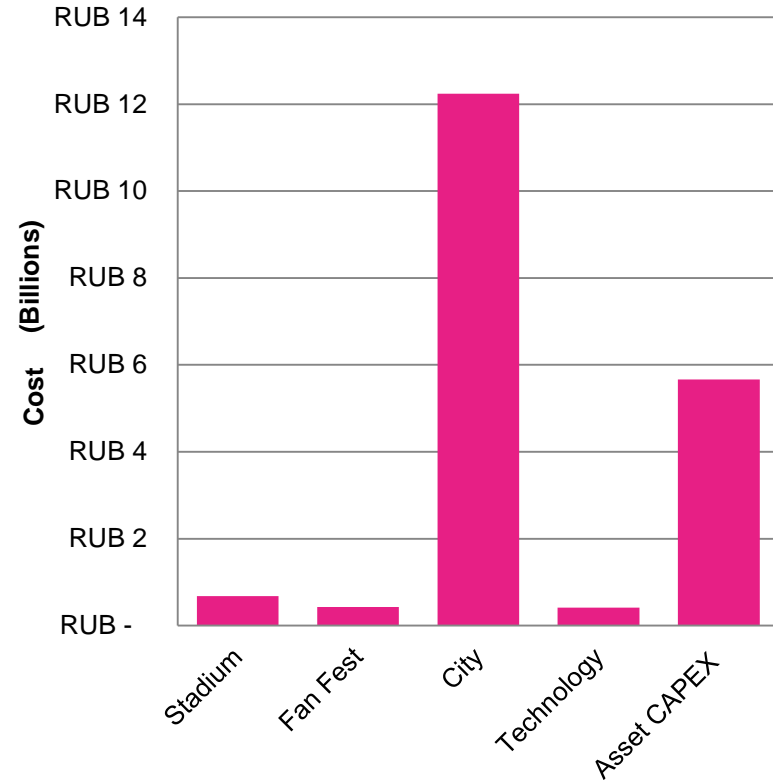
- seven new fire engines
- a new Hazmat vehicle
- a hydraulic platform
- a new mobile Incident Command Vehicle
- five Golf GTi patrol cars
- 29 bicycles
- protective clothing and equipment
- 40 motorcycles
- 20 new Chevrolet Optra sedans
- horse-box trailers for its equestrian unit
- four mini-buses
- five Segways
- light delivery vehicle

Estimated: RUB 300 Million

Total Security Costs

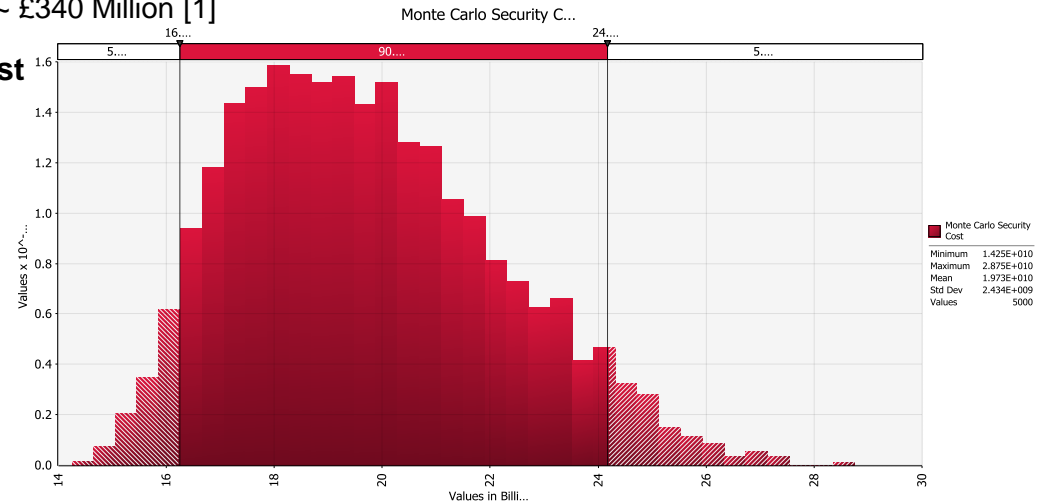
- Non Risk Adjusted
- Estimated crowd and city protection and management costs (CAPEX and OPEX) to Russia from the 2018 FIFA World Cup

Description	Minimum	Most Likely	Maximum
Total (RUB Billions)	10.5	16.6	38.6
Total (£ Millions)	133.7	210.5	490.5



Total Security Costs

- **The bottom up model has grown to estimate the security costs for managing the stadiums, fan festivals and the cities for the FIFA World Cup.**
- **The cost value is low (£ 246.8 Million P50) compared to reported security costs of analogous events**
 - Reported Russian Security Cost: \$453 million ~ £340 Million [1]
- **City wide policing dominates the overall cost**
- **Prominent costs not yet included:**
 - Pre event security costs (Planning etc)
 - Training costs
 - Changes to border security controls



[1] <https://www.groteck.com/blog/sport-event>

Risk Adjusted Total Cost

Risks in Register

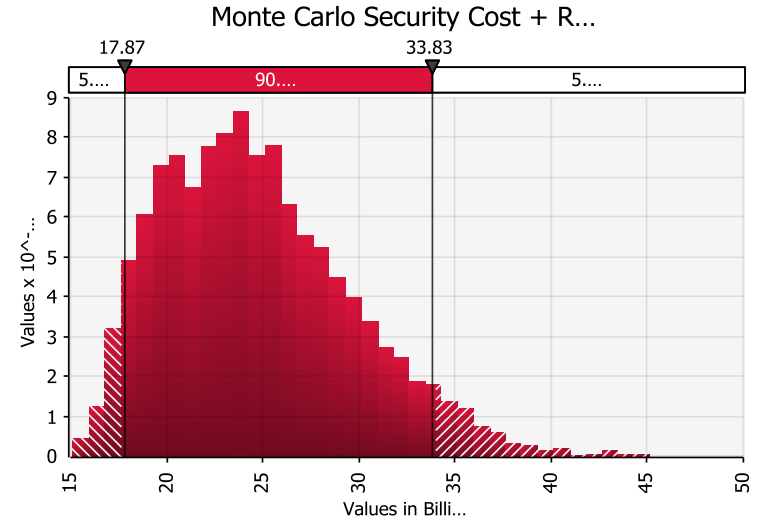
Increased security threat level

Security resource/personnel shortfall

Major incident

Reduce security spend through increased volunteer force

Total Cost	P50 RUB	P50 £
Initial	RUB 19.4 Billion	£ 246.8 Million
Risk Adjusted	RUB 24.1 Billion	£ 306.1 Million
Risk adds 24% to the Total Cost		



Validation – Dip Check

- Calculation
 - Cost to Police 13 Premier League Clubs Matches: £4.3million
 - Calculation:
 - Assumed 19 matches per club gives: £17,407.85 a match
 - For 64 FIFA World Cup Matches in 2018: £1,864,004.11
 - Cost Model Output for Stadium Police Cost: RUB 307,103,116 / £3,900,911.14
- Comment:
 - Cost Model output is double, which is reasonable as all the matches are expected to be at full capacity and with a higher policing presence
 - The large cost of security will come from City wide policing costs and Capital Expenditure

Conclusion

- **Costed the required security for managing the crowds and visitors at the 2018 World Cup**
 - **£ 306.1 Million Risk Adjusted P50 Value**
 - Lower than analogous events but is the base cost of making the event safe
 - Very low Russian wages and purchasing power of the pound compound the difference
 - Reported security costs likely spiral due to capital expenditure as investments in the country Police and Armed forces

Improvements

Key learning Points

- Cost modelling as a team
- Estimation Techniques
- Modelling cost risk
- Widening of domain experience

Widen the scope and increase the fidelity of the model to include

- **Consider state wide costs**
 - Counter Terrorism
 - State surveillance
 - Border control changes
 - Military
- **City differences**
 - CAPEX need
 - Effect of transportation
- **Pre event costs**

Thank you for your time and the opportunity to present to SCAF



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