IPRO 355

Enhanced Vision System for Construction Safety
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Problem Statement: Case Study
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Problem Statement

• Buried utilities pose threat to excavation
• Damaging underground utilities causes hundreds of deaths and injuries and millions in losses
• Current utility marking methods are flawed

Percentage of pipeline accidents caused by excavation damage

Source: PHMSA, 2008
Overall Project Goals

• Save lives and prevent construction accidents
• Provide operators with display location of utilities to operators
• Show better view of potential hazards
• Warn operators when within digging range of utility
Semester Goals

- Research construction industry and market
- Create business opportunity assessment
- Design software application
- Form relationship with Trimble
Team Organization

- Jeff
  - Team Leader
- John
  - Advisor
- Jim
  - Advisor
- Dave
  - Business Team Leader
- Chuck
  - Technology Team Leader
- Mike
- Sara
- Melissa
  - IPRO Day Coord.
- Kevin
- Leo
  - Minute Taker
- Tom
- Sam
Previous Semester's Work

• Previous team outlined overall goals
• Created business plan
• Designed device
• Began work on prototype
Progress Towards Goals

• Interviewed a safety administrator, operators, lawyers, and a mechanic
• Examined other companies in the market
• Obtained Software Developer's Kit (SDK)
• Emailed Trimble
Ethical Considerations

- Intellectual Property
  - Discovered under-utilized patent
  - Respect IP rights of others

- Public Good
  - Technologies may improve safety
  - Patent may inhibit public benefit

- Solution
  - Due diligence
Problem Solving

- Patent research
- Law student
- Team considered other means:
  - Good will statute
  - Forming relationship with patent holder
  - Changing our method
  - 3rd party company
- IP counsel
Conflict Resolution

- Robert Diehl of Seyfarth Shaw, LLP
- Determined non-infringement
- Performed patentability review
- Unable to patent, but seem to have freedom to operate
- May perform full review in coming semesters
Market Research

- Chicago-based construction companies
  - e.g. Walsh, McHugh, Power
- Researched current safety solutions
- Interviews conducted
- Identify key expansionary targets
  - Midwest upon launch
Competitors

- **Guardian Pro Star**
  - Provide integrated solution
  - Low market penetration

- **uaView / uaField**
  - Trimble software offering
  - Not intended for operator use

- **Legacy utility map systems**
  - Incumbent technology
  - Static, lacks features
Business Model

• Develop software applications
• Business to Business sales
  – Construction companies and contractors
  – Online downloads
  – Direct to customer outside sales
• Virtual organization composed of:
  – Owners
  – Employees
  – Independent contractors
Sales / Profit Forecasts

Projected Gross Profit of EVS software

Projected Sales Volumes of EVS software

- Sales Volume (Units)
- Breakeven Sales

Years One through Five
Income Statement

- $200,000 startup capital needed
- Profitable after first year – PV = $3,000,000
- Initial expenses and firm growth
  - New versions of EVS
- Potential for new R&D after two years

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<tr>
<th>Year</th>
<th>One</th>
<th>Two</th>
<th>Three</th>
<th>Four</th>
<th>Five</th>
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<tbody>
<tr>
<td>Sales Volume (Units)</td>
<td>650</td>
<td>1,500</td>
<td>3,500</td>
<td>6,000</td>
<td>4,800</td>
</tr>
<tr>
<td>Breakeven Sales (Units)</td>
<td>594</td>
<td>798</td>
<td>1,151</td>
<td>1,548</td>
<td>2,004</td>
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<tr>
<td>Revenue ($) [$399]</td>
<td>259,350</td>
<td>598,500</td>
<td>1,396,500</td>
<td>2,394,000</td>
<td>1,915,200</td>
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<tr>
<td>Expenses ($)</td>
<td>237,080</td>
<td>318,320</td>
<td>459,143</td>
<td>617,505</td>
<td>799,414</td>
</tr>
<tr>
<td>Net Profit ($)</td>
<td>15,589</td>
<td>196,126</td>
<td>656,150</td>
<td>1,243,546</td>
<td>758,563</td>
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Assumptions and Risks

**Assumptions**
- 20% market penetration
- Reasonable stable economy
- Effective project management
- Freedom to operate

**Risks**
- Resistance to change
- Standard start-up risks
- Technical Obsolescence
- Competitive reaction
- IP concerns
Path Ahead

• Perform secondary target market research
• Finalize business plan
• Develop software application beta version
• Pursue business relationship with Trimble
  – Identify substitute hardware providers
Summary

- Construction poses threat to utilities
- Current utility marking methods flawed
- EVS software may help prevent accidents
- Business opportunity
Credits and Thanks

• Seyfarth Shaw, LLP
• Robert Diehl, esq.
• Advisors: Jim Burstein, John Stoner
• Walsh Construction
• Martin Turek
• Alex Pappas- Kent Law student
• GISuser.com for CC licensed photo on slide 7 – see http://www.flickr.com/photos/gisuser/2742371252/
Questions