



# **Smartphones in the Tactical Environment: A Framework for Financial Analysis of U.S. Marine Corps Options**

Nicholas Dew, Ph.D.  
Glenn R. Cook  
John Gibson

May 14, 2014





# Agenda

- Research Purpose
- Background and Relevance
- Productivity/Consumer Surplus
- Economic Analysis/Unit of Measurement
- Summary of Findings
- Real Options
- Options Analysis
- Conclusions/Question
- Contact Information





# Research Purpose

The purpose of this research is to explore the application of smart phone technology and create a business case for deployment in the USMC tactical environment.

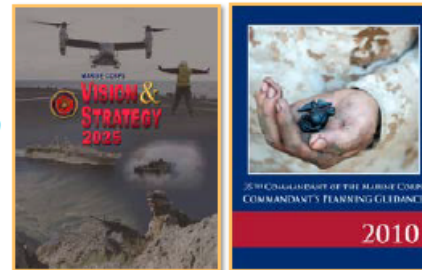
## *The Future Environment*

---

### **Force Implications for 2025**

**“To remain the Nation’s force in readiness, the Marine Corps must continuously innovate. This requires that we look across the entire institution and identify areas that need improvement and effect positive change.”**

- Marine Corps Vision and Strategy 2025
- Commandant's Planning Guidance 2010





# Background

- USMC units deployed during OEF/OIF purchased unsecure cell phones from the local markets.
- Current USMC junior personnel are smart phone literate and BYOD is common practice.
- Sleeved (secure) smart phones part of Mobility JCTD.
- Portable/private deployable 4G LTE cell systems reviewed
  - Oceus Networks for tactical broadband
- Hypotheses:
  - Sleeved smart phones may be both operationally and economically justifiable.
  - Productivity increases are the primary benefit
  - Consumer Surplus is the primary measurement





# Communications Options



Ruggedized, Secure, Sleeved  
Smart Phone (Scorpion H2)

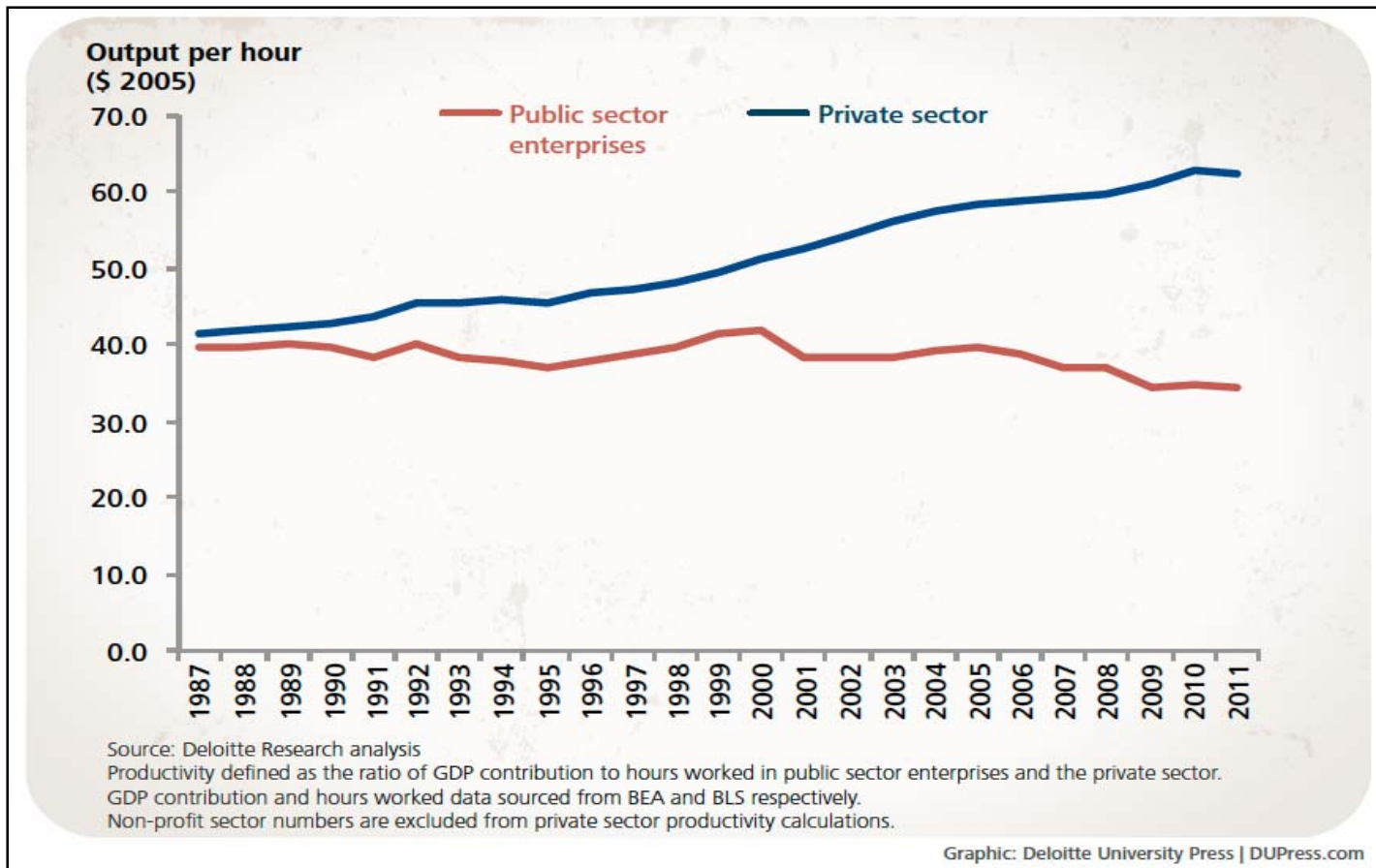
## Man-Packable Communications Systems (ICB-C2, 2012)





# Public/Private Productivity Gap

There have been large improvements in efficiency and technology in the private sector and at home, but not in interactions with the Government. (Peter Orzag, U.S. Budget Director, 2010)





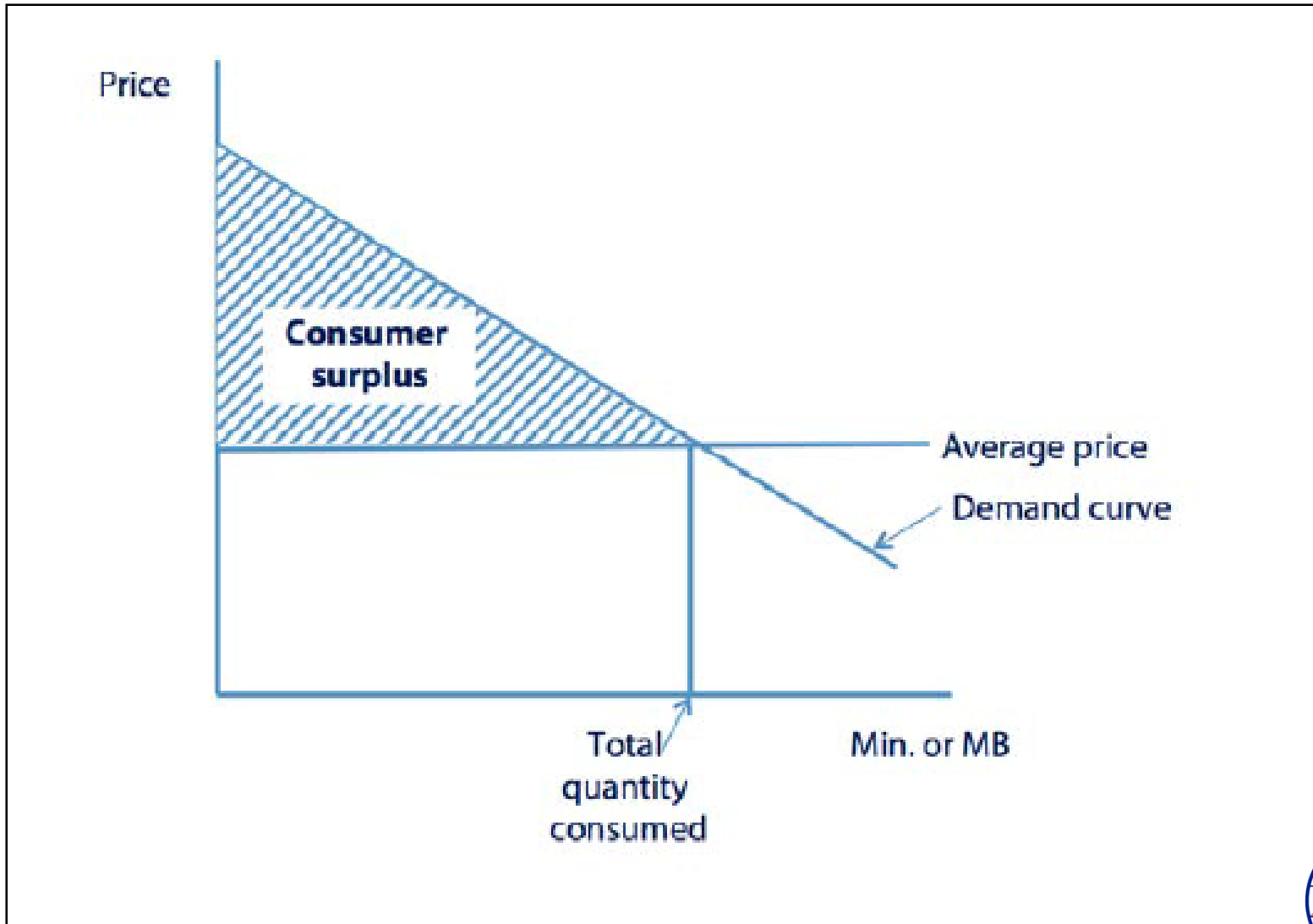
# Consumer Surplus

- Consumer Surplus (CS): The maximum sum of money a consumer would be willing to pay to consume a given amount of a good, less the amount actually paid. (OMB A-94 guidelines)
- Multiple analysis of consumer surplus from US, UK and Canada.
  - Average CS for Voice/text: \$2.09/day
  - Average for Mobile Broadband: \$.90/day
  - Total average CS baseline for analysis \$2.99/day





# Consumer Surplus







# Economic Analysis

- Methods and Assumptions:
  - NPV, with Inflation and Discount Rate
  - Economic Life of Equipment
  - Fully Burdened Cost of Fuel/Fuel Usage
  - Investment costs in phones/sleeves
  - Consumer Surplus
  - Maintenance is a “wash” between smart phones and other communications gear.
  - Sensitivity Analysis and Real Options Considered





# Unit of Analysis

- Unit of analysis. Force Size:
  - Squad = 13 Marines (1620 squads in USMC)
  - Company = 182 Marines (117 infantry, 65 support)
  - Company COC = 10 to 12 of 65 Support
  - USMC = 195,000 Strong
  - Work Days = 365 workdays deployed
  - Rotation: 2 days dwell for 1 day deployed
- Analyzed at the Squad and Company levels





# Numerical Factors

<b>Assumptions</b>	
Riflemen in a squad	13
Additional personnel at a COC	65
Duty days per year	365
Smartphone price	\$640
H2 sleeve price	\$1,100
L-3 Guardian phone price	\$3,250
PRC-152	\$4,800
PRC-152A	\$10,000
Oceus Networks RU module (200 connections)	\$450,000
Tethering equipment (smartphone to PRC-152)	\$1,434
COC equipment maintenance costs/month	\$5,600
Maintenance cost saving	50%
COC fuel use/gallons per day	20
FBC fuel	\$15
Fuel savings projected	30%
Dwell time (% at home base)	67%
Barracks efficiency benefits/productivity gain/cost saving/per day	\$2.99
Inflation	1.1%
Discount rate	-0.8%
# Squads in USMC (approx. 21,000 riflemen)	1620





# Summary of Findings

Alternative	Worst Case	Average Case	Best Case	Variance
Secure sleeved smart phone (1)	\$(1,863)	\$1,389	\$5,129	\$6,992
Secure, sleeved smart phones for a squad (13)	\$9,931	\$34,000	\$82,625	\$72,694
Secure, sleeved smart phone (non-deployed) (13)	\$(22,212)	\$1,858	\$50,482	\$72,694
Secure-sleeved smart phones + Oceus (13)	\$(84,649)	\$(60,579)	\$(11,955)	\$72,694
NSA secure smart phone + Oceus (13)	\$(71,111)	\$(47,042)	\$1,583	\$72,694
Tethered smart phones to PRC-152 (13)	\$(58,660)	\$176,606	\$558,019	\$616,679
Company support smart phones (65) + Oceus	\$(221,160)	\$105,106	\$486,519	\$707,679
Company sleeved phone (182) + Oceus	\$(416,172)	\$434,796	\$1,545,282	\$1,961,454



# Real Options

- Real Options Analogous to financial options
- Approach for staged investment for risky opportunities
- Right, but not the obligation to continue investment
- Being “in the money” relates to tech/operational success
- Intended to mitigate, not eliminate risk.
- Productivity considered to be the element of risk
  - Test concept in small (~1000 users) organization
  - Home base/barracks to mitigate tactical risk
  - Run for two years, evaluate, continue through 10 years
  - Expand constituency with each option out to 20,000 users
  - Analyze for incremental improvements in productivity
  - ONLY move forward IF successful in prior stage





# Options Analysis

Low Productivity				
Option	Years	Investment	Annual Efficiency	NPV
1,000 smartphones	10	\$(640,000)	\$366,825	\$2,116,744.00
20,000 smartphones	8	\$(12,800,000)	\$7,336,500	\$31,007,797.00
Oceus + sleeves	6	\$(44,500,000)	\$10,950,000	\$20,962,197.00
Total				<b>\$54,086,738.00</b>
Average Productivity				
Option	Years	Investment	Annual Efficiency	NPV
1,000 smartphones	10	\$(640,000)	\$731,205	\$5,744,202.64
20,000 smartphones	8	\$(12,800,000)	\$14,624,090	\$88,989,055.14
Oceus + sleeves	6	\$(44,500,000)	\$21,827,000	\$74,863,966.30
Total				<b>\$169,597,224.09</b>
High Productivity				
Option	Years	Investment	Annual Efficiency	NPV
1,000 smartphones	10	\$(640,000)	\$1,467,300	\$13,072,154.00
20,000 smartphones	8	\$(12,800,000)	\$29,346,000	\$206,118,978.00
Oceus + sleeves	6	\$(44,500,000)	\$43,800,000	\$205,848,414.00
Total				<b>\$425,039,546.00</b>



# Conclusions/Questions

- As technology advances the expectations of youth changes
- The business case may complement the military rationale
  - Military need precedes technological application
  - Technology flexibility may feed into military need
- A staged investment program strong choice for implementation.
  - Determine whether productivity materializes
  - Validate application in tactical environment
- Questions?





# Contact Information

Glenn Cook

Department of Information Sciences

Naval Postgraduate School

[grcook@nps.edu](mailto:grcook@nps.edu)

(831) 656-2778

Access to Full Research Paper

<http://www.acquisitionresearch.net/publications/detail/1216/>

