

UNITED STATES DEPARTMENT OF AGRICULTURE

UNITED STATES GEOLOGICAL SURVEY



Cost Benefit Analysis Handout

FGDC Steering Committee
Meeting
October 24, 2007

Table H-1: Description of Baseline and Alternatives

	Current State	Alternative 1: Original IFTN Concept	Alternative #2: Original IFTN Concept with Full Federal Funding for 1-ft Program	Alternative #3: Original IFTN Concept with Mandatory 50% Cost Share for 1-ft Program	Alternative #4: Original IFTN Concept with Optional 50% Cost Share for 1-ft Program
Description	Decentralized programs that vary in frequency, imagery type, cloud cover, funding cycles, and resolutions.	Nationwide program that will collect standardized multi-resolution products on set schedules.	Nationwide program that will collect standardized multi-resolution products on set schedules.	Nationwide program that will collect standardized multi-resolution products on set schedules. This alternative does not ensure any coverage of 1-foot or 6-inch products over states that do not cost share.	Nationwide program that will collect standardized multi-resolution products on set schedules. No cost share is required for the 1-foot program, but only 50% of each state will be acquired every three years. Increasing the area can be accomplished with cost share funds.
Ground Resolution & Area Coverage	Varies from high resolution (3-inch) to low resolution (10-meter) over very small to large multi-state areas	<ul style="list-style-type: none"> o 1 M. = Entire Nation o 1 Ft. = Adhering to Pop. Model o 6 In. = Identified Urban Areas 	<ul style="list-style-type: none"> o 1 M. = Entire Nation o 1 Ft. = All States and Insular Areas (AK has Pop. Model) o 6 In. = Identified Urban Areas 	<ul style="list-style-type: none"> o 1 M. = Entire Nation o 1 Ft. = All States and Insular Areas (AK has Pop. Model) o 6 In. = Identified Urban Areas 	<ul style="list-style-type: none"> o 1 M. = Entire Nation o 1 Ft. = All States and Insular Areas (AK has Pop. Model) o 6 In. = Identified Urban Areas
Frequency	Heavily dependent on funding.	<ul style="list-style-type: none"> o 1 M. = Every Year in Lower 48 States, 3 Years HI and Insular Areas, 5 Years AK o 1 Ft. & 6 In. = Every 3 Years 	<ul style="list-style-type: none"> o 1 M. = Every Year in Lower 48 States, 3 Years HI and Insular Areas, 5 Years AK o 1 Ft. & 6 In. = Every 3 Years 	<ul style="list-style-type: none"> o 1 M. = Every Year in Lower 48 States, 3 Years HI and Insular Areas, 5 Years AK o 1 Ft. & 6 In. = Every 3 Years Based on Funding Models 	<ul style="list-style-type: none"> o 1 M. = Every Year in Lower 48 States, 3 Years HI and Insular Areas, 5 Years AK o 1 Ft. & 6 In. = Every 3 Years Based on Funding Models
Image Type	Varies from natural color to CIR, and black and white.	Natural Color.	Natural Color.	Natural Color.	Natural Color.
Funding Model	Partnerships are sought to leverage costs.	<ul style="list-style-type: none"> o 1 M. = 100% Federally Funded o 1 Ft. = 100% Federally Funded o 6 In. = 50% Cost Share 	<ul style="list-style-type: none"> o 1 M. = 100% Federally Funded o 1 Ft. = 100% Federally Funded o 6 In. = 50% Mandatory Cost Share 	<ul style="list-style-type: none"> o 1 M. = 100% Federally Funded o 1 Ft. = 50% Mandatory Cost Share o 6 In. = 50% Mandatory Cost Share 	<ul style="list-style-type: none"> o 1 M. = 100% Federally Funded o 1 Ft. = 50% Optional Cost Share o 6 In. = 50% Mandatory Cost Share

Table H-2: Comparison of Current and Future State Business Processes

Business Processes	Current State			Future State		
	Federal	State	Local	Federal	State	Local
Step 1: Requirements Assessment						
Planning Meeting	X	X	X	X		
Statewide Coordination Council				X		
Step 2: Project Management						
Coordinate: Seek Partnerships	X	X	X			
Funding Coordination	X	X	X	X		
NDOP Acquisition Meeting				X		
Request for Proposal (RFP)	X	X	X	X		
Proposal Evaluation	X	X	X	X		
Negotiate Rates with Imagery Service Providers	X	X		X		
Task Award	X	X	X	X		
Step 3: Data Production (Imagery Service Providers)						
Image Acquisition						
Ortho Rectification						
Pre-Production Sample						
Balance Tiles for Color						
Create Metadata						
Step 4: Quality Assurance / Quality Control						
Evaluate Pre-Production Sample (by ISP)	X	X		X		
Ingest Imagery				X		
Distribute Interim Product	X			X		
Evaluate Pre-Production Sample (by IFTN)				X		
QA Database	X	X		X		
Step 5: Archive and Distribution						
Expose via Internet Portal	X	X				
License Data		X	X			
Expose to Ordering System	X	X				
Expose to Image Web Services	X	X		X		
Geospatial One Stop				X		
Ingest and Distribute 1-ft				X		
Archive Imagery	X	X		X		

Table H-3: IFTN Program Non-Quantifiable Benefits

<u>Classification of Benefit</u>	<u>Current State</u>	<u>Future State</u> <u>(Alternatives #1, #2, #3, #4)</u>
	<p style="text-align: center;">These are localized benefits – limited to those products that are generated through agency specific requirements</p>	<p style="text-align: center;">These benefits will be provided consistently on a nationwide basis. Levels the playing field.</p>
<p>User Value: Consists of benefits experienced by the end-users of imagery (e.g., private industry, academia, citizens, and organizations).</p>	<ul style="list-style-type: none"> • Cost savings through the use of a resource previously not available • Coverage and schedule appropriate to application areas where data is available 	<ul style="list-style-type: none"> • Access to current and historical imagery in the public domain • Reliability of product and schedule • Continuity of process and funding • Opportunities to meet additional business requirements with buy-up options • Increased interoperability across jurisdictions • Common source data • Local users will have higher resolution imagery • Access to consistent historical products • Increased applications available • Increased user base
<p>Government Operational Value: Consists of the positive effects on operations achieved by creating a quality and consistent process and product.</p>	<ul style="list-style-type: none"> • Ability to determine distribution and cost recovery • Programs control the workflow process • Continuity of partnerships • Programs determine required coverage and schedule • Programs monitor the quality and consistency of the product 	<ul style="list-style-type: none"> • Quality & consistency in operating data • Reliability of product and schedule • Standardization of procurement process • Creation of economies of scale through consolidation of federal, state, and local programs • Interagency interoperability • Increased government user base • More effective use of resources for other projects and programs
<p>Industry Value: Consists of the benefits absorbed by the Industry to support expansion of the GIS field.</p>	<ul style="list-style-type: none"> • Professional service providers can sell the same product multiple times • Business opportunities to work on speculation • Opportunity to produce imagery products over the same area multiple times 	<ul style="list-style-type: none"> • Increased opportunity for value added services • Overarching guidance for coordinating efforts across states and agencies • Common source data • Improved scheduling of workflow for professional service providers • Positive economic impact • Increased customer base

Table H-4: Financial Comparison of Alternatives

Comparison of Total Costs To Baseline			Financial Metric Comparison Across Alternatives		
Alternatives	Discounted Baseline LCCE Costs	Discounted Alternative LCCE Costs	Operational Cost Deltas From Baseline	Return on Investment	Net Present Value
Alternative #1: Original IFTN Concept	\$1.50B	\$1.24B	\$938M	4.44:1	\$267M
Alternative #2: Original IFTN Concept with Full Federal Funding for 1-ft Program		\$1.53B	\$637M	-0.27:1	-\$29M
Alternative #3: Original IFTN Concept with Mandatory 50% Cost Share for 1-ft Program		\$1.51B	\$660M	-0.09:1	-\$10M
Alternative #4: Original IFTN Concept with Optional 50% Cost Share for 1-ft Program		\$1.38B	\$796M	1.51:1	\$126M

Table H-5: Comparison of Business Requirements

Business Requirements	Current State	Alternative 1: Original IFTN Concept	Alternative #2: Original IFTN Concept with Full Federal Funding for 1-ft Program	Alternative #3: Original IFTN Concept with 50% Mandatory Cost Share for 1-ft Program	Alternative #4: Original IFTN Concept with 50% Optional Cost Share for 1-ft Program
MISSION AND BUSINESS RESULTS: Intended to capture the outcomes that agencies seek to achieve.					
Set consistent standards for imagery (resolution across boundaries, refresh)	3	4	4	4	4
Create public domain orthoimagery, devoid of any licensing restrictions allowing the customers unlimited access to the most current data sets	3	4	4	4	4
Achieve maximum cost savings through large area contracting/economies of scale	2	4	4	4	3
Reduce turnaround time between orthoimagery production and distribution	3	3	2	3	3
Develop common source data	2	4	4	3	4
Able to sustain funding	2	4	2	3	4
Application of consistent quality control processes and specifications	2	4	4	4	4
Facilitate coordination efforts across federal, state, and local agencies	2	4	4	4	4
Reduce the number of independent contracts	2	4	4	3	3
Imagery available across jurisdictions or state boundaries	3	4	4	3	4
CUSTOMER RESULTS: Intended to capture how well an agency or specific process within an agency is serving its customers.					
High Resolution imagery for urban and developing areas is consistently available	3	4	4	3	3
Provide access to all imagery at one location (i.e. via the Geospatial One Stop (GOS) Portal)	2	4	4	4	4
Help ensure regular update cycles for imagery	2	4	4	3	3
Standard image products available to show Pre-Event information in disasters	2	4	4	4	3
Ancillary Products such as Raw Stereo, Digital Elevation Model (DEM), Meta Data, Digital Terrain Model (DTM) are readily available	2	3	3	3	3
Turnaround time for ortho-rectification does not exceed twelve months	2	3	3	3	3
PROCESSES AND ACTIVITIES: Intended to capture the outputs that are the direct result of the process that an IT initiative supports.					
Reduction in administrative costs related to maintaining independent imagery programs	2	3	3	3	3
State and local programs will be required to align budget cycles to coincide with IFTN production schedules	2	3	3	3	3
Provide predictable operating requirements for vendors	2	4	4	3	3
TECHNOLOGY: Designed to capture key elements of performance that directly relate to the IT initiative.					
Decrease storage capacity to host and distribute imagery	2	3	4	3	3
Adequate network infrastructure that supports the archive and distribution functions of all programs	2	4	4	4	4
AVERAGE TOTALS:	2	4	4	3	3

Table H-6: Alternative #1 Risk

Alternative 1: Original IFTN Concept						
Risk	Description	Rationale	Probability (1-5)	Impact (1-5)	% Overall Costs	Risk Factor
Financial	Risk associated with changes in lifecycle investment costs.	<ul style="list-style-type: none"> Uncertainty of sustainable federal funding Budget cycles not aligning Congress not providing funds due to discrimination of pop. model 	3	5	25%	3.75
Technical	Risks associated with the changes in the technology underlying the IFTN program over its lifecycle.	<ul style="list-style-type: none"> Current technology becoming obsolete 	1	5	15%	0.75
Operational	Risks associated with direct or indirect losses resulting from inadequate or failed internal processes, people, and systems or from external events.	<ul style="list-style-type: none"> Unsure if infrastructure can support a nationwide program Unsure that state and local agencies will give up control of their programs Uncertainty of meeting 6-9 month turnaround time 	2	2	25%	1.00
Legal & Contractual	Risks associated with USDA and USGS' explicit relationships with vendors, contractors, and external imagery users.	<ul style="list-style-type: none"> Small business having to consolidate with larger vendors Inability to maintain long term federal contracts 	3	2	5%	0.30
Organizational	Risks associated with the business processes, and the key stakeholders' views of the IFTN program	<ul style="list-style-type: none"> Customer dissatisfaction with population model Lower adoption rate Program specific or ad hoc requirements may not be met. 	4	4	30%	4.80
Total Score			13	18	100%	10.60

Table H-7: Alternative #2 Risk

Alternative #2: Original IFTN Concept with Full Federal Funding for 1-ft Program						
Risk	Description	Rationale	Probability (1-5)	Impact (1-5)	% Overall Costs	Risk Factor
Financial	Risk associated with changes in lifecycle investment costs.	<ul style="list-style-type: none"> Uncertainty of sustainable federal funding Budget cycles not aligning Congress considers the cost excessive and doesn't fund. 	4	5	25%	5.00
Technical	Risks associated with the inability to accurately predict the	<ul style="list-style-type: none"> Current technology becoming obsolete 	1	5	15%	0.75

	technology underlying the IFTN program over its lifecycle.					
Operational	Risks associated with direct or indirect losses resulting from inadequate or failed internal processes, people, and systems or from external events.	<ul style="list-style-type: none"> • Unsure if infrastructure can support a nationwide program • Unsure that state and local agencies will give up control of their programs • Uncertainty of meeting 6-9 month turnaround time 	2	2	25%	1.00
Legal & Contractual	Risks associated with USDA and USGS' explicit relationships with vendors, contractors, and external imagery users.	<ul style="list-style-type: none"> • Small business having to consolidate with larger vendors • Inability to maintain long term federal contracts 	3	2	5%	0.30
Organizational	Risks associated with the business processes, and the key stakeholders' views of the IFTN program	<ul style="list-style-type: none"> • The federal government incurring a larger burden of program costs and responsibilities (Financial, operational, etc.) • Program specific or ad hoc requirements may not be met. 	3	3	30%	2.70
Total Score			12	17	100%	9.75

Table H-8: Alternative #3 Risk

Alternative #3: Original IFTN Concept with Mandatory 50% Cost Share for 1-ft Program						
Risk	Description	Rationale	Probability (1-5)	Impact (1-5)	% Overall Costs	Risk Factor
Financial	Risk associated with changes in lifecycle investment costs.	<ul style="list-style-type: none"> • Uncertainty of sustainable federal funding • Budget cycles not aligning • Congress not providing funds due to cost share model • Uncertainty that states can afford 50% mandatory cost share 	3	5	25%	3.75
Technical	Risks associated with the inability to accurately predict the technology underlying the IFTN program over its lifecycle.	<ul style="list-style-type: none"> • Current technology becoming obsolete 	1	5	15%	0.75
Operational	Risks associated with direct or indirect losses resulting from inadequate or failed internal processes, people, and systems or from external events.	<ul style="list-style-type: none"> • Unsure if infrastructure can support a nationwide program • Unsure that state and local agencies will give up control of their programs • Uncertainty of meeting 6- 	2	2	25%	1.00

		9 month turnaround time				
Legal & Contractual	Risks associated with USDA and USGS' explicit relationships with vendors, contractors, and external imagery users.	<ul style="list-style-type: none"> • Small business having to consolidate with larger vendors • Inability to maintain long term federal contracts • More difficult for imagery service providers to predict operating requirements 	3	2	5%	0.30
Organizational	Risks associated with the business processes, and the key stakeholders' views of the IFTN program	<ul style="list-style-type: none"> • The state and local governments incurring a larger burden of program costs and responsibilities (Financial, operational, etc.) • Lower adoption rate • Program specific or ad hoc requirements may not be met. 	4	4	30%	4.8
Total Score			12	18	100%	10.60

Table H-9: Alternative #4 Risk

Alternative #4: Original IFTN Concept with Optional 50% Cost Share for 1-ft Program						
Risk	Description	Rationale	Probability (1-5)	Impact (1-5)	% Overall Costs	Risk Factor
Financial	Risk associated with changes in lifecycle investment costs.	<ul style="list-style-type: none"> • Uncertainty of sustainable federal funding • Budget cycles not aligning • Uncertainty of how much states can afford under 50% optional cost share 	2	5	25%	2.50
Technical	Risks associated with the inability to accurately predict the technology underlying the IFTN program over its lifecycle.	<ul style="list-style-type: none"> • Current technology becoming obsolete 	1	5	15%	0.75
Operational	Risks associated with direct or indirect losses resulting from inadequate or failed internal processes, people, and systems or from external events.	<ul style="list-style-type: none"> • Unsure if infrastructure can support a nationwide program • Unsure that state and local agencies will give up control of their programs • Uncertainty of meeting 6-9 month turnaround time 	2	2	25%	1.00
Legal & Contractual	Risks associated with USDA and USGS' explicit relationships with vendors, contractors, and	<ul style="list-style-type: none"> • Small business having to consolidate with larger vendors • Inability to maintain long term federal contracts 	3	2	5%	0.30

	external imagery users.	<ul style="list-style-type: none"> Operations requirement are a larger unknown for imagery service providers to predict operating requirements 				
Organizational	Risks associated with the business processes, and the key stakeholders' views of the IFTN program	<ul style="list-style-type: none"> Uncertainty of the burden on the state and local governments related to program costs and responsibilities (Financial, operational, etc.) Lower adoption rate Program specific or ad hoc requirements may not be met. 	2	4	30%	2.40
Total Score			10	18	100%	6.95

Table H-10: Financial Comparison of Alternatives: Risk Adjusted

Comparison of Total Costs To Baseline			Financial Metric Comparison Across Alternatives		
Alternatives	Discounted Baseline LCCE Costs	Risk Adjusted Alternative LCCE Costs	Operational Cost Deltas From Baseline	Return On Investment	Net Present Value
Alternative #1: Original IFTN Concept	\$1.50B	\$1.37B	\$938M	2.26:1	\$136M
Alternative #2: Original IFTN Concept with Full Federal Funding for 1-ft Program		\$1.68B	\$637M	-2.96:1	-\$178M
Alternative #3: Original IFTN Concept with 50% Mandatory Cost Share for 1-ft Program		\$1.67B	\$660M	-1.60:1	-\$170M
Alternative #4: Original IFTN Concept with 50% Optional Cost Share for 1-ft Program		\$1.47B	\$796M	0.37:1	\$31M