

Issue #33: 💰 Economic Impact Assessment for EO Guidance

Repository: CherrelleTucker/codesign-toolkit **URL:**

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💰 Economic Impact Assessment for EO Guidance

Quantifying Financial Value and Return on Investment for Earth Observation Solutions

Tool Category: Impact & Monitoring | **Phase:** Deployment | **Difficulty:** 🕒 Advanced

Systematically calculate and document the economic value, cost savings, and return on investment of Earth observation solutions to demonstrate financial impact and justify continued investment.

📋 Tool Summary Card

Attribute	Value
🕒 Purpose	Calculate comprehensive economic impact including cost savings, value creation, and ROI for EO solutions
⌚ Time Required	1-2 weeks data collection + 3-5 days analysis + 2-3 days report preparation
👥 Participants	5-7 people: economist/analyst + project manager + finance representative + user representatives + technical lead
📊 Outputs	Economic impact report, ROI calculations, cost-benefit analysis, value proposition documentation
🔄 Frequency	Annually for established solutions, at major milestones for new deployments
💼 Materials	Financial data, user time tracking, cost accounting records, benefit quantification tools

⌚ When to Use This Tool

Essential For:

- Solutions requiring financial justification for continued funding or expansion
- Large-scale implementations with significant organizational investment
- Multi-year projects needing periodic value demonstration to stakeholders
- Solutions being considered for replication or scaling to other organizations

Particularly Valuable When:

- Budget reviews or funding decisions are approaching
- Leadership requires evidence of return on technology investments
- External partners or funders need economic impact documentation
- Solution has been operational for at least 6-12 months with measurable outcomes

Consider Simpler Approaches When:

- Very early prototype or pilot phases without sufficient operational data
- Small-scale solutions with minimal financial investment
- Projects where qualitative benefits significantly outweigh quantifiable economic impacts

Prerequisites:

- Solution has been operational long enough to generate measurable impacts (minimum 6 months)
- Baseline cost and performance data available from before solution implementation
- Access to financial and operational data from relevant organizational units
- Clear understanding of solution objectives and intended benefits

Economic Impact Framework

Value Creation Categories

Direct Economic Benefits:

Benefit Type	Description	Measurement Approach	EO Context Examples
 Time Savings	Reduced time to complete tasks	Time tracking, workflow analysis	Automated data processing vs. manual analysis
 Cost Avoidance	Expenses prevented by better decisions	Comparison of outcomes with/without solution	Early warning prevents costly emergency response
 Revenue Generation	New income or value created	Financial tracking, market analysis	Better crop yield predictions increase agricultural revenue
 Resource Efficiency	More effective use of existing resources	Resource utilization analysis	Optimized field work reduces travel and equipment costs

 Quality Improvements	Reduced errors, rework, or waste	Error tracking, quality metrics	Improved data accuracy reduces decision errors
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Indirect Economic Benefits:

Benefit Type	Description	Measurement Approach	EO Context Examples
 Capacity Building	Enhanced organizational capabilities	Skill assessments, capability metrics	Staff gain EO analysis skills applicable to multiple projects
 Collaboration Value	Improved coordination and partnerships	Partnership effectiveness measures	Shared EO platforms enable inter-agency collaboration
 Strategic Positioning	Competitive or mission advantage	Strategic outcome assessment	Enhanced monitoring capabilities support policy leadership
 Innovation Catalyst	Enables new approaches or solutions	Innovation tracking, spin-off analysis	EO insights lead to new research directions or service offerings
 Risk Reduction	Decreased exposure to various risks	Risk assessment, insurance value	Better hazard monitoring reduces liability and insurance costs

Cost Accounting Framework

Total Cost of Ownership (TCO) Analysis:

-  **Comprehensive Cost Categories**

ROI Calculation Methodologies

Financial Analysis Approaches

Return on Investment (ROI) Calculation:

Basic ROI Formula:

$$\text{ROI} = (\text{Total Benefits} - \text{Total Costs}) / \text{Total Costs} \times 100\%$$

Multi-Year ROI Analysis:

Year	Costs	Benefits	Net Benefit	Cumulative Net	Cumulative ROI
0 (Development)	\$150,000	\$0	-\$150,000	-\$150,000	-100%

1 (Deployment)	\$75,000	\$50,000	-\$25,000	-\$175,000	-233%
2 (Operations)	\$60,000	\$120,000	\$60,000	-\$115,000	-153%
3 (Mature)	\$65,000	\$180,000	\$115,000	\$0	0%
4 (Optimized)	\$70,000	\$200,000	\$130,000	\$130,000	43%
5 (Scaled)	\$75,000	\$250,000	\$175,000	\$305,000	100%

Net Present Value (NPV) Analysis:

NPV Calculation with Discount Rate:

- NPV Analysis Template
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Impact Measurement & Data Collection

Benefit Quantification Methods

Primary Data Collection Approaches:

Method	Purpose	Data Collected	Frequency	Participants
Time Tracking Studies	Measure efficiency gains	Task completion times, workflow duration	Monthly samples	Representative users
Cost Accounting Analysis	Calculate direct cost impacts	Expense records, resource utilization	Quarterly	Finance, operations staff
Outcome Tracking	Measure decision/process improvements	Performance metrics, quality indicators	Ongoing	Decision makers
Value Assessment Interviews	Quantify perceived and realized benefits	User-reported value, impact stories	Semi-annually	Key stakeholders

Baseline Establishment:

- Pre-Implementation Baseline Data
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Economic Impact Reporting

Executive Economic Impact Report Template

- Comprehensive Economic Impact Report Structure
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Integration with Other Tools

Tool Integration Matrix:

Integration Type	Tool	Information Exchange
Builds On	Indicator Development Guidance	Performance metrics and quantitative data for benefit calculations
Builds On	Monitoring, Impact and Learning Plan	Outcome data and impact evidence for economic analysis
Builds On	Adoption Monitoring Dashboard	User engagement data for value per user calculations
Enables	Impact Story Collection Templates	Quantitative evidence and ROI data for compelling narratives
Informs	Sustainability Planning Workshop	Financial viability evidence for long-term planning decisions
Informs	Designing for Impact 101	Real-world examples of economic impact measurement

Data Source Integration:

Data Source	Information Provided	Integration Method	Update Frequency
Solution Analytics	Usage patterns, efficiency metrics	Automated API connections	Daily/Weekly
Financial Systems	Cost data, budget information	Scheduled data exports	Monthly
User Feedback	Value perceptions, benefit realization	Survey integration, interview data	Quarterly
Performance Systems	Outcome metrics, quality indicators	Data warehouse connections	Weekly/Monthly

External Validation Sources:

Validation Type	External Sources	Purpose	Frequency
Benchmarking	Industry reports, peer organizations	Validate benefit estimates and assumptions	Annually
Methodology Review	Academic literature, evaluation experts	Ensure robust analytical approaches	As needed
Financial Audit	Independent auditors, finance experts	Verify cost calculations and benefit claims	Annually

 User Validation	Independent user surveys, focus groups	Confirm reported benefits and user value	Semi-annually
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Source Attribution

Primary Sources:

- **Solution Co-Development Toolkit Narrative** - Economic impact assessment framework for user-centered Earth observation solutions
- **NSITE Solution Project Requirements and Expectations** - Financial accountability and return on investment requirements for EO solution projects

Supporting Sources:

- **SERVIR Service Design Tool 2021** - Economic value assessment methodologies for Earth observation services
- **MSFC Coordination on Solutions Co-Development Toolkit** - Multi-stakeholder economic impact coordination and reporting approaches

Methodology Foundation:

- Cost-benefit analysis methodologies from public policy and program evaluation literature
- Return on investment calculation standards from corporate finance and project management practice
- Net present value and financial analysis frameworks from investment evaluation literature
- Economic impact assessment approaches from technology evaluation and innovation studies
- Value measurement methodologies from information systems and technology adoption research

Community Discussion

Share your economic impact assessment experience:

- What economic benefits have been most significant and measurable for Earth observation solutions?
- How do you handle quantification of indirect or long-term benefits that are difficult to measure?
- What approaches work best for establishing credible baselines and attributing improvements to EO solutions?
- How do you balance comprehensive economic analysis with practical resource constraints?

Tool improvements:

- What additional economic impact categories would be valuable for Earth observation contexts?
- How do you adapt economic analysis for solutions with highly variable or seasonal usage patterns?
- What validation methods have been most effective for confirming economic impact claims?