Modeling and Simulation
Resource Reuse
Business Model

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**Modeling and Simulation Resource Reuse Business Model**

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**ABSTRACT**

**SUBJECT TERMS**

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Outline

- Problem statement
  - Barriers to reuse
  - Repositories as necessary but insufficient incentives
  - On the need for an M&S resource reuse business model
- M&S contain intellectual property
  - Laws and policies affecting IP
- Framework for a business model
  - Critical elements
  - Examples of how M&S transactions might take place
  - Government and industry roles
- Next steps
  - Industry/Government summit on a new business model
The Problem: Inefficient Use of M&S Resources

Few M&S resources are reused – either during a single program’s lifecycle or across acquisition programs.

<table>
<thead>
<tr>
<th>Tools</th>
<th>Data</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Models</td>
<td>Input datasets</td>
<td>Architectures</td>
</tr>
<tr>
<td>Simulations</td>
<td>Scenarios</td>
<td>Network resources</td>
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<tr>
<td>Federations</td>
<td>Threat data Algorithms</td>
<td>Interfaces</td>
</tr>
<tr>
<td>Utilities (post-</td>
<td>Environmental info</td>
<td>SME expertise</td>
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<tr>
<td>Processors)</td>
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<td>Protocols</td>
</tr>
</tbody>
</table>

Absence of incentives for Gov’t M&S managers and industry developers
Barriers to M&S Resource Reuse

- Users lack awareness of reusable resources
- Insufficient details about reusable resources
- Hard to assess the true capabilities and limitations of existing resources
- Resources not in a form suitable for reuse
- Users lack trust in resources developed by others/NIH
- Model is available but not the data
- M&S components don’t work well together

- Repositories are incomplete and not current
- Little insight into how resources have been used in the past, including successfully and failures
- Difficult to access the actual resource
- Difficult to adapt existing resources to new problems
- No mechanism to compensate developer for resource investment and guidance on use
- No mechanism to protect developer from mischievous uses
Improved M&S repositories could overcome some barriers

- Users lack awareness of reusable resources
- Insufficient details about reusable resources
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- **Resources not in a form suitable for reuse**
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But repositories alone are insufficient to motivate reuse:

- Without incentives to populate, repositories will not include a comprehensive set of available resources.
- Without incentives for reuse, repositories will be underutilized.
- Existing resources require additional work to adapt to new problems, and support to guide their application.
- Repositories often don’t facilitate the transaction to obtain the actual resource.
- Repositories don’t protect the original developer from resource misuse by new users.
- Developers must be compensated to make resources reusable and to shift business model from resell to reuse.
What is a business model?

A business model describes the

- Value to M&S consumers produced by the ability to access and reuse M&S resources;
- The reciprocal value to M&S producers through transactions that result in the reuse of their resources;
- The capabilities, partners, and business processes required to create and deliver this value;
- The motivation, compensation principles, and policy necessary to sustain a mutually beneficial relationship between these entities
M&S Resource Reuse Business Model

M&S Suppliers & Support Infrastructure

Core capabilities
- H/W & S/W
- System information
- Org & Op Knowledge
- Conceptual models

Partner network
- Gov’t agencies
- Labs
- Industry
- International

Customer

Target Mkt
- PEOs, PMs
- Dir Training
- Hd Analysis
- Service/Component

Customer Relationships
- Discovery tools
- Trust/ MOUs

Value activities
- Develop
- Test
- Validate
- Prototype

Value Proposition
- Savings (time/$$)
- Authoritative
- Joint context
- Interoperability

Compensation
- Licensing
- Royalties
- Support $$
- Purchase options

Distribution channel
- Access control
- IP Intermediaries
- MOUs
M&S resources generally contain **valuable** intellectual property

- Intellectual property refers to *creations of the mind*: inventions, literary and artistic works, and symbols, names, and images used in commerce.
  - In M&S the IP is often encapsulated in the source code and data sets
- DOD’s access to M&S IP developed under contract is governed by both copyright law, patent law, and the procurement regulations contained in the DFARS
  - These laws affect the Government’s ability to use, reproduce, modify, and release the resource to one or more potential users
- Control of IP is determined, in part, by who funded development
  - Government, Industry, or Mixed
  - But formal title is generally retained by the contractor-developer regardless of funding source
  - DoD acquisitions that involve a mix of government and IRAD funded technologies pose a challenge in determining control “rights”
**Default DFARS rights:**

*Contracts for software*

<table>
<thead>
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<th>100% Government Funded</th>
<th>Mixed Funding Sources</th>
<th>100% Private Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial</strong></td>
<td>N/A</td>
<td>Same rights as standard license</td>
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</tr>
<tr>
<td><strong>Non-Commercial</strong></td>
<td>Unlimited rights</td>
<td>Government purpose rights (5 years)</td>
<td>Restricted rights</td>
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## Default DFARS rights:

**Contracts for technical data**

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<tr>
<td><strong>Commercial</strong></td>
<td>Unrestricted gov’t rights for unmarked data</td>
<td>Qualified gov’t purpose use for other data</td>
<td></td>
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Possible M&S Business Model

M&S Developer
Private Industry or Gov’t Lab / In-house

Gov’t Agency 1

Discussed joint requirements

Gov’t Agency 2

Provide original deliverables
Pay license fee for original deliverables
Report reusable asset
Discover reusable asset

“Match.com”

Provide metadata

Pay license fee for upgrade
Pay license fee for upgraded deliverables

Discussed joint requirements
Another Business Model View

Gov’t Agency 1

Agreement & Deliverables

Agreement

payment and/or royalties

Notify: resource available

“Match.com”

Input: resource requirements

Gov’t Agency 2

Provide compensation/
negotiate agreement

Complete agreement

Gov’t Agency 1

Provide resource

Provide support to adapt and apply resource

Gov’t Agency 2

M&S Team

In-house, Lab, Industry

Payment for support services received

Provide resource

M&S Team

In-house, Lab, Industry

Gov’t Agency 1

M&S Team

In-house, Lab, Industry

provide resource and use guidelines

Agreement

provide compensation/
negotiate agreement

Provide resource

M&S Team

In-house, Lab, Industry

Gov’t Agency 2

Complete agreement

Provide resource

Gov’t Agency 1

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M&S Team

In-house, Lab, Industry

Payment for support services received

Provide resource
Seeking a Balance

Government

- Establish standards
- Specify requirements
- State expectations
- Provide incentives
- Create intermediary
- Promote innovation and competition

Industry

- Compete for business
- Innovate to meet • requirements • standards and • expectations
- Promote COTS
- Protect IP investment
• Develop improved contracting practices
  – Specify software, tech data, documentation as a deliverable
  – Fund full cost of making M&S reusable (documentation, VV&A, interfaces, …)
  – Include expectations for software reuse in solicitations (and incentives for achieving reuse)
  – Implement stronger oversight of M&S development process
  – Require registration of all M&S resources (with metadata)
• Develop methods to assess downstream reuse potential
• Define criteria for reusability and assess new M&S against criteria w/metrics
  – Add criteria to discovery metadata
• Adopt strong scientific practices to ensure credibility of M&S products
• Publish specific open standards and common data formats that all must follow
• Apply “IP Intermediary” to bring together providers and consumers in a competitive market
• Create incentives for program managers
  – Overcome NIH and become open to external ideas
  – Fund full cost of achieving reusable M&S products
  – Form alliances with other program managers
  – Share program-funded resources and collaborate across government

• Promote the use of open source software

• Grant industry access to approved government models and databases

• Pursue balanced acquisition strategy
  – M&S COTS with enterprise licenses, GOTS, GPR, and proprietary non-commercial where needed
Industry role in a business model

(1 of 2)

- Recognize and embrace interdependencies through open business models
- Estimate the “value” of M&S products to include true cost of development and maintenance to make the resource discoverable and reusable
- Adopt strong scientific practices and rigor to establish credibility of M&S products
- Document and register M&S resources, including metadata
Industry role in a business model

(2 of 2)

- Develop and distribute M&S consistent with government business model
  - License copies, including enterprise licenses
  - Provide M&S for a fixed fee with unlimited rights
  - Distribute broadly at low cost (or free for open source) and sell supporting services
  - Enter into service agreements that provide access to M&S assets (industry retains exclusive rights and control of IP embodied in the M&S assets)
Private Incentives with Public Management
Government’s Role

Little

1. Publish standards
2. Require resources be registered
3. Provide incentives
4. Use market-driven approach that brings together users and providers

Significant

1. Invest in common goods
2. Broker alliances
3. Assess products for potential reuse applications
   - Fund investments to achieve reuse
4. Guide new users to existing resources
5. Manage enterprise licenses
6. Retain software contract deliverables for reuse
Next steps: Forum for Shaping a Business Model

• One-day summit
• Invite industry and government representatives
• Potential scenarios:
  – M&S support to an acquisition program
  – Shaping tools for analytic agenda
• Potential Issues:
  – Rights in M&S software and databases
  – Commercial wargaming and non-proprietary M&S??
  – Alternative M&S business transactions
  – Shared infrastructure
  – Promote both innovation and competition