



Modeling and Simulation Resource Reuse Business Model

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Report Documentation Page

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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.

<u>Tools</u>	<u>Data</u>	<u>Environment</u>	
Models	Input datasets	Architectures	Network resources
Simulations	Scenarios	Interfaces	SME expertise
Federations	Threat data	Protocols	
Utilities (post-Processors)	Algorithms Environmental info	VV&A templates	

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



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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

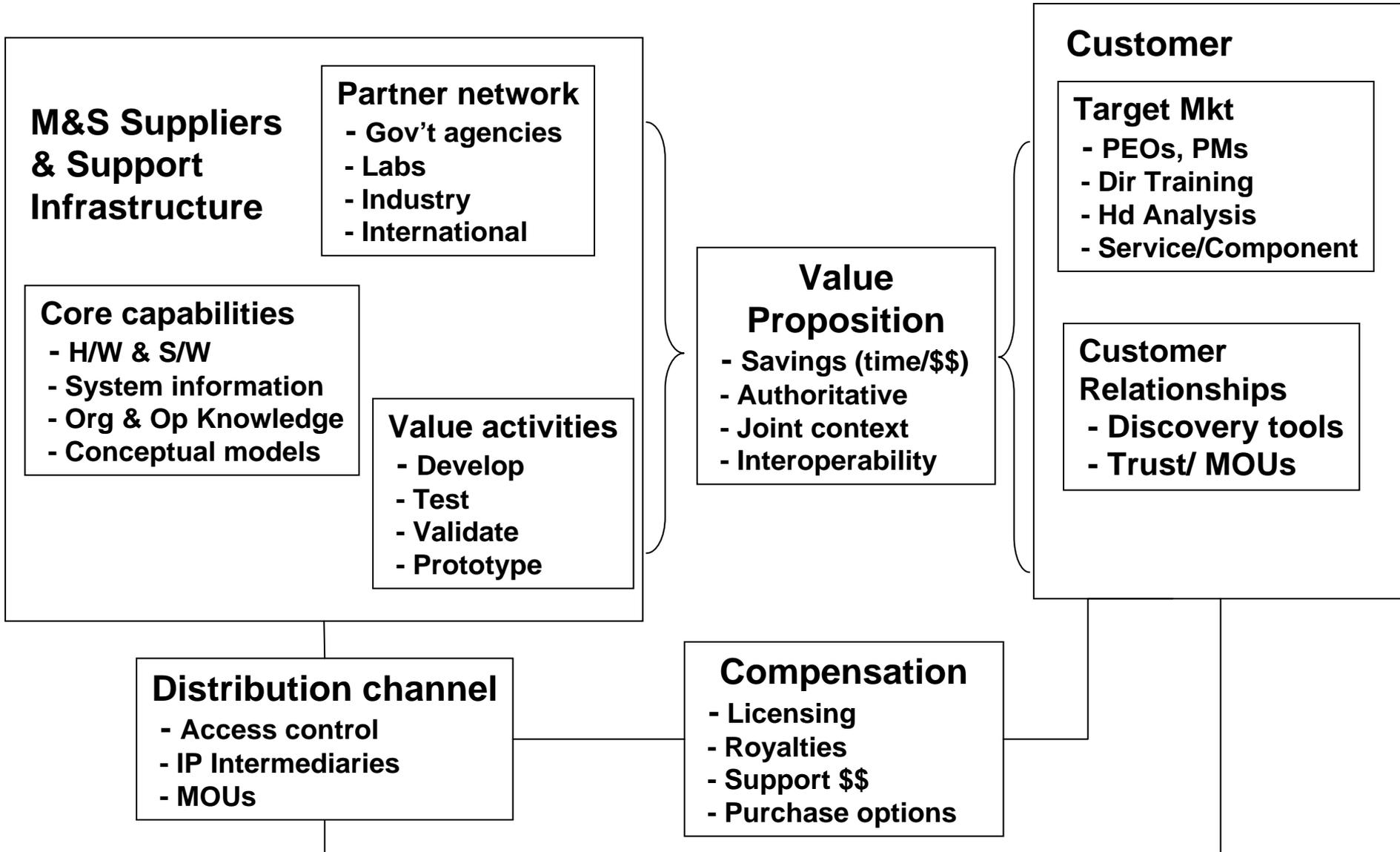
What is a business model?



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 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



	100% Government Funded	Mixed Funding Sources	100% Private Funding
Commercial	N/A	Same rights as standard license	Same rights as standard license
Non- Commercial	Unlimited rights	Government purpose rights (5 years)	Restricted rights

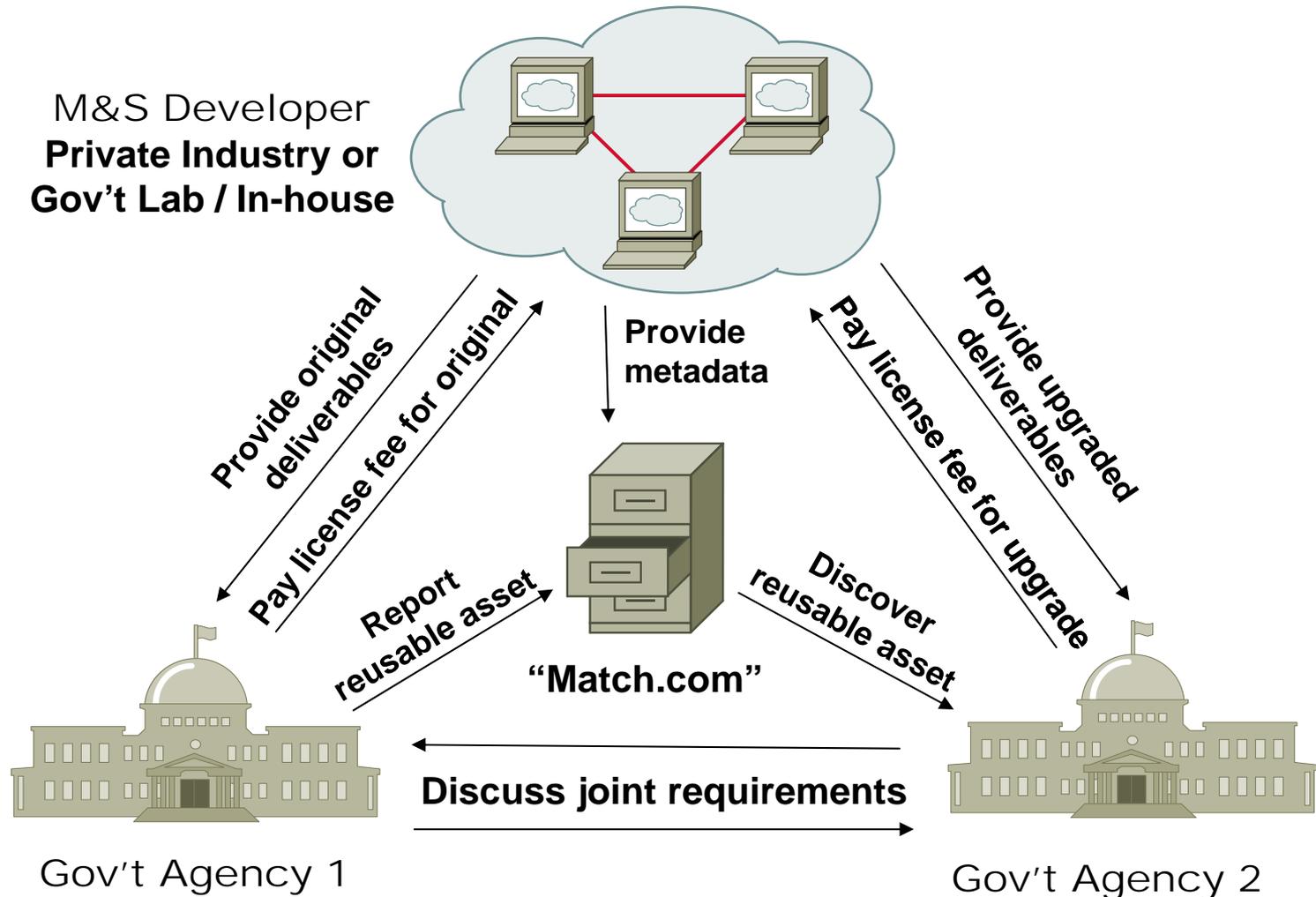
Default DFARS rights:

Contracts for technical data

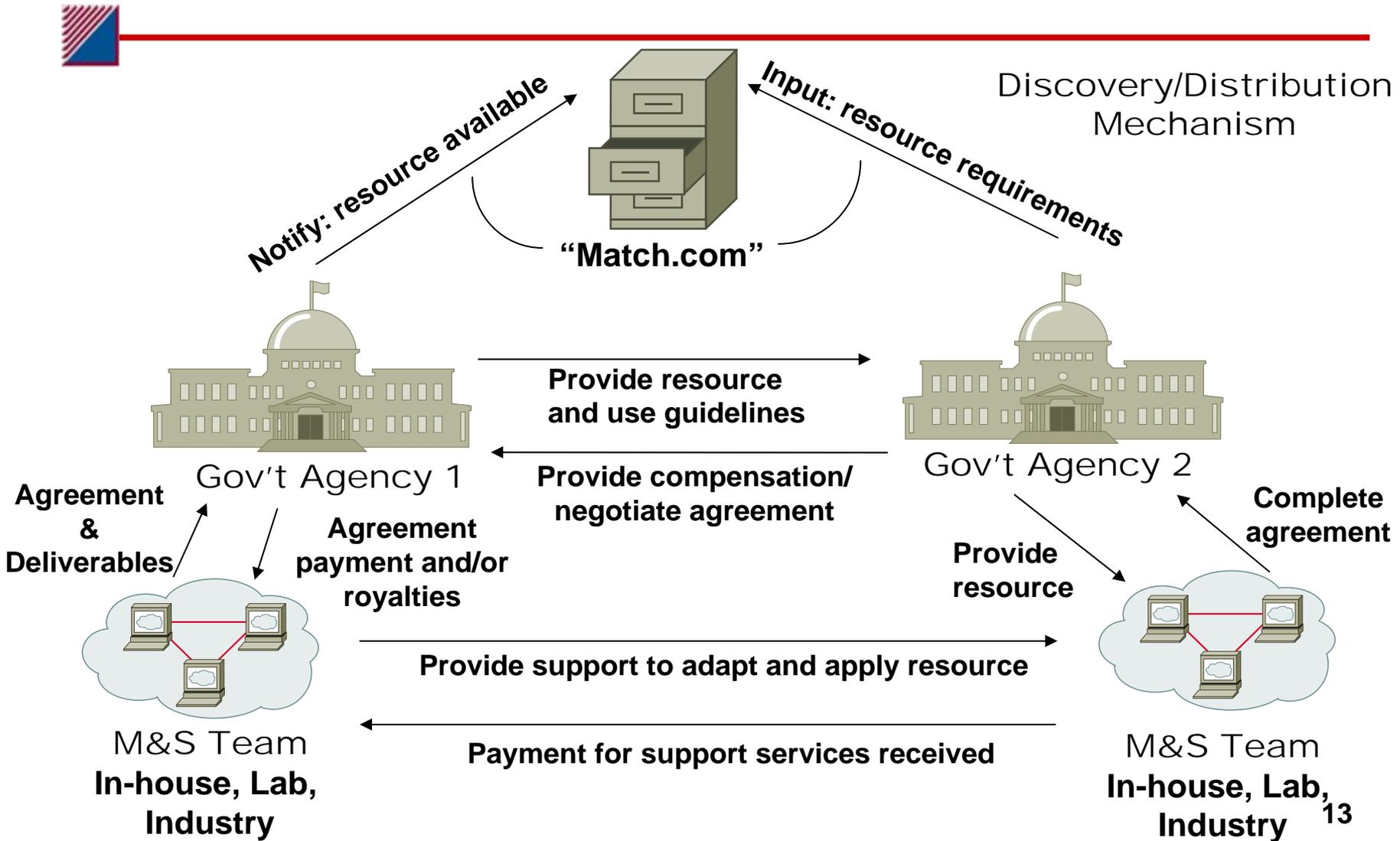


	100% Government Funded	Mixed Funding Sources	100% Private Funding
Commercial	Unrestricted gov't rights for unmarked data Qualified gov't purpose use for other data		
Non- Commercial	Unlimited rights	Government purpose rights (5 years)	Limited rights

Possible M&S Business Model



Another Business Model View



Seeking a Balance



Establish standards

Specify requirements

State expectations

Provide incentives

Create intermediary

Promote innovation and competition

Compete for business

Innovate to meet

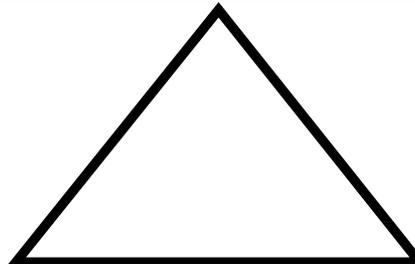
- requirements
- standards and
- expectations

Promote COTS

Protect IP investment

Government

Industry



Government role in a Business Model

(1 of 3)



- **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)**

Government role in a Business Model

(2 of 3)



- **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**

Government role in a business model

(3 of 3)



- **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



Significant

- Publish standards
- Require resources be registered
- Provide incentives
- Use market-driven approach that brings together users and providers

- Invest in common goods
- Broker alliances
- Assess products for potential reuse applications
 - Fund investments to achieve reuse
- Guide new users to existing resources
- Manage enterprise licenses
- 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