

Modeling and Simulation Resource Reuse Business Model

Briefing to the NDIA M&S Committee

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Outlook for DoD M&S

DoD's future environment

- **Tight budgets, short timelines, rapidly changing events, uncertainty**
- **Joint operations, often with other services, agencies, coalition partners**
- **Interoperable weapon systems and planning tools**
- **Net-centric operations with collaboration and sharing keys to success**

Implications for M&S and associated data

- **Must be affordable**
- **Assemble from existing components (first choice!)**
- **Transparent to new users**
- **Sharable with other partners**
- **Agile and adaptable to support a variety of problems**
- **Built to open standards**

Reusable M&S resources will command premium value

Status Quo:

Broad set of potentially reusable M&S resources

Data:

- Input datasets
- Scenarios
- CONOPs
- Threat data
- Algorithms
- Environmental info

Tools:

- Models
- Simulations
- Federations
- Utilities

Environment:

- Architectures
- Protocols
- Interfaces
- Network resources
- VV&A templates
- SME expertise

However, few M&S resources are reused – either during a single program's lifecycle or across acquisition programs

Existing Barriers to M&S Resource Reuse

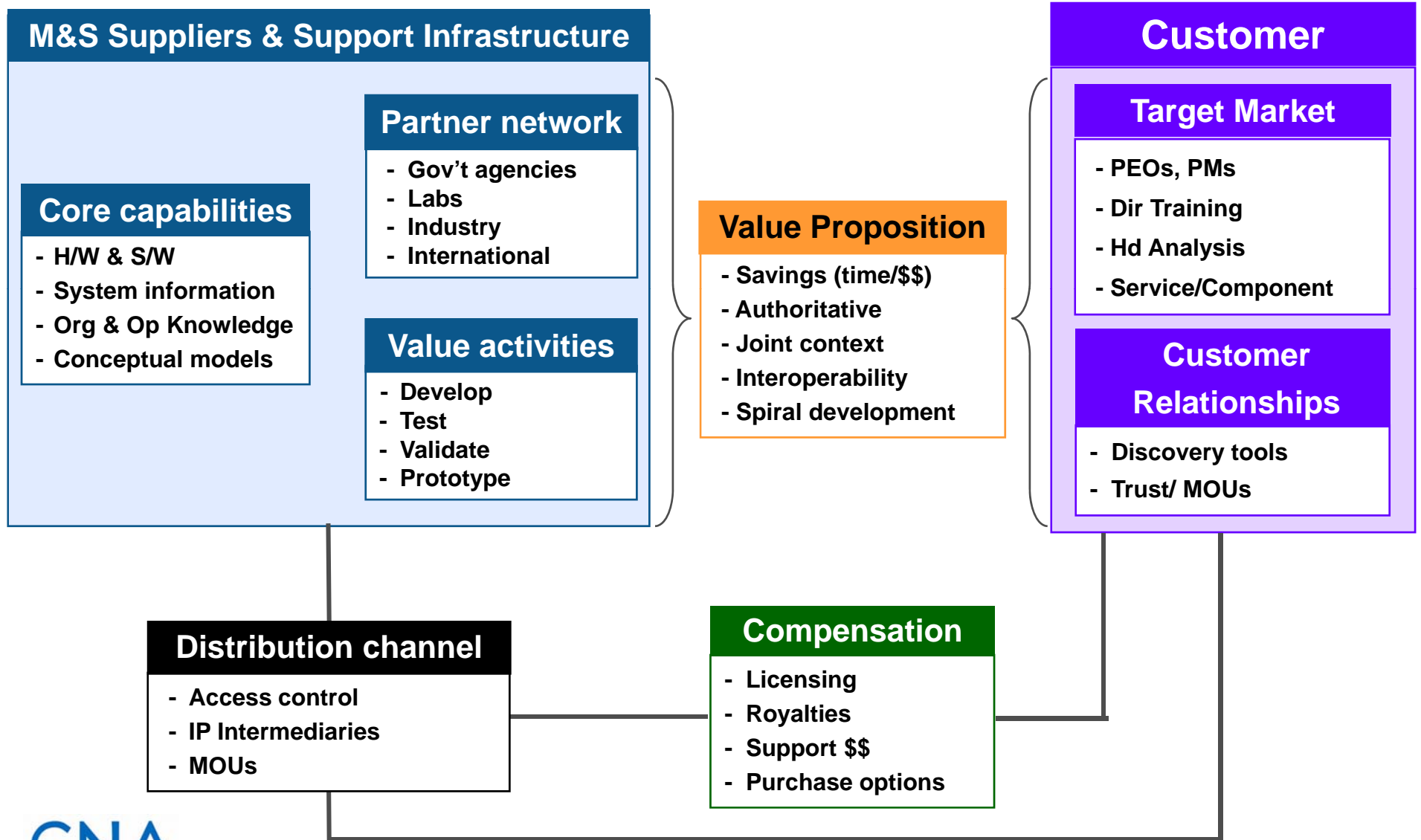
- Users lack awareness of reusable resources
- Insufficient details about reusable resources
- Hard to assess the true capabilities and limitations of existing resources
- Resources not in a form suitable for reuse
- Users lack trust in resources developed by others/ NIH
- Model is available but not 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

Can a business model overcome?

Approach

- Reviewed existing policy documents, DoD instructions, guidance, interagency agreements, FAR, DFARS, prior reports, ...
- Prepared case studies of reusable resources
 - SIMDIS, Linux, EADSIM, ICT, NIH/OTT, ...
- Used a variety of survey instruments, interviews, e-dialogue with industry and government
 - Where is reuse occurring today?
 - What “business factors” help to motivate reuse?
 - What are the challenges to reuse and how might these be overcome?
- Analyzed results within business model framework

M&S Resource Reuse Business Model



Lessons learned from successful M&S reuse (N-PSI, USAF CDS, JASP, JDS, DIA-TMAP)

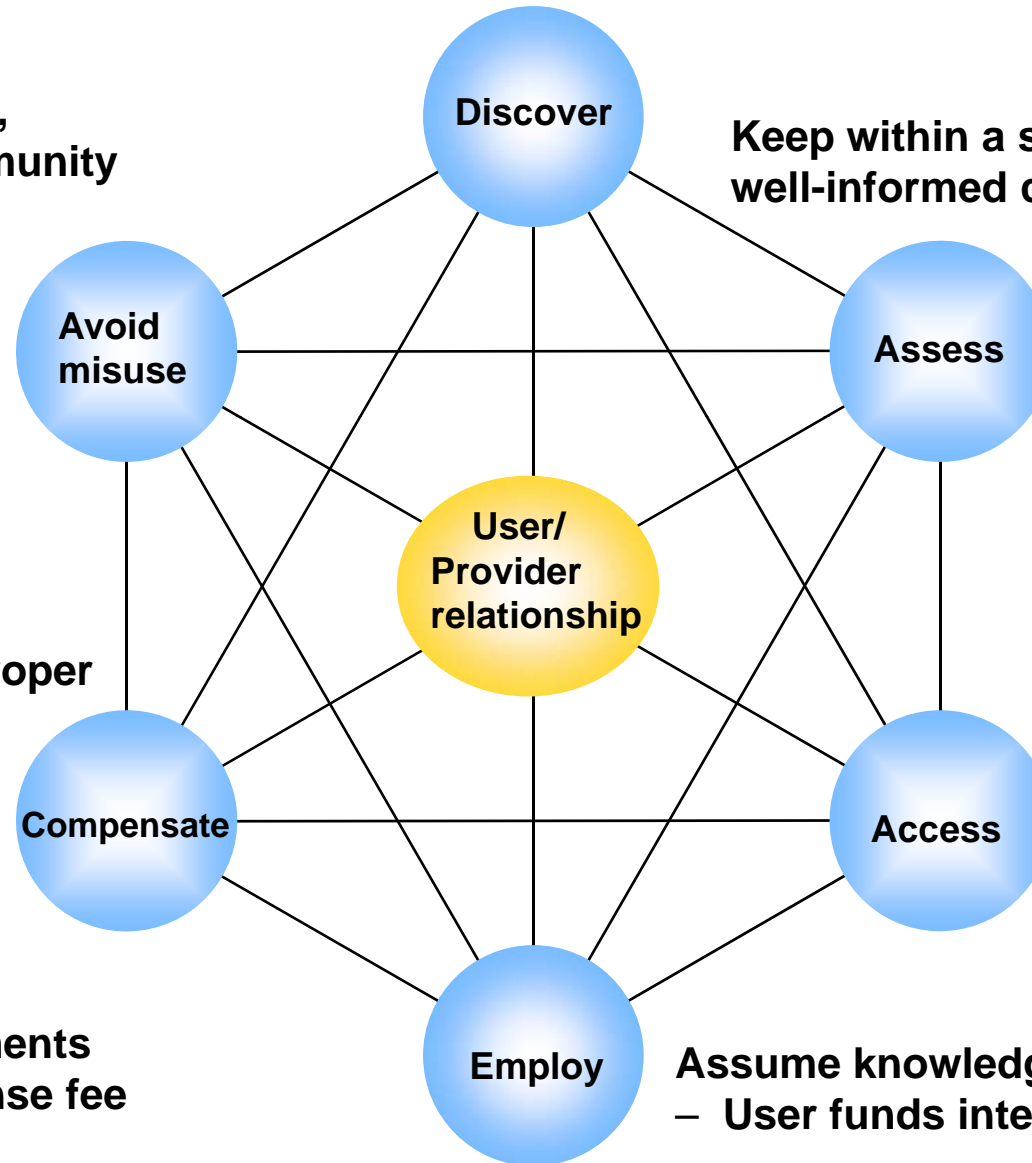
Keep within a small, well-informed community

- V&V guides use
- MOU if needed

GPR license and proper Sys Eng to reduce costs

MIPR to cover Additional costs:

- Personnel
- Model enhancements
- Incremental license fee



Keep within a small, well-informed community

Rely on standards

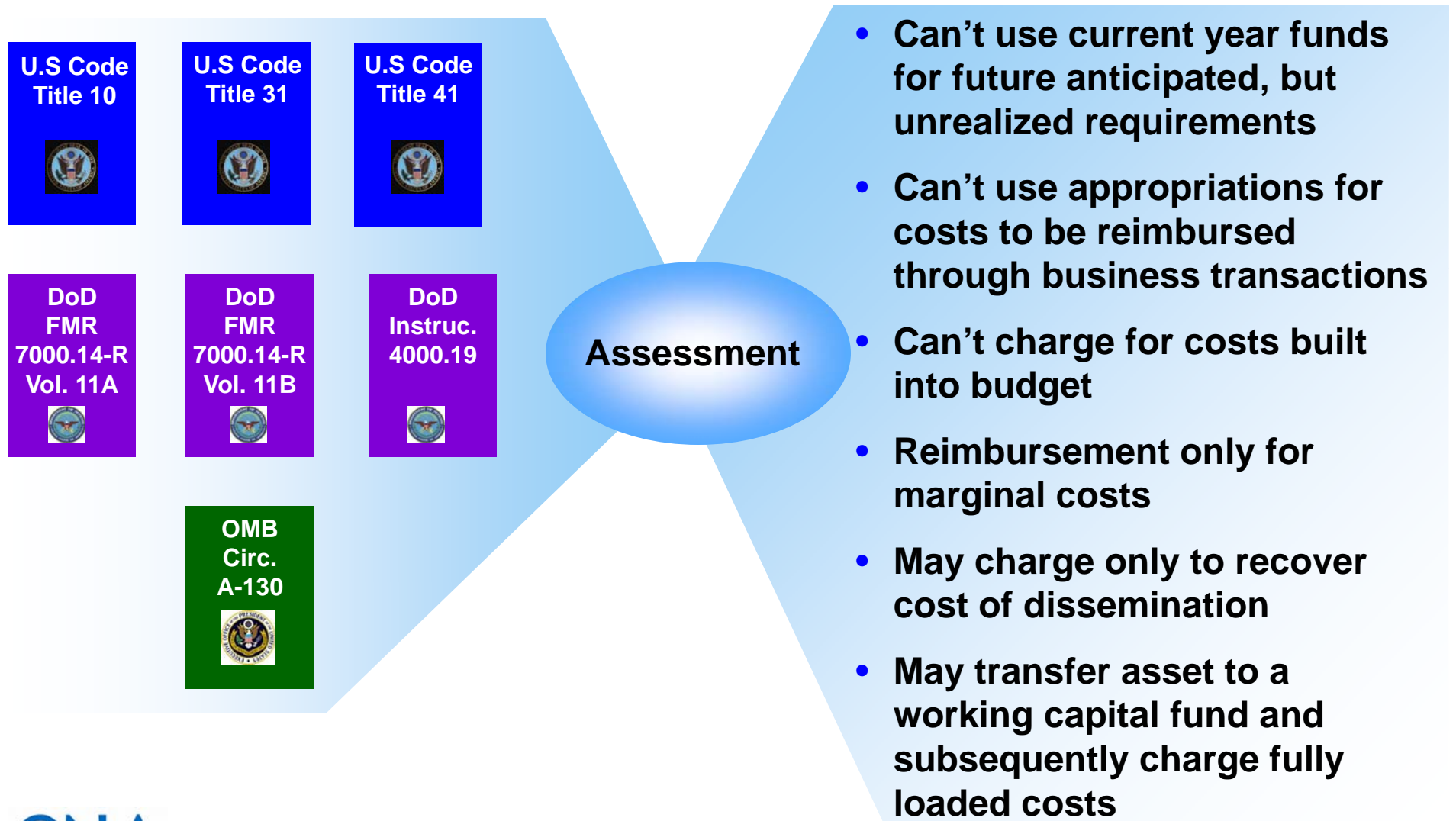
- V&V
- database formats (SEDRIS, OpenFlight, Shape, GeoTIFF)

Government Purpose Rights

Assume knowledgeable user

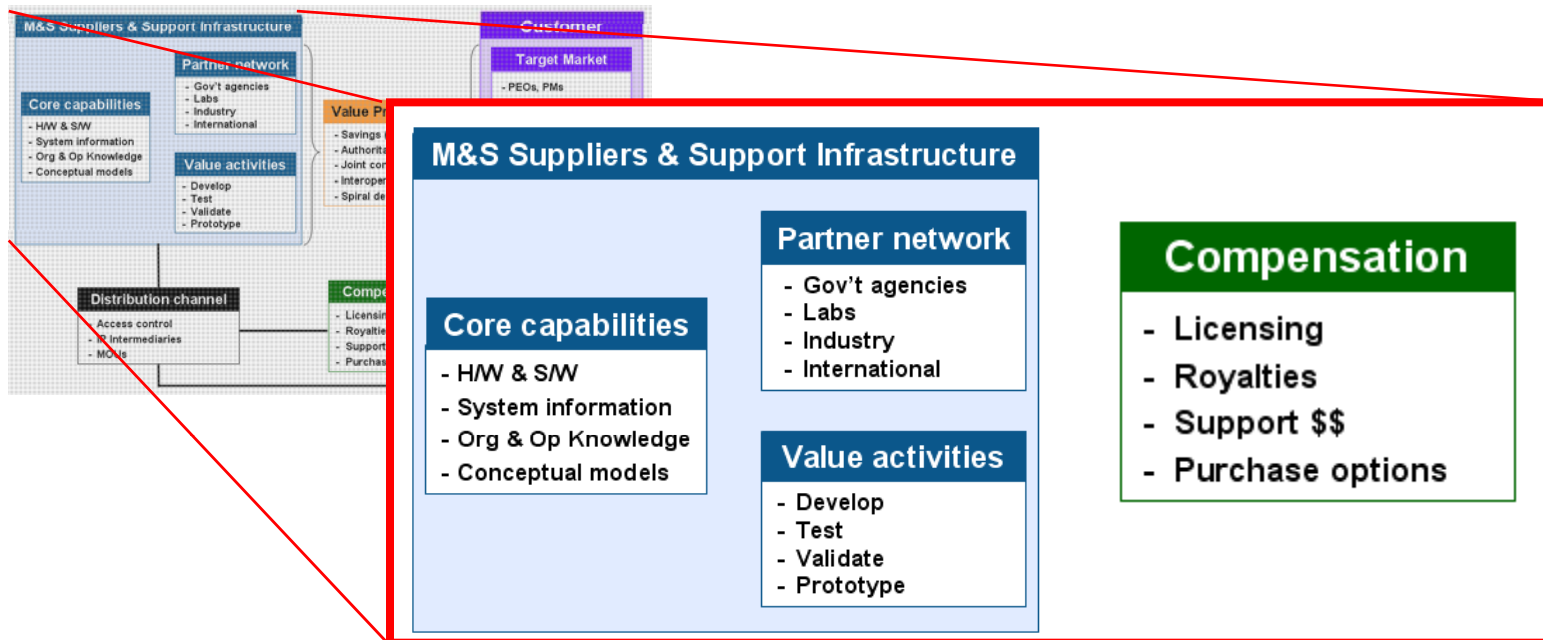
- User funds integration

Federal laws and DoD regulations affecting intra-government business transactions



Recommended Actions to Strengthen Reuse

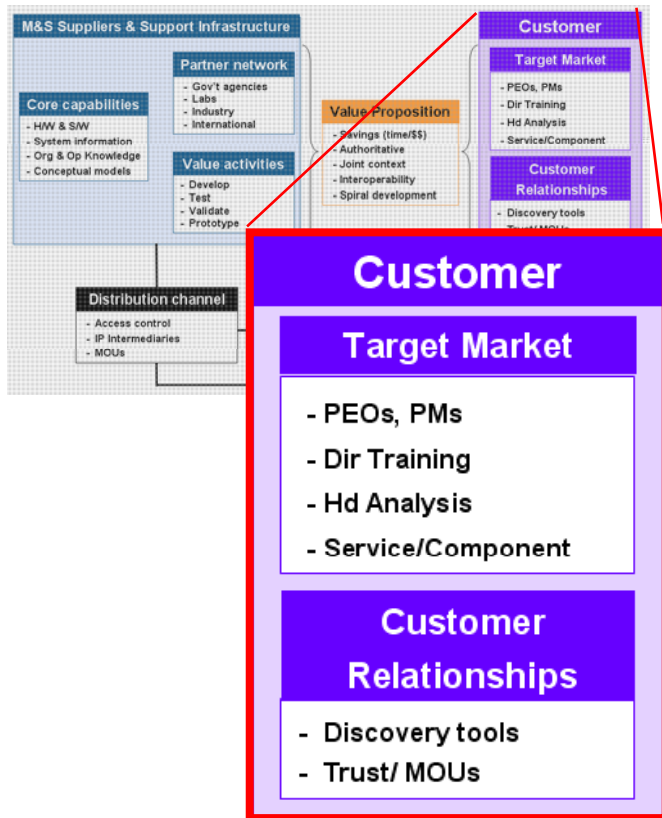
M&S Resource Reuse Business Model



Improve M&S Contracting Practices

- Government must become consummate and savvy consumer
- State reuse intentions in RFP (and incentives for achievement)
- Negotiate Tech Data Rights
- Price contract to include full cost of making M&S reusable
- Specify software, data, documentation to enable reuse in CDRL
- Implement stronger oversight of M&S development process

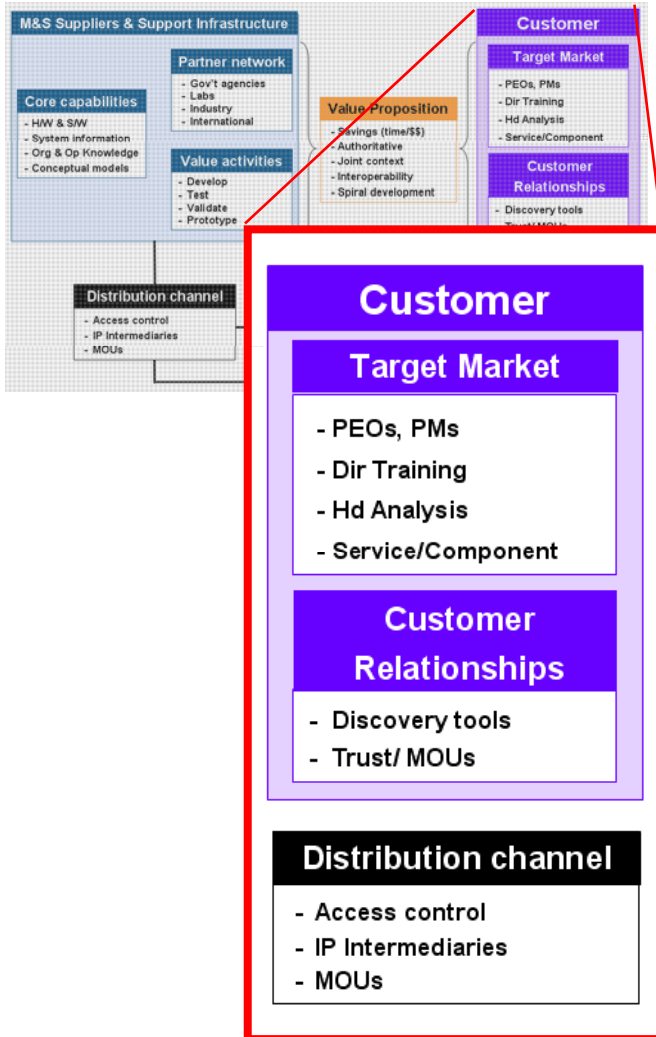
M&S Resource Reuse Business Model



Develop training and education for M&S contracting

- **Protect government rights to reuse M&S**
 - Contract Officers**
 - Form and function of alternative deliverables (source code, object code, database)
 - Program Managers/ DoD decision makers**
 - Understand proprietary, open-source, commercial and associated rights
 - Negotiating strategies
 - Support materials to make reusable
 - Life cycle concerns
- **Create registry of existing license rights**
- **“Best Practices” Guide for M&S contracting**

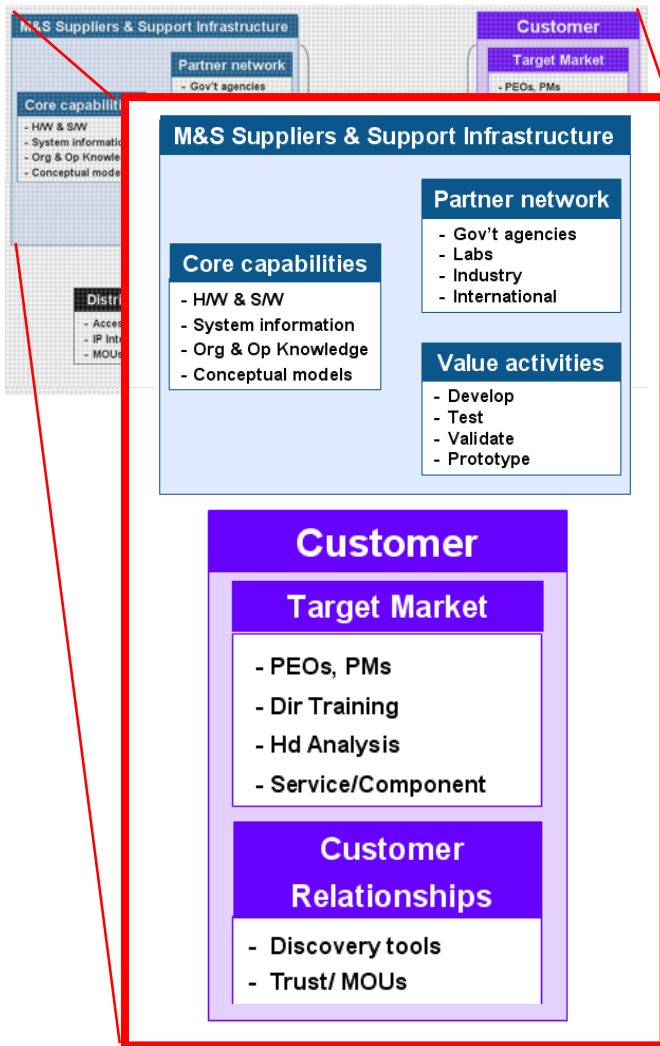
M&S Resource Reuse Business Model



Identify reuse opportunities early and make visible to others

- Downstream and cross-program reuse
- Form partnerships for common needs
- Share costs (licenses, V&V, etc.) to make reusable
- Use M&S Intermediary to bring parties together
 - Helps PMs locate suitable M&S resources
 - Helps developers find a market for established M&S resources
 - Facilitates license agreements
 - Registers rights associated with each resource
 - Handles MOUs to guide appropriate use and avoid liability
 - Builds and maintains the knowledge base
 - How resource used in the past
 - V&V histories

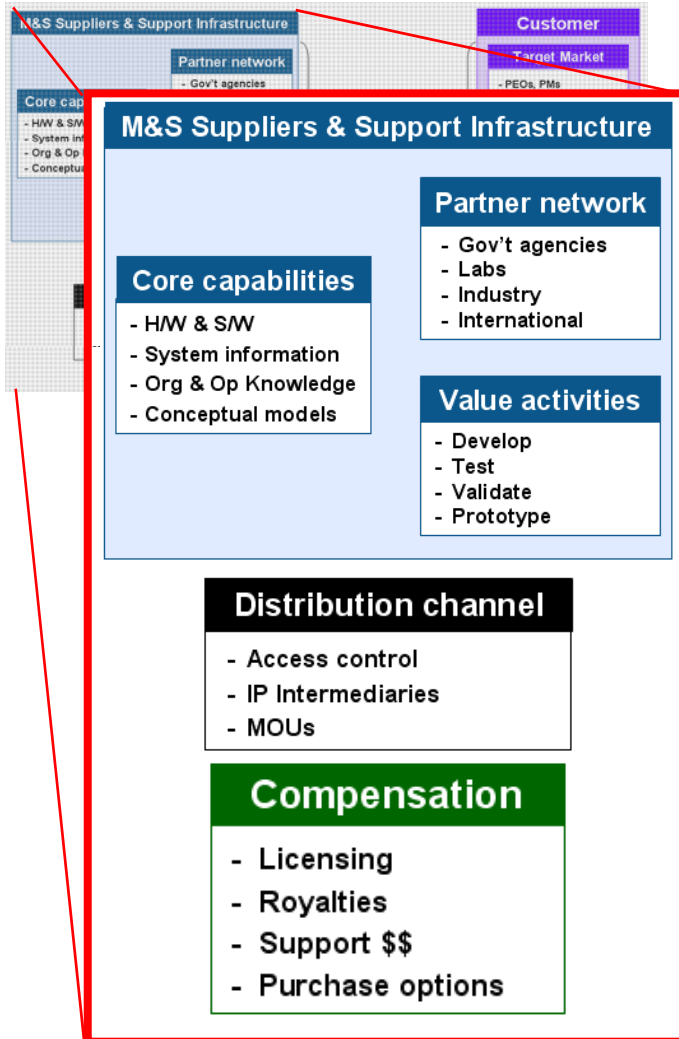
M&S Resource Reuse Business Model



**Implement M&S registry with
“Discovery” meta-data tagging
for reuse**

- **Require all DoD-funded M&S to be registered**
- **Include available license rights in meta-data**
- **Supplement with Wiki posting user experiences with the resource**
- **Link to a few, small, controlled repositories of GOTS products**

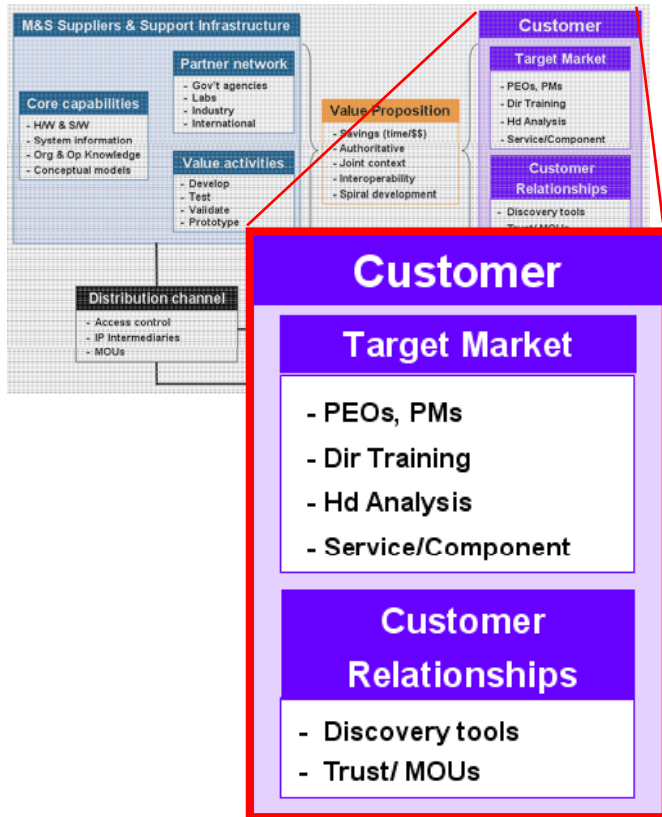
M&S Resource Reuse Business Model



Centrally fund the common M&S infrastructure

- **Make broadly used GOTS M&S reusable and manage Life Cycle Costs**
 - No single program can be responsible
 - Baseline version must support majority
- **Similar approach for common databases**
 - Environment, threat models, scenarios
- **Register reusable assets in the “M&S commons”**
- **Negotiate site or enterprise licenses for broadly used commercial M&S**

M&S Resource Reuse Business Model

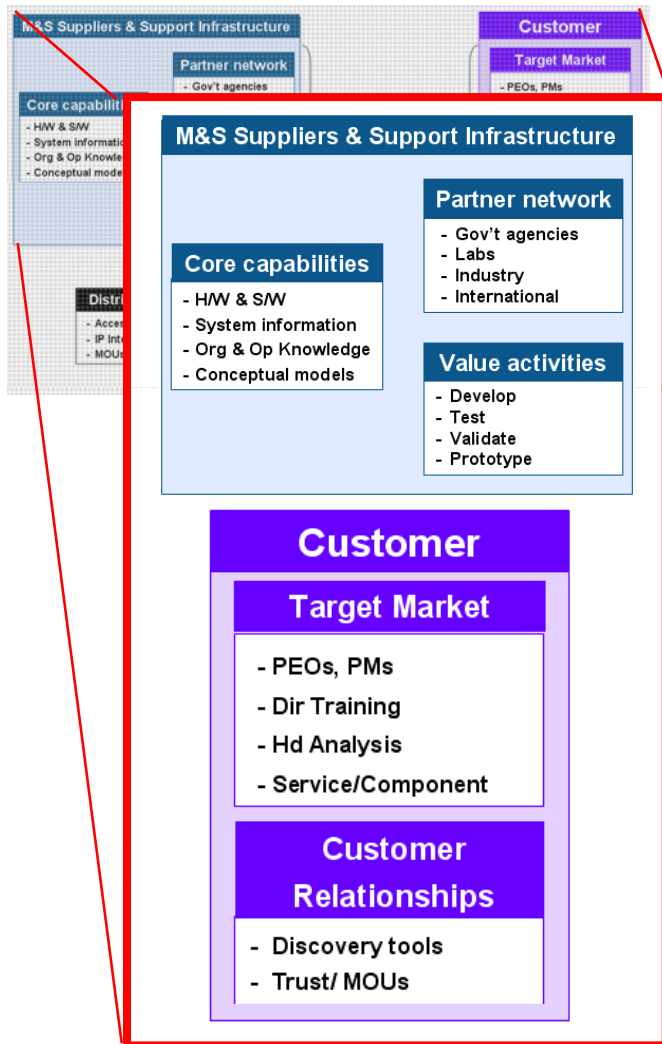


Establish reuse goals at PEO and program levels

- Comprehensive review of existing resources before buy before build
- DoD provide supporting infrastructure
 - Resource registry including:
 - License rights of existing resources
 - User-Wiki experiences with resource
 - M&S intermediary to identify potential partnerships

Amend DoD regulations to allow recovery of costs through subsequent reuse by others

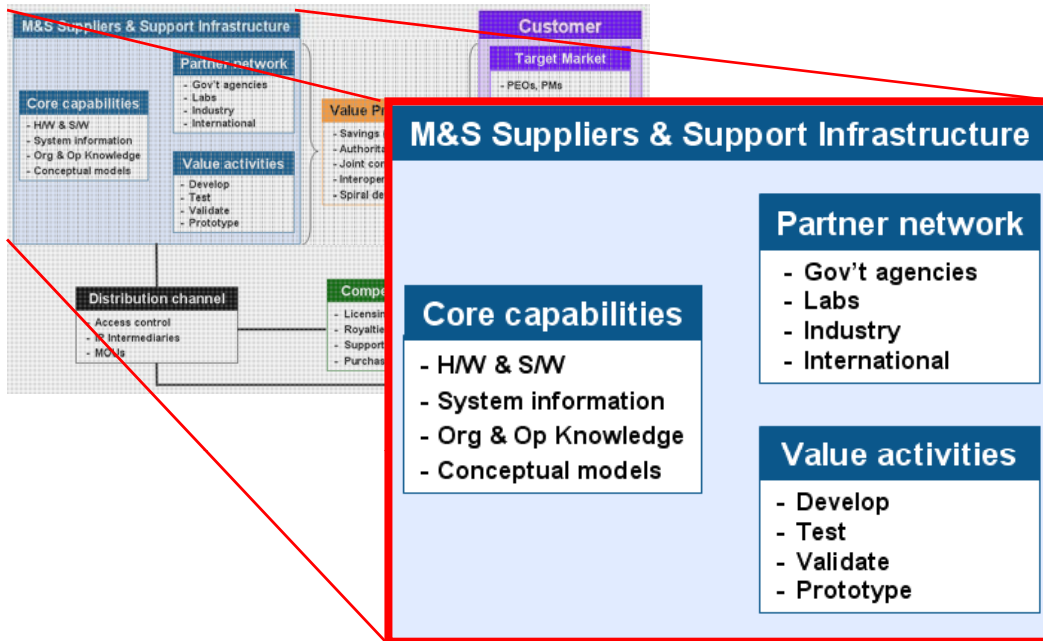
M&S Resource Reuse Business Model



Recruit a senior government champion/advocate for reuse

- **Use the bully pulpit**
 - Keynote addresses
 - Publish articles on reuse success stories
- **Overcome industry skepticism**
 - Articulate DoD true aims for reuse

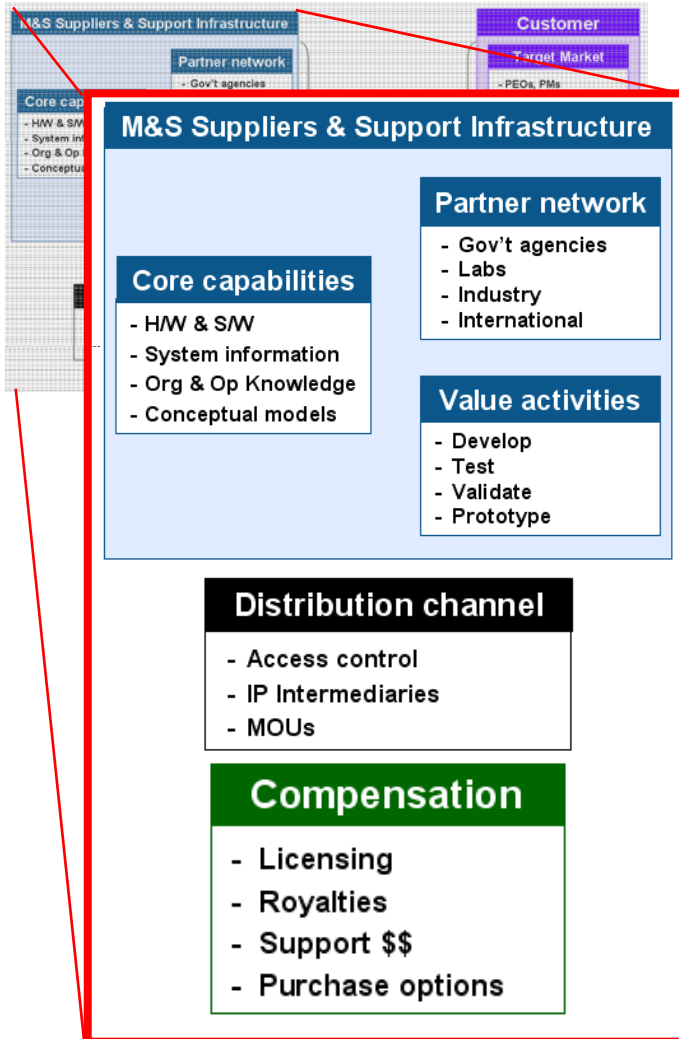
M&S Resource Reuse Business Model



Convene Industry Summit on M&S IP

- Communicate DoD objectives with respect to IP
- Balance governments role:
 - Provide industry with incentives to innovate
 - Protect government investments and rights to reuse
- Grant industry access to approved gov't M&S
- Use Congressional H. Res 487 to energize partnership
- Reinforce through bully pulpit (articles, speeches)

M&S Resource Reuse Business Model



Transfer appropriate M&S resources to DoD Working Capital Funded activities

- **Example: Major test range**
- **WCF activities can reuse M&S and bill fully loaded costs to government and industry**
- **Compensate M&S provider with test range services**

Summary

Barriers to M&S Reuse

Actions to Overcome Barriers

	Discover resource	Assess resource	Acquire resource	Ensure inter-operability	Compensate developer	Avoid Misuse
Include reuse in RFP			X		X	
Register all resources	X	X	X			X
Few, small, linked repositories			X			
Intra-governmental transactions			X		X	X
Oversee development process			X		X	
Make reuse opportunities visible	X	X		X	X	X
Centrally fund common tools			X	X	X	
Gov't Champion	X					X
Training & education			X		X	X
Best Practices Guide			X		X	X
Open Business Models	X	X	X		X	X
Scientific Practices		X		X		X

Follow-on Work: Best Practices for M&S Contracting

Develop a guidebook to enable government decision-makers to make cost-effective investments in M&S, including reuse

Issues:

- **Understanding the appropriate role of M&S in the proposed application and defining user requirements**
- **Discovery process to determine availability and suitability of existing M&S resources**
- **Guidelines for selecting between government funded new development and existing commercial or other non-developmental (e.g., GOTS)**
- **Developing RFP for M&S goods and services**
- **Evaluating the capabilities of government and industry M&S teams**

Follow-on Work: Best Practices for M&S Contracting

Issues: (Continued)

- **Relevant government laws, policies, and regulations**
- **Assessing the long-term reuse potential of an M&S resource and the steps to make it reusable**
- **Assessing the technical data “rights” needed to support current, and potential future, applications of an M&S resource and matching with software licenses and data rights available through the DFARS**
- **Negotiating strategies to obtain rights to use, modify, reproduce, ...**
- **Assessing M&S interoperability and data interchange requirements**
- **Monitoring the software development process**
- **Understanding the government’s responsibility in protecting proprietary data from unauthorized use and disclosure**

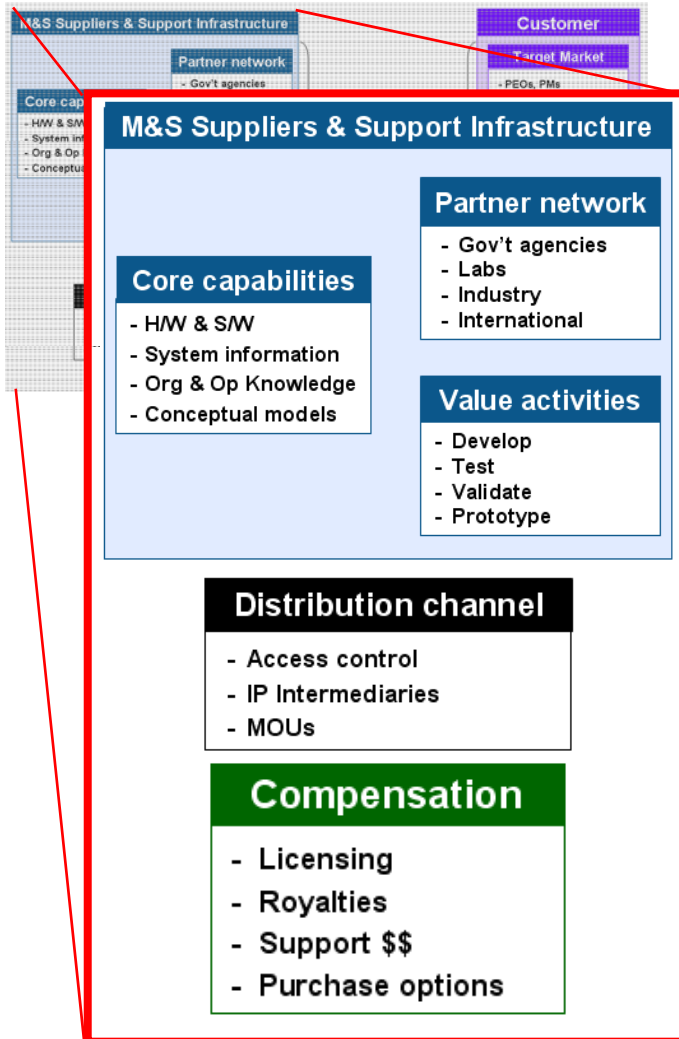
Follow-on Work: Best Practices for M&S Contracting

Issues: (Continued)

- **Specifying contract deliverables**
 - Form of software (source vs object code)
 - Types of documentation to support current and future
 - Criteria for acceptability of final deliverables
- **Contracting for life-cycle maintenance of M&S**

Backup

M&S Resource Reuse Business Model



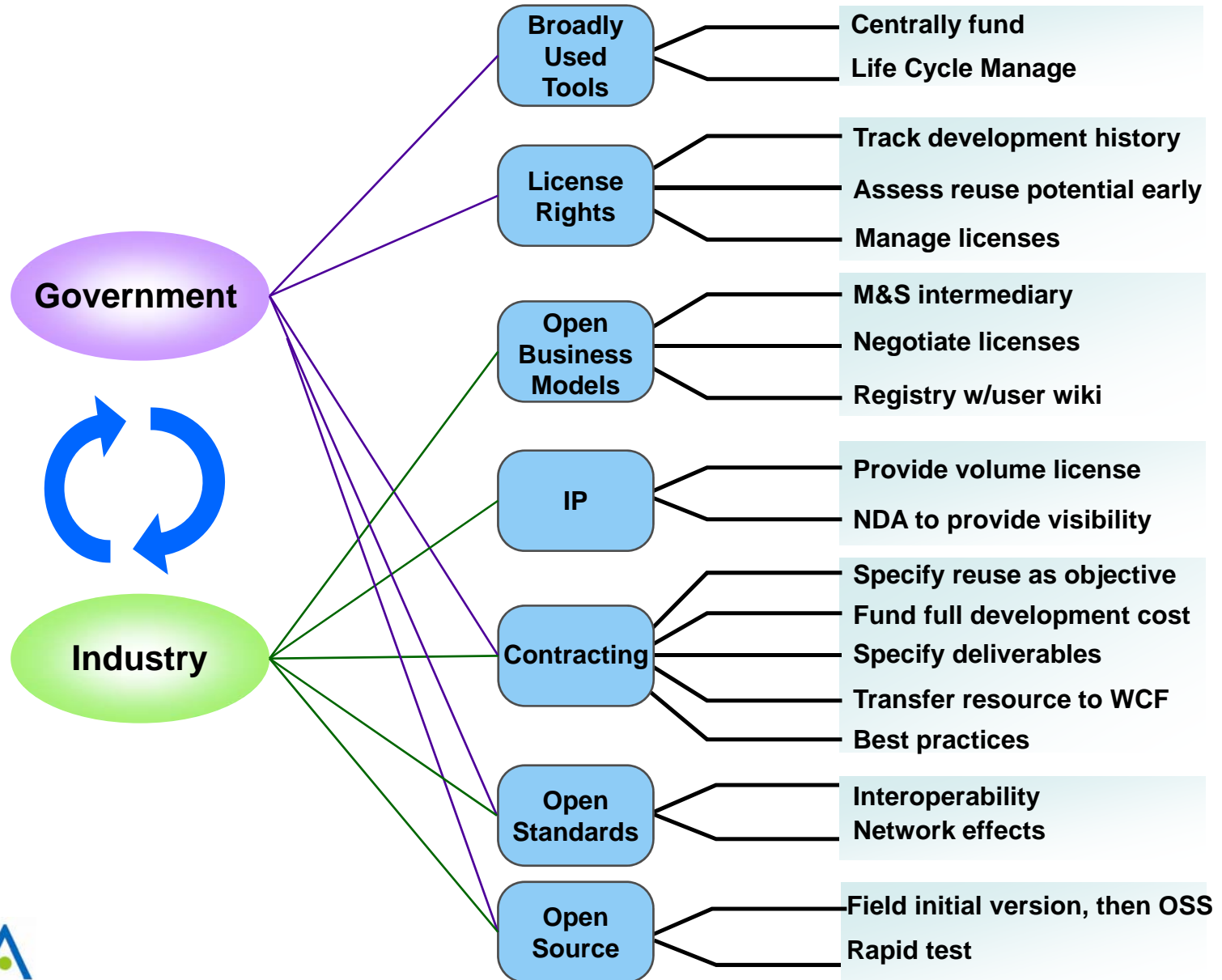
Adopt Open Source Software where it makes sense

- Leverage talents of many
- Improve peer review
- Achieve “network effects”

Challenges

- Feasible for some but not all M&S
- Decoupling from original developer can be expensive
- Configuration management
- Potential for lots of derivative products
- Funding to integrate into baseline
- Requires strong Gov't leadership
- Some commercial firms will retain proprietary products

Summary



Who we have spoken to:

Northrop Grumman
Aegis Technology
MAK Technologies
PM FCS AD M&S
NGA
NAVAIR Portable Source Initiative
OSD-JDS
BreakAway, LTD
MSIC, DIA TMAP
USJFCOM J9
USAF Common Data Set
M&S EA (Ocean, Air&Space, Terrain)
IWS General Council (SEA00)
Pitch Technologies
MMA M&S

Boeing
Soar Technology
Lockheed Martin
MOVES/NPS
Metron
NAVMSMO
JSF M&S
IWS M&S
USN IWS SHARE
SAF/XC
OPNAV N814
NRL
JASP
MSIAC

Challenges to M&S Reuse

How do users –

- Become aware of available reusable resources?
- Assess the capabilities of existing resources against new requirements?
- Acquire the resource from prior users (or the developer)?
 - Without re-purchasing the resource
- Ensure interoperability with other M&S components?
- Compensate the resource provider ?
- Avoid misuse of the resource and potential liability?

Can a business model overcome?