



Requirements – Management Using Web Services Architecture

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Abstract:

This document lists the requirements for Management Using Web Services Architecture (MUWSA) specification.

Status:

This document is a **working draft** of the OASIS Web Services Distributed Management (WSDM) Technical Committee. Comments are most welcome.

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1 Introduction

This document lists the requirements to be satisfied by *Management Using Web Services Architecture*, part of an OASIS standard to be developed by WSDM-TC, as per the TC charter:

To define web services management. This includes using web services architecture and technology to manage distributed resources. This TC will also develop the model of a web service as a manageable resource. This TC will collaborate with various evolving activities within other standards groups, including, but not limited to, DMTF (working with its technical work groups regarding relevant CIM Schema), GGF (on the OGSA common resource model and OGSI regarding infrastructure), and W3C (the web services architecture committee). Also liaison with other OASIS TCs, including the security TC and other management oriented TCs.

This document is concerned only with requirements for management using Web services architecture. A companion document will identify requirements for management of Web services.

1.1 Basic Structure and Components of a Management Framework

An enterprise deploying a management solution would typically have following components:

- Several *manageable resources* capable of being monitored, configured and controlled via one or more remote applications, known as *manager*. The software component representing or part of the manageable resource responsible for interacting with the manager is referred to as the *managed object* in this document. Traditionally, such software is also known as *agent*. The main difference is that a managed object referents only one manageable resource whereas an agent is typically responsible for a complete node or application.
- Management protocol to convey control and data packets between manageable resources and the manager.
- Model of manageable resources describing
 - Attributes
 - Operations
 - Event Notifications
 - Relations with other manageable resources

To support such solutions, a management framework consists of:

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- A protocol definition
- A language to specify management models
- Description of common model elements
- Description of domain specific models

98 1.2 Existing Management Frameworks

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A number of standard management frameworks are currently in wide use

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- SNMP (SNMPv1, SNMPv2 and SNMPv3) and related standards developed by IETF.
- CIM/WBEM developed by DMTF
- Open Management Interface (OMI) – submitted to OASIS MPTC by HP and webMethods.

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Besides these, there are many proprietary frameworks developed by various vendors.

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Though OMI is XML based and uses SOAP for packaging, none of these frameworks are based on Web services architecture and leverage its benefits.

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111 1.3 Notation

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The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this specification are to be interpreted as described in IETF RFC 2119.

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2 Management Framework

2.1 Functional Requirements

[<HK remove the word 'protocol' from this entire section >](#)

[<HK Editors finished categorizing thru \(I\)>](#)

[<HK TC finished section 2.1.2\(A\) , 2.1.3\(B\)>](#)

2.1.1 Specification requirements

2.1.1.2 WSA Compliance (A) [WSA-COMP]

[FR001 WSA-COMP.001] ~~The management protocol~~ MUST use existing Internet infrastructure and be compliant to Web Services Architecture developed by W3C WSA Working Group. (Source: IBM, HP, MPTC). {#1, #11, #45, #96, [128](#), [125](#), [39](#), [22](#)}

The standards included for the purpose of this section:

- [XML](#)
- [HTTP, HTTPS](#)
- [SOAP](#)
- [WSDL \(1.1 or 1.2?\)](#)
- [WS-I Basic Profile \(as a goal for interoperability\)](#)
- [WS-Security \(#25\)](#)
- [Reliable Messaging \(#90\)](#)

- **[FR001.1 WSA-COMP.001.1]** ~~The protocol~~ MUST involve exchange of XML [infoset](#) messages. [<HK: not must, messages expressable in XML. > \(attachments, http, binary compression\)](#)
- **[WSA-COMP.001.2 FR001.2]** ~~The protocol~~ ~~MUST~~ ~~SHOULD~~ allow discovery of manageable resources through Web services discovery mechanisms. These mechanisms could be based on a central registry like UDDI and/or decentralized, out-of-band gathering of WSDL documents (such as retrieving WSDL documents through a crawler). (Source: IBM, HP, MPTC) {#6, #76} [< Winston: Make separate high level requirement, look at discovery mechanism to see if sufficient \(i.e. email, asking one resource for other resources. May need normative method for interop. >](#)
- **[WSA-COMP.001.3 FR001.3]** ~~The protocol~~ MUST require description of management capabilities of a manageable resource using WSDL. [and documents it refers to \(align and ref w/ 122\)](#). WSDL should be used for
 - [capabilities – ref 122](#)
 - [interface, - props and ops that represent the management capabilities \(#2, #15\)](#)

- 153 o [access – description binding of interface to wire format \(including message](#)
- 154 [packaging\) \(#3, #15\)](#)
- 155 o [addressability description – info necessary to send a message to invoke the](#)
- 156 [interface described using the access described. \(Source: IBM, HP, MPTC\) \(#2,](#)
- 157 [#3, #4, #15\)](#)
- 158 o [some of the capabilities may not be fully described in WSDL interface at design](#)
- 159 [time, the details of some capabilities may be accessible only during runtime](#)
- 160 • **[WSA-COMP.001.4 FR001.4] Goal:** Leverage, does not invent, non-management
- 161 specific Web services infrastructure. If non-management specific
- 162 services/infrastructure is required then it is placed as a requirement on the Web
- 163 services community. This TC may need to assist in the development of the
- 164 infrastructure services. Required infrastructure include: notifications, relationships,
- 165 registry etc. {#1, #11, #22, #39, #57, #125, #128}
- 166 • ~~<delete>~~ **[WSA-COMP.001.5 FR001.5]** Should follow the principles of Web Services
- 167 – Loose Coupling {#48}, Discoverable {#6, #76 – to new section}, Internet friendly
- 168 (already have from top part) (need to define loose coupling, architectural? Msg?)
- 169 • **[WSA-COMP.001.6 FR001.6]** Outline an ~~architecture~~ architecture for Management
- 170 Using Web Services. {#28, #57}, management patterns, how a mgmt app uses, how
- 171 a mgd resource uses, how to self manage. < move to specification requirements >
- 172 • **[WSA-COMP.001.7 FR001.7] Interoperability between vendors. Goal:** Should be
- 173 WS-I basic profile compliant conformance. {#71}
- 174 • ~~<delete>~~ **[WSA-COMP.001.8 FR001.8]** Use HTTPS for security on the wire. {#25},
- 175 Should also leverage WS-Security as well. {#25} < Delete, covered by FR001 and
- 176 security section)
- 177

(A) Access to manageability capabilities of manageable resources is described using WSDL (Binding)	3.
(A) Addressability or access point for manageability capabilities of manageable resources is described using WSDL (Port)	4.
(A) based on ws standards	128.
(A) be a GOOD web service (wsdl, use messaging efforts avail for ws allowing multiple transports, interoperability efforts underway)	45.
(A) composability, independently written put together so can understand the result, like continuity principles, understanding semantics of change	105.
(A) Leverages, does not invent, non-management specific Web services infrastructure. If non-management specific services/infrastructure is required then it is	11.

placed as a requirement on the Web services community. Required infrastructure includes: notifications, relationships, registry, etc.	
(A) loose coupling	48.
(A) Manageability capabilities of manageable resources described using WSDL (PortType)	2.
(A) Manageable resources are discoverable in a manner consistent with the Web services architecture.	6.
(A) Use existing internet infrastructures	1.
(A) work in ws platform medium	96.
(A) ws management architecture – identify facilities that allow management using ws for management applications	28.
(A) wsdl based, portTypes, bindings	15.
(A, G) discovery	76.
(A,C) consistent w/ existing and future ws, don't break ws	125.
(A,C) ws-I compliant	71.
(A,C,E) support current ws security models	25.
(A,G,H) discovery oriented, use whatever tools in other models too to figure out whats around	104.

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179 **2.1.22.1.3 Message Exchange Patterns (B) [MEP]**

180 **[FR002 MEP.001]** ~~The management protocol~~ MUST support request-response style
 181 interaction between a manager and a manageable resource for interface. {#38}

182 • **[FR002.1 MEP.001.1]** ~~Must~~ Support Synchronous as well as asynchronous
 183 delivery of messages and request/response styles. {#142}

184 • **[MEP.001.2 FR002.2]** Should support Asynchronous delivery of messages
 185 and request/response styles

186 **[MEP.002 FR002A]** Should support asynchronous interactions between a manager and
 187 a manageable resource for interface.

188 **[MEP.003 FR002B]** Should support one-way style interaction (asynchronously)

189 <check what WS-I supports>

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[MEP.004 FR003] ~~The management protocol~~ MUST support delivery of ~~event~~ notifications from manageable resources to manager. (Source: IBM, HP, MPTC) [{98,33}](#)

- **[MEP.004.1 FR003.4]** ~~The notification receiver~~A manager SHOULD be able to control what notifications ~~are sent to it~~does it receive. [\(filtering and/or subscription at managed resource side\)](#) (Source: HP)
- **[MEP.004.2 FR003.2]** ~~A manager~~The notification receiver SHOULD be able to indicate [whether it wants to receive notifications asynchronously as and when they happen or poll them periodically.](#) (Source: HP) [{#90}](#)
- **[MEP.004.3 FR003.2C]** SHOULD support asynchronous delivery of notifications
- **[MEP.004.4 FR003.2.D]** MUST support synchronous polling for notifications
- [\[FR003.2.E\] The managed resource MUST be able to indicate if it supports asynch or polling notifications mechanisms.](#)
- **[MEP.004.5 FR003.3]** **Must** ~~S~~support guaranteed notifications. [{#90}](#) [\(and advertise its support\)](#)
- **[MEP.004.6 FR003.4]** **Must** ~~S~~support ~~in-ordering-delivery~~ of notifications [from a managed resource's perspective.](#) (if event A happens before even B then notification of A should arrive before notification of B) [{#90}](#)
- **[MEP.004.7 FR003.4]** Support synchronous as well as asynchronous. [{#142}](#) [<Dup of 3.2>](#)

(B) support event mechanism	38.
(B) support pull and push notification models, also guaranteed delivery in order	90.
(B) Synch and asynch usage	142.

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2.1.32.1.4 Conformance/Consistency with Other Standards (C) [STD-COMP]

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[FR004STD-COMP.001] ~~The management protocol~~ SHOULD be consistent with existing ~~upcoming~~ management specifications such that it can be used/applied in those communities. I.e., GGF, DMTF. (Source: IBM) [{#12, #20, #130}](#) [Including, but not limited to:](#)

[\[STD-COMP.001.1 FR004.4\]](#) SHOULD be possible to build WSDM implementations such that it can manage systems that are described by CIM models. [{#23}](#) [<Take this out and work thru requirement in Model Neutrality?>](#)

[STD-COMP.002 FR004+] SHOULD consider consistency with upcoming (draft) management specifications such that it can be used/applied in those communities. I.e., GGF, DMTF. (Source: IBM) [{#12, #20, #130}](#)

224 ~~[**STD-COMP.003 FR005**] This protocol SHOULD co-exist with existing management~~
 225 ~~environments and protocols and SHOULD~~ not inhibit their simultaneous usage with existing
 226 management environments and protocols in a common environment. (Source: MPTC)
 227 ~~[**STD-COMP.004**] It SHOULD~~ be possible for other standards to use this standard.
 228 {#12, #130, #57}
 229 **SHOULD, wherever reasonable, factor the specification so that it is possible to use**
 230 **modules of this standard and not only the standard as a whole.**
 231 ~~[**FR005.1**] Should be able to support CIM models. {#23}~~
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<u>(C) leverage existing ws standards</u>	<u>39.</u>
<u>(C) management using vs/ cim/soap overlaps</u>	<u>130.</u>
<u>(C,K) offer a framework for comprehensive management solution – allow other standards to plug in and complete this picture (i.e. other ws standards, etc.)</u>	<u>57.</u>
<u>(C1) defined consistently w/ existing management specs including ggf, dmtf</u>	<u>20.</u>
<u>(C1) develop/support latest ws standards</u>	<u>22.</u>
<u>(C1) extend current models of a service</u>	<u>23.</u>
<u>(A,C) consistent w/ existing and future ws, don't break ws</u>	<u>125.</u>
<u>(A,C) ws-I compliant</u>	<u>71.</u>
<u>(A,C,E) support current ws security models</u>	<u>25.</u>
<u>(C) Is defined consistently with existing Web services management specifications such that it can be used/applied in those communities, i.e. GGF, DMTF</u>	<u>12.</u>

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234 **2.1.42.1.5 Distributed Management (D) [DIST-M]**

235 ~~[**FR006DIST-M.001**] This protocol MUST~~ support highly distributed environments. {#18, #81,
 236 #85, #101}
 237 • ~~[**DIST-M.001.1 FR006.1**] It SHOULD~~ be possible to use this protocol
 238 over the public Internet.
 239 • ~~[**DIST-M.001.2 FR006.2**] There MUST~~ SHOULD not force a be-ne
 240 central point of control ~~/or~~ failure for implementations of this
 241 specificationthis protocol.

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- ~~[DIST-M.001.3 FR006.3] In addition to MUST allow a manager to manage multiple manageable resources, it~~
 - ~~[DIST-M.001.4] MUST allow a manageable resource to be managed by multiple managers {#42, #98}~~
 - ~~[DIST-M.001.5] MUST ensure that managers are able to tolerate multiple managers – (#98) <Delete>~~
 - ~~[DIST-M.001.6] Must enable support of scaleable volumes of managed resources (#101)~~
 - ~~[DIST-M.001.7] Must enable support of scaleable volumes of manager interactions (#101)~~
 - ~~[DIST-M.001.8 FR006.4] It should~~ **MUST** be possible to manage through aggregates of manageable resources. Allowing: {#33, #132, #24}
 - **Support for global actions (#111)**
 - ~~[DIST-M.001.9 FR006.5] MUST S~~ **be possible to support** management of occasionally connected resources, including the recovery of state.- {#85, #101}
 - ~~[DIST-M.001.10 FR006.6] MUST define Should tolerate failure gracefully through proper exceptions handling mechanism such that implementations can tolerate failures, e.g. connections failure, in a distributed environment. –Cope with connection failure, unexpected events, and so on. {#117}~~
 - ~~[DIST-M.001.11 FR006.7] Should not prohibit~~ **Allow local autonomy (respect local overrides) (#111)**
 - ~~<DELETE> [DIST-M.001.12] Support global actions. {#111}~~
 - ~~<DELETE> [DIST-M.001.13] SHOULD~~ **Supports Time synchronization {135, 136}**
 - ~~[DIST-M.001.14] SHOULD ensure that time sensitive specifications define how to calibrate time or be time difference tolerant~~
- <<< 06/11/03 CALL ENDED HERE >>>
- ~~[DIST-M.001.15 FR006.8] Work with loose data consistency. Not all interactions need to be atomic or transactional. {#114}~~
 - ~~[DIST-M.001.16 FR006.9] Support role collapsing.~~
 - ~~[DIST-M.001.16.1] An entity acting as a Manager could also be a manageable resource. {#85}~~
 - ~~[DIST-M.001.16.2] Support protocol aware proxies and chains. {#24}~~
 - ~~[DIST-M.001.17 FR006.10] Support Manager of Managers (Hierarchical Manager) {#32, #43, #126, #133}.~~
 - ~~[DIST-M.001.17.1] Across enterprise boundaries. {#133}~~
 - ~~[DIST-M.001.17.2] Collaboration/Federation among managers. {#52}~~

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- o [\[DIST-M.001.17.3\]](#) Should support cooperative, peer to peer, managers –(# 98)

TC HELP - #105 not categorized

(D) aggregate up to higher level user so can see end to end management, depth and breadth	132.
(D) availablility of time synchronization service	136.
(D) cooperative expectections – manager must expect are not alone	98.
(D) distributed, disconnected, scaleability	101.
(D) exception handling for large scale systems, any part of nw unavail, but can't talk to who you need to to do job, cope with reconnection, unexpected	117.
(D) global and local – respect for local autonomy, global actions	111.
(D) highly distributed	18.
(D) loose consistency – data gathering, not all in transactions or atomic	114.
(D) operates in distrib environment, occasional connectivity, hierarchy of management collection, (list in DisMan on distrib env?)	85.
(D) support for hierarchical and heterogeneous managers	43.
(D) support heirarchial infrastructure for management, not single layered	126.
(D) support more than one manager for a managed resource	42.
(D, T) hierarchy of manager (federated) – across and within enterprises	133.
(D,H) support aggregation and representation of resources	33.
(D,N) can be multilayered (can have aggregations and proxy and chains)	24.
(D,T) support distribution and federated management	52.
(D,T) support federated and hierarchical manager approaches (mgr to mgr)	32.

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290 **2.1.52.1.6 Security (E) [SEC]**

291 **[FR007SEC.001]** This protocol MUST enable secure management of manageable resources.
292 (Source: HP, MPTC) {#25, #19, #30}

- 293 • **[SEC.001.1 FR007.1]** It SHOULD be possible for the manager to authenticate the
294 managed object.
- 295 • **[SEC.001.2 FR007.2]** It SHOULD be possible for the managed object to authenticate
296 the manager.
- 297 • **[SEC.001.3 FR007.3]** It SHOULD be possible to guarantee the integrity and
298 confidentiality of the messages exchanged between a manager and managed object.
299 [#82](#)
- 300 • **[SEC.001.4 FR007.4]** A managed object should be able to control access ([view and](#)
301 [change](#)) to its management information, operations and event notifications at
302 appropriate granularity. [Access should be controllable by role](#). For example, an
303 internal manager should have greater control than a manager being run by a partner.
304 (Source: MITRE) {#74, #99, #116, #83, #82}

- 305 • **[SEC.002 FR008]** This protocol MUST be firewall friendly, i.e. [work across enterprises](#). {#99}
- 306 • **[SEC.003 FR008A]** [The addition of management MUST not increase security risks or](#)
307 [enlarge security exposures.](#) {#112} <TC Clarify>
- 308 • **[SEC.004 FR008B]** [Management must allow a standalone security model](#) {41}
- 309 • **[SEC.005 FR008C]** [Must be able to manage Security Infrastructure](#) {34} <TC Clarify>
 - 310 ○ **[SEC.005.1 FR008C.1]** [MUST allow operational capabilities on security features](#)
311 [\(enable, disable\),](#) {#70} <TC Clarify>

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(E) access control, acl mechanism for accessing mgmt info of managed resources, tie into roles from management of ws.	74.
(E) build in security consciousness, awareness, adaptability, esp. cross enterprise.. We both monitor, but for different reasons.	99.
(E) deal with privacy issues – who’s allowed to see what	116.
(E) design infrastructure to uh, to be cognizant of denial of service attacks	139.
(E) do no harm – guard against attacks	112.
(E) provide diff levels of access, what controls and data can access	83.
(E) secure	19.

(E) secure mechanism, protecting data AND management interface	82.
(E) security – possible for operator to enable/disable security features	70.
(E) security management	34.
(E) stand alone security model that doesn't require separate saml authorities, ldap directories, etc.	41.
(E) ws mgmt arch is securable	30.

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314 **2.1.62.1.7 Model Neutrality (F) [MDL-NEUT]**

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- **[FR008MDL-NEUT.001]** This protocol MUST be model neutral and be able to work with multiple existing, domain specific models. (Source: MPTC, HP) [{#68, #36, #122}](#)
 - **[MDL-NEUT.002 FR008A]** [Must be able to map between models <or is this really mapping from models to Web services > {#97} <TC Clarify> <Delete, dup of previous>](#)
 - **[MDL-NEUT.003 FR008B]** [Describe the model in higher level terms {#97} <TC Clarify>- <dup of first one>](#)
 - [\[MDL-NEUT.003.1\] act as model normalizing/neutralizing layer so it can support various tiers, domains {#56}, dupe of #97? <dup of first one>](#)

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[Acceptance or rejections of this model is still an issue:](#)

[Choices – from TC on model neutrality, normalization, canonicalization](#)

(F) ability to map between models, platform a way to describe model in higher level terms and then others can see how to map in	97.
(F) act as model normalizing/neutralizing layer so it can support various tiers, domains	56.
(F) apply management to diff domain specific models	68.
(F) should be model agnostic, able to expose snmp mib,	36.
(F,H) managed object agnostic	122.

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328 2.1.72.1.8 Model Exposure (G) [MDL-EXP]

- 329 **[FR009 MDL-EXP.001]** A managed object **MUST** expose its management model **including**
330 **performance metrics, configuration details, control operations** and other such capabilities
331 using WSDL description. (Source: IBM, HP) {#76, #7}
- 332 • **[MDL-EXP.001.1 FR009.1]** A managed object **MUST** expose its Identity.
 - 333 • **[MDL-EXP.001.10]** A managed object **MUST** expose relevant management lifecycle
334 **state**
 - 335 • **[MDL-EXP.001.2 FR009.2]** A managed object **SHOULD** expose relevant
336 management **performance metrics information**.
 - 337 • **[MDL-EXP.001.9]** A managed object **MUST** expose relevant management
338 **configuration**.
 - 339 • **[MDL-EXP.001.3 FR009.3]** A managed object **MUST** expose relevant
340 management operations.
 - 341 • **[MDL-EXP.001.4 FR009.4]** A managed object **MUST** expose its events
342 through notifications.
 - 343 ○ **[MDL-EXP.001.4.1]** Events must be extensions of a standard XML management
344 **event format (38)**
 - 345 —
 - 346 • **[MDL-EXP.001.5 FR009.5.4]** A managed object **MUST** expose its relations
347 with other managed objects.
 - 348 **[MDL-EXP.001.5.1 FR009.5.1]** **SHOULD** expose relationships with other
349 **management interfaces**
 - 350 **[MDL-EXP.001.5.2 FR009.5.2]** **SHOULD** expose relationships between
351 **portTypes**
 - 352 **[MDL-EXP.001.5.3 FR009.5.2]** **SHOULD** expose relationships between
353 **service instances {#89}**
 - 354 **[MDL-EXP.001.5.4 FR009.5.2]** **Instance Relationships can change during**
355 **runtime {#89} <delete from here, part of runtime/distributed requirements,**
356 **moved to MDL-EXP.001.2>**
 - 357 **[MDL-EXP.001.5.5 FR009.5.2]** Should enable relationships between
358 **manageable resources to be discoverable from the manageable resources {#8}**
 - 359 **[MDL-EXP.001.5.6 FR009.5.2]** Should enable relationships between
360 **manageable resources to be discoverable from Web services discovery**
361 **mechanisms {#8}**
 - 362 • **[MDL-EXP.001.6 FR009.6]** **SHOULD** enable exposure of other associated
363 **descriptions , including work flows and policies. {#9}**
 - 364 • **[MDL-EXP.001.7 FR009.6B]** **SHOULD** enable exposure of existing standard
365 **management models and runtimes {#65, #50}**
 - 366 ○ **[MDL-EXP.001.7.1]** Should consider and leverage current models of service
367 **(23)**
 - 368 ○ **MDL-EXP.001.8**
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- 370 • [\[MDL-EXP.001.9 FR009.8\] MUST be able to associate metadata with operations,](#)
- 371 [attributes and notifications](#)
- 372 ○ [\[MDL-EXP.001.9.1 FR009.7\] MUST be able to associate categories with](#)
- 373 [information, operations, notifications, and relations {#5}](#)
- 374 ○ [\[MDL-EXP.001.9.2 FR009.7\] MUST be able to associate read/and](#)
- 375 [writeability of attributes {#91}](#)
- 376 ○ [\[MDL-EXP.001.9.3 FR009.7\] MUST be able to associate information for](#)
- 377 [internationalization of values in the model {#91}](#)
- 378 ○ [\[MDL-EXP.001.9.4 FR009.7\] MUST be able to associate semantics with the](#)
- 379 [model {#16}](#)

380
381 [\[MDL-EXP.001.2\] Must support changes to information in the model during](#)

382 [runtime.](#)

383
384 TC HELP with:

385 [#124 – is this model consistency?](#)

386 [#21 – what does this mean?](#)

387

(G) Additional descriptions, work flows and/or policies can be associated with a manageable resource	9.
(G) Additional interfaces for the manageable resource can be associated with the manageable resource (i.e. security, administration, etc.)	10.
(G) Manageability capabilities can be categorized according to their purpose, i.e. properties can be categorized as identification information, description, metrics, capabilities, configuration information, etc.	5.
(G) Manageability capabilities of a manageable resource are discoverable from the WSDL.	7.
(G) metadata for attributes and operations, like i18n name, read writeable, etc.	91.
(G) model based, if support a model, completely support it, can support part of this one and that one, if support multiple models support all parts of those models	124.

(G) relationships – on the fly, Managed resources need relationships from runtime, static not enough	89.
(G) Relationships between manageable resources are discoverable from the manageable resources or Web services discovery mechanisms	8.
(G, H) ability to do auditing and accounting	115.
(G, Q) support for monitoring, config, eventing, etc. (read/write, ops, events) consistent so that you have an event get semantic content and when invoke an operation have semantic	21.
(G, V) possible to expose mgmt of existing ws mgmt models and runtime systems	65.
(G,A) support new methodology for management based on web services use. Thru this framework enable exposure of management info in standard external way without wanting to interfere with internal implementations of the managed objects.	50.
(G,Q) need to address semantic content as well as operations (no blobs)	16.

388

389 **2.1.82.1.9 Manageable Resource (H) [MNGBL-RES]**

390 **[FR040 MNGBL-RES.001]** ~~This framework s~~MUSTould support management of [varieties of](#)
391 [resources](#):

392 **[MNGBL-RES.001.1]** [hardware related](#) -resources (such as machines, networking
393 elements, devices, application software) as well as [software related](#) -resources (such as a
394 Web service, a business process, SLA etc.). ~~{#60, #29}~~

395 **[MNGBL-RES.001.2]** [physical resources {#31}](#) and [logical resources {#31}](#)

396 **[MNGBL-RES.001.3]** [Manage transient and long-lived/persistent resource {#64}](#)

397 **[MNGBL-RES.001.3]** [Web services and Web services architecture](#)

398 **[MNGBL-RES.002 FR041]** Allow discovery of manageable resources with whatever tools
399 and models in hand. No need to define everything before-hand. ~~{#104} <del, already covered~~
400 [in otherones>](#)

401 ~~**[MNGBL-RES.002.1]** [discovery of resource by type {#94}](#) <del, already covered>~~

402 **[MNGBL-RES.003]** [ability of sys to explain own workings {#106}](#) – <TC Help: Does this go
403 with Model Exposure instead> < move to SELF managing>

404 **[MNGBL-RES.004]**

405 ~~**[MNGBL-RES.004.1]** [Should support Monitoring management capabilities {#79}](#)~~

406 ~~**[MNGBL-RES.0094.3]** [Should support Configure management capabilities {#81}](#)~~

407 [\[MNGBL-RES.00104.3\]](#) Should support Control management capabilities {#80}
 408 [\[MNGBL-RES.005\]](#) MUST support identification and be uniquely identifiable (where
 409 identifiers can be recreatable) {#95, #46}
 410 [\[MNGBL-RES.006\]](#) MUST be possible to find a description (and therefore an invocable
 411 reference to the management endpoint) for an identity {#95}
 412 [\[MNGBL-RES.007\]](#) MUST be possible to express groupings of resources {#73, #93}
 413 [\[MNGBL-RES.007.1\]](#) by type {94} <del, dup of 007>
 414 [\[MNGBL-RES.008\]](#) Must be able to support manageability incrementally. (Ranges from
 415 minimally Identifiable to Monitorable to Fully operable) {#103}
 416

(H) ability of sys to explain own workings	106.
(H) able to monitor ws, including status info/metrics	79.
(H) configure ws	81.
(H) control ws,	80.
(H) extensions for unique ids, recreatable ids – I am a managed object in one area and create a relationship between myself and someone in another area, need to be able to find that other object/ handle	95.
(H) grouping of resources based on type, locality, and other factors (usability)	73.
(H) groupings/collections	93.
(H) need a unique ID for resources, whether is a business process, disk, etc. so can see relationships between these resources	46.
(H) search criteria - search mgd domain for types of objects	94.
(H) support management of web services as resources	60.
(H) support mgmt of longlived and shortlived resources	64.
(H) ws mgmt arch applies equally to physical and logical resources	31.
(H,L) awareness and capabilities piecewise, resources monitorable to fully capable	103.
(H,S) ws mgmt arch is manageable as a resource	29.

417

418 **2.1.92.1.10 Life-cycle Management (I) [LC-MGMT]**

419 [~~FR044A LC-MGMT.001~~] ~~This framework MUST should allow monitoring and control of life-~~
 420 ~~cycle states of various managed resource objects. {HP}The life-cycle itself could be different~~
 421 ~~for different managed objects.~~

422 [~~LC-MGMT.002 FR044B~~] ~~MUST allow control of life-cycle states of managed resources. {HP}~~
 423 [~~LC-MGMT.004~~] ~~Allows creation and deletion of new managed objects (manageability Web~~
 424 ~~services) for resources {#92}~~

425 [~~]~~ ~~Allow deployment management {#26} <TC Help> < where does our management start???~~
 426 ~~Deployed? Pre-deploy? Runtime? > <delete>~~

427 [~~LC-MGMT.003 FR044C~~] ~~MUST not define a canonical lifecycle for all managed resources.~~
 428 ~~(Note: this is a modeling exercise) {#131}~~

(I) do we want features to allow object creation and deletion (new managed objects)	92.
(I) lifecycle management of diverse components in various domains	131.
(I) support deployment/lifecycle management	26.

429

430 **2.1.11 Semantics (Q) [SEM]**

(Q) semantic intelligence built into it (chewable bite sizes) <TC Help><what does this mean><deleted>	53.
---	---------------------

431

432 **2.1.12 Management Manageability (S) [SELF-MGMT]**

433 [~~FR043 manSELF-MGMT.001~~] ~~It should be possible to model and manage the manager as a~~
 434 ~~manageable resource. (Source: CA) <new words> enables a manager to be a manageable~~
 435 ~~resource.~~

436 [~~ManSELF-MGMT.002~~] ~~Management infrastructure must be manageable. {58, 102} <new~~
 437 ~~words> enables resources that are part of a management infrastructure to be manageable~~
 438 ~~resources~~

439 [~~ManSELF-MGMT.003~~] ~~Permit manageable resources to be self-managing {} <new words>~~
 440 ~~do not preclude manageable resources from using their own manageability interfaces.~~

441

(S) needs to be self-managed management infrastructure	58.
(S) self aware, self management, recursive	102.

442

443 **2.1.13 Federation (T) [FED]**

444 [\[Fed.1-FED.001\]](#) Enables the federation of management systems {100} <new words> does not
 445 preclude the development of federated managersFED.001.1 [Fed.1.1](#)

446 {141} management system conflict resolution is out of scope, understanding effect of actions
 447 addressed by existing requirements on modeling.

448 [\[FED.002 Fed.2\]](#) Enables overriding existing management {140} <delete, out of scope>

(T) federated management fundamental	100.
(T) intervention by humans that can be dealt with – override-ability	140.
(T) understanding effect of your actions on other systems, management system conflict resolution	141.

449

450 **2.1.14 Co-existence (U,V) [CO-EXIST]**

451 [\[- CO-EXIST.001\]](#) Should make use of consistent with other Mgmt specs: GGF, DMTF,
 452 cim/soap – {12, 130, 20} <new words> should make use of existing specifications where
 453 appropriate to avoid duplication and conflict, e.g. GGF OGS, DMTF CIM/WBEM

454 [\[CO-EXIST.002-\]](#) MUWS Specification should be usable by other Management specs: GGF,
 455 DMTF, cim/soap – {12, 130, 20} <new words> should be usable by other specifications
 456 where we have similar requirements.

457 [\[CO-EXIST.003-\]](#) Ensure ability to build adapters to existing management systems {37, 59,
 458 77, 78} <out of scope, maybe a use case for feasibility of adapters? >

459 [\[CO-EXIST.004-\]](#) Ensure Web services platform neutrality {61} <already covered, dup>

460 [\[CO-EXIST.005-\]](#) Ensure implementations can co-exist without interfering with existing
 461 standardized management infrastructures {138}

(U) support legacy systems, able to build a proxy for existing systems	37.
(V) Accommodate existing middleware architectures (J2EE, .net)	61.
(V) allow existing deployed resource in enterprise to be part of the ws management fw, wrap existing, legacy applications	59.
(V) coexist w/ other existing mgmt infrastructures	138.
(V) inclusion of other protocol bridge, interact w/ non ws endpoints	77.
(V) keep a biased eye on existing implementations	78.

462

463 2.1.15 Discovery [DISC]

464 [FR004.2 DISC.001] MUST allow discovery of manageable resources through Web services
465 discovery mechanisms. These mechanisms could be based on a central registry like UDDI
466 and/or decentralized, out-of-band gathering of WSDL documents (such as retrieving WSDL
467 documents through a crawler). (Source: IBM, HP, MPTC) {#6, #76} < Winston: Make
468 separate high level requirement, look at discovery mechanism to see if sufficient (i.e. email,
469 asking one resource for other resources. May need normative method for interop. > <new
470 words> the manageability interface must be described in WSDL documents and XML
471 Schema so that it can be discoverable (like any other Web service)

472 [DISC.002-] Discovery oriented - (manager finding resources as well as manager having
473 resources defined to it)- (104) <new words> do not require a manager to have all resources
474 explicitly defined to it.

475 [DISC.003-] ws able to announce to managers <new words> <delete>

476 [DISC.004 FR044] Allow discovery of manageable resources with whatever tools and models
477 in hand. No need to define everything before-hand. {#104} <dup, delete>

478 [DISC.004.1-] discovery of resource by type {#94} <delete>

479 [DISC.005 FR009.5-2] Relationships between manageable resources (that it knows about)
480 may be discoverable from the manageable resources {#8} <dup in model exposure>

481 [DISC.006 FR009.5-2] enable the discovery of appropriate (tbd) relationships between
482 manageable resources via Web services discovery mechanisms {#8} <new words>

483 [DISC.007-] enable discovery of manageability capabilities of resources

484 2.1.102.1.16 Miscellaneous (J) [MISC]

485 [FR042 MISC.001] At least one standard binding is defined (but not required to be supported
486 by all compliant implementations): SOAP/HTTP. (Source: IBM). [Editorial Note – This
487 requirement is in conflict with interoperability requirement [NR001], as it would be
488 possible to two implementations without any common binding.]. <dup, Interop>

489 [FR043] It should be possible to model and manage the manager as a manageable resource.
490 (Source: CA)

491 [MISC.002 FR044] Time Synchronization. Should allow normalization and synchronization of
492 time for data sources and data sinks. {135} <TC: out of scope, delete>

493 [MISC.003 -] Time data formats should normalized. < new words> Use XML schema
494 types available for Time and Date when representing a time.

495 [MISC.004 -] Ability to have some manager capabilities collocated w/ managed element, i.e.
496 event filtering, metric aggregation, and resource aggregation. {44} <dup of Man-Mgmt.003>

497 [MISC.005 -] Enable management interfaces to be supported directly by resources or
498 indirectly through proxies or agents. {51} <del, impl issue, define agent/proxies in glossary
499 and commentary>

500 [MISC.006 -] The definition of management applications are out of scope. {120} <add
501 scope/out of scope section(s)>

502 [MISC.007-] To the TC: Urgency of delivery {63} < del, move to schedule document >

503 [\[MISC.008 -\] Should support transactionality, i.e. consistency on a unit of work {143} < out of](#)
 504 [scope, infrastructure concern >](#)
 505 [\[MISC.009 -\] Must support Management of Web services {129} < dup of manageable](#)
 506 [resource>](#)
 507 [\[MISC.010-\] Should be implementable using existing technologies and standards {35} <move](#)
 508 [to co-existence>](#)

(J) ability to have some manager capabilities collocated w/ managed element	44.
(J) Be able to support various deployment models – agent based, agentless	51.
(J) management application agnostic <TC Help, what kind of apps? Pd? Sla? Or is this technology?>	121.
(J) management infrastructure, not management application	120.
(J) meet a timing window of ??, urgency of meaningful contribution window	63.
(J) transactional – consistency on a unit of work	143.
(J) work closely w/ of and using. Do using first, where mgmt of is an instance of this	129.
(J) ws u ws is implementable w/o dependency on work yet to happen that we don't have control of	35.

509

510 2.2 Non-Functional Requirements

511 2.2.1 Interoperability (K) [INTEROP]

- 512 • [\[NR004 INTEROP.001\]](#) A compliant manager MUST be able to interoperate with a compliant
 513 manageable resource and vice-versa. (Source: HP, MPTC) [{67,47,75}](#)

514 [\[INTEROP.001.1\] For all resource capabilities {75}](#)

515 [\[INTEROP.001.2\] Define one standard WS-I compliant binding for required](#)
 516 [compliance {40}](#)

517 [\[INTEROP.001.3\] Define standard operations for compliance {123}](#)

(K) ability for a compliant manager to work with a compliant agent in a predictable way	67.
(K) define one and only one standard binding required for compliance	40.
(K) interoperability	47.

(K) interoperability – compliant mgr interop w/ compliant manageable resource for all the resources capabilities	75.
(K) provides for standard set of operations for compliance	123.

518

519 **2.2.2 Evolvability (L) [EVOLV]**

520 **[NR002 EVOLV.001]** The protocol should be designed so that it can be evolved without
 521 breaking backward compatibility. (Source: MPTC)

522 [\[EVOLV.002-\] Future-proof: allow evolution and pluggability for ws specs to come – \(57\)](#)

523 [\[EVOLV.003 -\] Tolerate multiple versions of a resource in simultaneously in the same system](#)
 524 [{127, 109}](#)

525 [\[EVOLV.003.1 -\] enable upgrades {108}](#)

526 [\[EVOLV.003.2 -\] enable maintenance](#)

(L) must allow world of management upgradeable and maintainable thru multiple versions in same system in parallel and together	127.
(L) tolerate multiple versions of same thing in same systems	109.
(L) versioning and piece-wise upgrade	108.

527

528 **2.2.3 Extensibility (M) [EXTN]**

529 **[NR003 EXTN.001]** It MUST be possible to extend the management models exposed through
 530 this protocol by adding additional model elements, management information, operations,
 531 event notifications and relations without breaking the manager software. (Source: HP, MPTC,
 532 IBM) [{13,49,17}](#)

533 **[EXTN.002 NR004]** It MUST be possible to extend the schema of event notifications
 534 supported by this protocol. (Source: HP)

535 [\[EXTN.003 -\] Allow pluggability of infrastructure capabilities, i.e. security {54}](#)

(M) adapt to various management needs that different domains have... allow for different capabilities that they need, i.e. security, other protocols, etc.	54.
(M) Extensibility	13.
(M) extensibility	49.
(M) extensible	17.

536

537 2.2.4 Scalability (N) [SCAL]

538 [NR004 SCAL.001] It SHOULD be possible to have scalable deployment of compliant
539 implementations. (Source: HP, MPTC) {110}

540 [SCAL.002 NR004.1] A manager SHOULD be limited only by the h/w (CPU power, RAM,
541 Secondary storage, network bandwidth etc.) resources on how many managed objects it can
542 manage. {119}

543 [SCAL.003 NR004.2] It SHOULD be possible to build a hierarchy of managers for large scale
544 deployments.

545 [SCAL.004 NR004.3] It SHOULD be possible to retrieve management information or carry
546 out management operations on more than one manageable resource with a single request.
547 {69, 72}

548 [SCAL.005 NR004.4] It SHOULD be possible to specify filtering/processing at the managed
549 object to reduce network traffic and distribute computation.

550 [SCAL.006 -] It should be possible to carry out multiple management operations on one
551 manageable resource with a single request {86}

552 [SCAL.007 -] It should be possible to handle scalability of events (event storm handling in
553 large scale systems, event aggregation) {137}

(N) fw should allow scaleable (on operation to 15000 res shouldn't force 15000 requests)	69.
(N) potentially highly scalable and available	110.
(N) scaleability – across objects, and w/in an object. Don't want to have to do a sep ws request to get every value of every attr, rather get all attr values together	86.
(N) scaleability of events (event storm handling in large scale systems, event aggregation)	137.
(N) small to large number of objects	119.
(N) support grouping of managed resources for bulk config and operations	72.

554

555 2.2.5 Useability (O) [USE]

556 [NR005 USE.001] Usability of WSDM specification to implementers. This is important for
557 rapid adoption.

- 558 • [USE.001.1 NR005.4] It SHOULD be possible to create a minimally compliant
559 implementation with relatively small amount of effort [including gradual adoption](#).
560 (Source: HP, MPTC) {62, 55}

- [\[USE.001.2 NR005.2\]](#) The specification SHOULD provide sufficient clarity to implementers in interpretation of various implementation related aspects. (Source: HP, MPTC)
- [\[USE.001.3 -\] At least one standard binding is defined \(but not required to be supported by all compliant implementations\): SOAP/HTTP. {14}](#)
- [\[USE.001.4 -\] Ensure easy to develop adapter to existing systems {84}](#)

[Editorial Note: Validation of these requirements would require feedback from implementation teams. Another way to look at these requirements is that the TC must actively encourage parallel implementation and actively seek feedback from implementation teams.]

[\[USE.002 NR006\]](#) Usability of the resulting implementation. Again, this would depend, to a large extent, on specific implementation but the protocol should not preclude certain features. Certain examples are given below (from Homayoun's email):

- protocol that allow the manager to get to the management information (e.g. how many steps do I need to take to get to the information, how do I do bulk operations, how hard is it to get events, etc.)
- protocol that allow the manager to display the information in a user and domain friendly way (e.g. How easy is it for me to convert the data to my special format, can I display it in a non-english env., etc.)
- model that allows the manager to understand the capabilities and the relationships between the managed objects such that it can understand their interdependencies and the type of management information they're capable of providing without having to necessarily know the details of their specific modeling techniques

[\[USE.003-\] testability and debuggability {107}](#)

(O) simple and easy to plug into by various supplier and developers	62.
(O) testability and debuggability	107.
(O) usable in a way that makes adoption of it easy and people can gradually comply with it	55.
(O,K) At least one standard binding is defined (but not required to be supported by all compliant implementations): SOAP/HTTP.	14.
(O,V) enable, easy to develop ws agents for other resources (like snmp.etc.)	84.

584

585 **2.2.6 Internationalization (P) [I18N]**

586 [\[NR007 I18N.001\]](#) This protocol MUST allow compliant implementations to be localized.
587 (Source: HP) [{66,134}](#)

588 [\[I18N.002-\] Accommodate management systems which are in different locals from the](#)
589 [managed resources. {87}](#)

(P) fw should support internationalization	66.
(P) i18n, consider cross locale; management is around the world, managed resources may be in diff locale domains than managers	87.
(P) internationalization	134.

590

591 **2.2.7 Performance Impact (R) [PERF]**

592 [\[-PERF.001\] minimally intrusive, the management infrastructure and system does not have](#)
593 [unnecessary effects on ability to do work {113, 27}](#)

594 [\[PERF.002-\] permit deployment resource constrained systems {118}](#)

595 [\[PERF.003-\] permit managed resources to control the impact of management on their](#)
596 [environments](#)

(R) developed so cognizant of system overhead/requirements	27.
(R) minimally intrusive, mgmt system not have unnecessary effects on ability to do work	113.
(R) scaleable footprint – small devices and large devices	118.

597

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4 References

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616 **Appendix A. Acknowledgments**

617 The editors would like to acknowledge the contributions of the OASIS WSDM Technical
618 Committee, whose voting members at the time of publication were:
619

Appendix B. Brainstorming

Requirements identified in WSDM-TC F2F brainstorming session.

Requirement	Number
(A) Access to manageability capabilities of manageable resources is described using WSDL (Binding)	3.
(A) Addressability or access point for manageability capabilities of manageable resources is described using WSDL (Port)	4.
(A) based on ws standards	128.
(A) be a GOOD web service (wsdl, use messaging efforts avail for ws allowing multiple transports, interoperability efforts underway)	45.
(A) composability, independently written put together so can understand the result, like continuity principles, understanding semantics of change	105.
(A) Leverages, does not invent, non-management specific Web services infrastructure. If non-management specific services/infrastructure is required then it is placed as a requirement on the Web services community. Required infrastructure includes: notifications, relationships, registry, etc.	11.
(A) loose coupling	48.
(A) Manageability capabilities of manageable resources described using WSDL (PortType)	2.
(A) Manageable resources are discoverable in a manner consistent with the Web services architecture.	6.
(A) Use existing internet infrastructures	1.
(A) work in ws platform medium	96.
(A) ws management architecture – identify facilities that allow management using ws for management	28.

applications	
(A) wsdl based, portTypes, bindings	15.
(A, G) discovery	76.
(A,C) consistent w/ existing and future ws, don't break ws	125.
(A,C) ws-I compliant	71.
(A,C,E) support current ws security models	25.
(A,G,H) discovery oriented, use whatever tools in other models too to figure out whats around	104.
(B) support event mechanism	38.
(B) support pull and push notification models, also guaranteed delivery in order	90.
(B) Synch and asynch usage	142.
(C) Is defined consistently with existing Web services management specifications such that it can be used/applied in those communities, i.e. GGF, DMTF	12.
(C) leverage existing ws standards	39.
(C) management using vs/ cim/soap overlaps	130.
(C,K) offer a framework for comprehensive management solution – allow other standards to plug in and complete this picture (i.e. other ws standards, etc.)	57.
(C1) defined consistently w/ existing management specs including ggf, dmtf	20.
(C1) develop/support latest ws standards	22.
(C1) extend current models of a service	23.
(D) ability to normalize time for data sources and data sinks	135.
(D) aggregate up to higher level user so can see end to end management, depth and breadth	132.
(D) availablility of time synchronization service	136.
(D) cooperative expectections – manager must expect are not alone	98.

(D) distributed, disconnected, scalability	101.
(D) exception handling for large scale systems, any part of nw unavail, but can't talk to who you need to do job, cope with reconnection, unexpected	117.
(D) global and local – respect for local autonomy, global actions	111.
(D) highly distributed	18.
(D) loose consistency – data gathering, not all in transactions or atomic	114.
(D) operates in distrib environment, occasional connectivity, hierarchy of management collection, (list in DisMan on distrib env?)	85.
(D) support for hierarchical and heterogeneous managers	43.
(D) support heirarchical infrastructure for management, not single layered	126.
(D) support more than one manager for a managed resource	42.
(D, T) hierarchy of manager (federated) – across and within enterprises	133.
(D,H) support aggregation and representation of resources	33.
(D,N) can be multilayered (can have aggregations and proxy and chains)	24.
(D,T) support distribution and federated management	52.
(D,T) support federated and hierarchical manager approaches (mgr to mgr)	32.
(E) access control, acl mechanism for accessing mgmt info of managed resources, tie into roles from management of ws.	74.
(E) build in security consciousness, awareness, adaptability, esp. cross enterprise.. We both monitor, but for different reasons.	99.
(E) deal with privacy issues – who's allowed to see what	116.
(E) design infrastructure to uh, to be cognizant of	139.

denial of service attacks	
(E) do no harm – guard against attacks	112.
(E) provide diff levels of access, what controls and data can access	83.
(E) secure	19.
(E) secure mechanism, protecting data AND management interface	82.
(E) security – possible for operator to enable/disable security features	70.
(E) security management	34.
(E) stand alone security model that doesn't require separate saml authorities, ldap directories, etc.	41.
(E) ws mgmt arch is securable	30.
(F) ability to map between models, platform a way to describe model in higher level terms and then others can see how to map in	97.
(F) act as model normalizing/neutralizing layer so it can support various tiers, domains	56.
(F) apply management to diff domain specific models	68.
(F) should be model agnostic, able to expose snmp mib,	36.
(F,H) managed object agnostic	122.
(G) Additional descriptions, work flows and/or policies can be associated with a manageable resource	9.
(G) Additional interfaces for the manageable resource can be associated with the manageable resource (i.e. security, administration, etc.)	10.
(G) Manageability capabilities can be categorized according to their purpose, i.e. properties can be categorized as identification information, description, metrics, capabilities, configuration information, etc.	5.
(G) Manageability capabilities of a	7.

manageable resource are discoverable from the WSDL.	
(G) metadata for attributes and operations, like i18n name, read writeable, etc.	91.
(G) model based, if support a model, completely support it, can support part of this one and that one, if support multiple models support all parts of those models	124.
(G) relationships – on the fly, Managed resources need relationships from runtime, static not enough	89.
(G) Relationships between manageable resources are discoverable from the manageable resources or Web services discovery mechanisms	8.
(G, H) ability to do auditing and accounting	115.
(G, Q) support for monitoring, config, eventing, etc, (read/write, ops, events) consistent so that you have an event get semantic content and when invoke an operation have semantic	21.
(G, V) possible to expose mgmt of existing ws mgmt models and runtime systems	65.
(G,A) support new methodology for management based on web services use. Thru this framework enable exposure of management info in standard external way without wanting to interfere with internal implementations of the managed objects.	50.
(G,Q) need to address semantic content as well as operations (no blobs)	16.
(H) ability of sys to explain own workings	106.
(H) able to monitor ws, including status info/metrics	79.
(H) configure ws	81.
(H) control ws,	80.
(H) extensions for unique ids, recreatable ids – I am a managed object in one area and create a relationship between myself and someone in another area, need to be able to find that other object/ handle	95.
(H) grouping of resources based on type, locality, and other factors (usability)	73.

(H) groupings/collections	93.
(H) need a unique ID for resources, whether is a business process, disk, etc. so can see relationships between these resources	46.
(H) search criteria - search mgd domain for types of objects	94.
(H) support management of web services as resources	60.
(H) support mgmt of longlived and shortlived resources	64.
(H) ws mgmt arch applies equally to physical and logical resources	31.
(H,L) awareness and capabilities piecewise, resources monitorable to fully capable	103.
(H,S) ws mgmt arch is manageable as a resource	29.
(I) do we want features to allow object creation and deletion (new managed objects)	92.
(I) lifecycle management of diverse components in various domains	131.
(I) support deployment/lifecycle management	26.
(J) ability to have some manager capabilities collocated w/ managed element	44.
(J) Be able to support various deployment models – agent based, agentless	51.
(J) management application agnostic	121.
(J) management infrastructure, not management application	120.
(J) meet a timing window of ??, urgency of meaningful contribution window	63.
(J) transactional – consistency on a unit of work	143.
(J) work closely w/ of and using. Do using first, where mgmt of is an instance of this	129.
(J) ws u ws is implementable w/o dependency on work yet to happen that we don't have control of	35.
(K) ability for a compliant manager to work with a compliant agent in a predictable way	67.

(K) define one and only one standard binding required for compliance	40.
(K) interoperability	47.
(K) interoperability – compliant mgr interop w/ compliant manageable resource for all the resources capabilities	75.
(K) provides for standard set of operations for compliance	123.
(L) must allow world of management upgradeable and maintainable thru multiple versions in same system in parallel and together	127.
(L) tolerate multiple versions of same thing in same systems	109.
(L) versioning and piece-wise upgrade	108.
(M) adapt to various management needs that different domains have... allow for different capabilities that they need, i.e. security, other protocols, etc.	54.
(M) Extensibility	13.
(M) extensibility	49.
(M) extensible	17.
(N) discovery – scalability issue here too, advertising many objects, or hierarchies in a registry	88.
(N) fw should allow scaleable (on operation to 15000 res shouldn't force 15000 requests)	69.
(N) potentially highly scalable and available	110.
(N) scalability – across objects, and w/in an object. Don't want to have to do a sep ws request to get every value of every attr, rather get all attr values together	86.
(N) scalability of events (event storm handling in large scale systems, event aggregation)	137.
(N) small to large number of objects	119.
(N) support grouping of managed resources for bulk config and operations	72.
(O) simple and easy to plug into by various supplier and developers	62.

(O) testability and debuggability	107.
(O) usable in a way that makes adoption of it easy and people can gradually comply with it	55.
(O,K) At least one standard binding is defined (but not required to be supported by all compliant implementations): SOAP/HTTP.	14.
(O,V) enable, easy to develop ws agents for other resources (like snmp,etc.)	84.
(P) fw should support internationalization	66.
(P) i18n, consider cross locale; management is around the world, managed resources may be in diff locale domains than managers	87.
(P) internationalization	134.
(Q) semantic intelligence built into it (chewable bite sizes)	53.
(R) developed so cognizant of system overhead/requirements	27.
(R) minimally intrusive, mgmt system not have unnecessary effects on ability to do work	113.
(R) scaleable footprint – small devices and large devices	118.
(S) needs to be self-managed management infrastructure	58.
(S) self aware, self management, recursive	102.
(T) federated management fundamental	100.
(T) intervention by humans that can be dealt with – override-ability	140.
(T) understanding effect of your actions on other systems, management system conflict resolution	141.
(U) support legacy systems, able to build a proxy for existing systems	37.
(V) Accommodate existing middleware architectures (J2EE, .net)	61.
(V) allow existing deployed resource in enterprise to be part of the ws management fw, wrap existing, legacy	59.

applications	
(V) coexist w/ other existing mgmt infrastructures	138.
(V) inclusion of other protocol bridge, interact w/ non ws endpoints	77.
(V) keep a biased eye on existing implementations	78.

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- 1. [2.1 Functional Requirements](#)
- 2. [2.1.1 WSA Compliance](#)
- 3. [1, 2, 3, 4, 6, 11, 12, 15, 16, 22, 25, 28, 45, 48, 50, 71, 76, 104, 105, 125, 128](#)
- 4. [2.1.2 Message Exchange Patterns](#)
- 5. [38, 90, 142](#)
- 6. [2.1.3 Conformance/Consistency with Other Standards](#)
- 7. [11, 12, 20, 23, 25, 39, 57, 71, 125, 130,](#)
- 8. [2.1.4 Distributed Management – multiple managers, hierachical](#)
- 9. [18, 24, 32, 33, 42, 43, 53, 85, 98, 101, 103, 111, 114, 117, 126, 132, 133, 135, 136](#)
- 10. [2.1.5 Security](#)
- 11. [19, 25, 30, 34, 41, 70, 74, 82, 83, 99, 112, 115, 116, 139](#)
- 12. [2.1.6 Model Neutrality](#)
- 13. [36, 56, 68, 97, 122](#)
- 14. [2.1.7 Model Exposure](#)
- 15. [5, 7, 8, 9, 10, 21, 23, 33, 50, 65, 76, 89, 91, 104, 115, 122, 124](#)
- 16. [2.1.8 Manageable Resources](#)
- 17. [29, 31, 46, 60, 64, 73, 79, 80, 81, 93, 94, 95, 103, 106](#)
- 18. [2.1.9 Life-cycle Management](#)
- 19. [26, 92, 131](#)
- 20. [2.1.10 Miscellaneous](#)
- 21. [35, 44, 51, 63, 94, 112, 120, 121, 122, 129, 143](#)
- 22. [2.2 Non-Functional Requirements](#)
- 23. [2.2.1 \(K\) Interoperability](#)
- 24. [14, 40, 47, 57, 67, 75, 123](#)
- 25. [2.2.2 \(L\) Evolvability](#)
- 26. [103, 108, 109, 125, 127](#)
- 27. [2.2.3 \(M\) Extensibility](#)
- 28. [9, 10, 13, 17, 49, 54](#)

652 [29. •2.2.4 \(N\) Scalability](#)
653 [30. •24, 32, 33, 69, 72, 86, 88, 110, 119, 137](#)
654 [31. •2.2.5 \(O\) Useability](#)
655 [32. •14, 55, 62, 84, 107](#)
656 [33. •2.2.6 \(P\) Internationalization](#)
657 [34. •66, 87, 134](#)
658 [35. •New](#)
659 [36. •\(Q\) Semantics](#)
660 [37. •16, 21, 53](#)
661 [38. •\(R\) Performance Impact](#)
662 [39. •27, 113, 118](#)
663 [40. •\(S\) Self Management.](#)
664 [41. •29, 58,102](#)
665 [42. •\(T\) Federation.](#)
666 [43. •32, 53, 100, 103, 133, 140, 141](#)
667 [44. •\(U,V\) Coexistence](#)
668 [45. •37, 50, 51, 59, 61, 77, 78, 84, 13](#)
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Appendix E. Revision History

Date	Lead Author	Description
May 13, 2003	Pankaj Kumar	Initial Draft.
May 27, 2003	Pankaj Kumar	Draft#2 -- Incorporated requirements identified in the F2F brainstorming into the main text. Used the classification agreed upon in the phone conf. With Heather, John and Veena.

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Note:

When we get to creating a glossary, define 'monitoring'