

2262 Unlike many of the security responses discussed here, it is likely that the scope for automation in  
2263 rejecting a repudiation attempt is limited to careful logging.

### 2264 5.2.3.8 Graduated engagement

2265 The key to managing and responding to DoS attacks is to be careful in the use of resources when  
2266 responding to interaction. Put simply, a system has a choice to respond to a communication or to ignore  
2267 it. In order to avoid vulnerability to DoS attacks a service provider should not commit to any interaction to  
2268 a significantly greater extent than service consumers.

## 2269 5.3 Services as Managed Entities Model

### 2270 Management

2271 Management is the control of the use, configuration, and availability of resources in accordance  
2272 with the policies of the stakeholders involved.

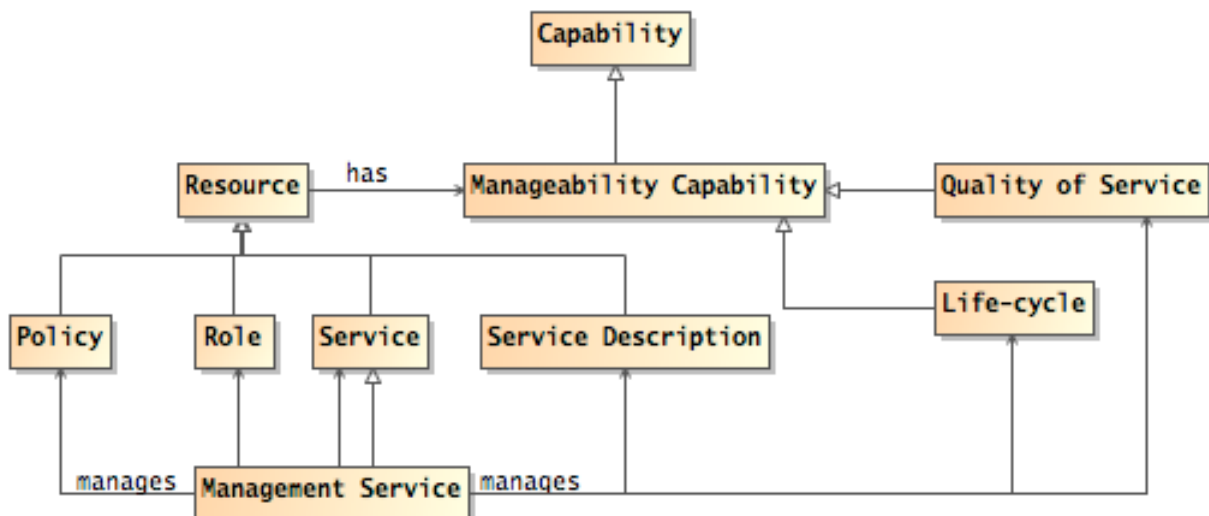
2273 Where governance is often about what the policies regarding artifacts and services should be,  
2274 management is about ensuring that those policies are consistently applied.

2275 There are many artifacts in a large system that may need management. As soon as there is the possibility  
2276 of more than one instance of a thing, the issue of managing those things becomes relevant. In the context  
2277 of SOA we have seen many possible artifacts that may require management: services, service  
2278 descriptions, service capabilities, policies, contracts, roles, relationships, security, infrastructure elements  
2279 and so on.

2280 Managing systems that may be used across ownership boundaries raises issues that are not normally  
2281 present when managing a system within a single ownership domain. For example, care is required  
2282 managing a service when the owner of the service, the provider of the service, the host of the service and  
2283 access mediators to the service may all belong to different stakeholders. In addition, it may be important  
2284 to allow service consumers to communicate their requirements to the service provider so that they are  
2285 satisfied in a timely manner.

2286 In fact, managing a service has quite a few similarities to using a service: suggesting that we can use the  
2287 service oriented model to manage SOA systems as well as provide them. A management service would  
2288 be distinguished from a non-management service more by the nature of the capabilities involved (i.e.,  
2289 capabilities that relate to managing services) than by any intrinsic difference.

2290 In this model we show how the SOA framework may apply to managing services as well as using and  
2291 offering them. There are, of course, some special considerations that apply to service management which  
2292 we bring out: namely that we will be managing the life-cycle of services, managing any service level  
2293 attributes, managing dependencies between services and so on.



2294

2295 *Figure 34 Managing resources in an SOA*

2296 The core concept in management is that of a manageability capability:

2297 **Manageability Capability**

2298 The manageability capability of a resource is the capability that allows it to be managed with  
2299 respect to some property. Note that manageability capabilities are not necessarily part of the  
2300 managed entities themselves.

2301 Manageability capabilities are the core resources that management systems use to manage:  
2302 each resource that may be managed in some way has a number of aspects that may be  
2303 managed. For example, a service's life-cycle may be manageable, as may its Quality of Service  
2304 parameter; a policy may also be managed for life-cycle but Quality of Service would not normally  
2305 apply.

2306 **Life-cycle manageability**

2307 A manageability capability associated with a resource that permits the life cycle of the resource to  
2308 be managed. As noted above, the life-cycle manageability capability of a resource is unlikely to  
2309 reside within the resource itself (you cannot tell a system that is not running to start itself).

2310 The life-cycle management of a resource typically refers to how the resource is created, how it is  
2311 destroyed and what dependencies there might exist that must be simultaneously managed.

2312 **Quality of service manageability**

2313 A manageability capability associated with a resource that permits any quality of service  
2314 associated with the resource to be managed. Classic examples of this include bandwidth  
2315 requirements and offerings associated with a service.

2316 **Policy manageability**

2317 Where the policies associated with a resource may be complex and dynamic, so those policies  
2318 themselves may require management. The ability to manage those policies (such as  
2319 promulgating policies, retiring policies and ensuring that policy decision points and enforcement  
2320 points are current) is a management function.

2321 **Management service**

2322 A management service is a service that manages other services and resources.

2323 **Management Policy**

2324 A management policy is a policy whose topic is a management topic. Just as with other aspects  
2325 of an SOA, the management of resources within the SOA may be governed by management  
2326 policies, contracts (such as SLAs).

2327 In a deployed system, it may well be that different aspects of the management of a given service are  
2328 managed by different management services. For example, the life-cycle management of services often  
2329 involves managing dependencies between services and resource requirements. Managing quality of  
2330 service is often very specific to the service itself; for example, quality of service attributes for a video  
2331 streaming service are quite different to those for a banking system.

2332 There are additional concepts of management that often also apply to IT management:

2333 **Systems management**

2334 Systems management refers to enterprise-wide maintenance and administration of distributed  
2335 computer systems.

2336 **Network management**

2337 Network management refers to the maintenance and administration of large-scale networks such  
2338 as computer networks and telecommunication networks. Systems and network management  
2339 execute a set of functions required for controlling, planning, deploying, coordinating, and  
2340 monitoring the distributed computer systems and the resources of a network.

2341 However, for the purposes of this Reference Architecture, while recognizing their importance, we do not  
2342 focus on systems management or network management.

2343  
2344

### 2345 **5.3.1 Manageability Capabilities**

2346 Historically, systems management capabilities have been organized by the following functional groups  
2347 known as “FCAPS” functions (based on the ITU-T Rec. X.700 | ISO/IEC 7498-4:1989(E) standard):

#### 2348 **Fault Management**

2349 Encompasses fault detection, isolation and the correction of abnormal operation of the SOA  
2350 environment. Faults cause SOA distributed systems to fail to meet their operational objectives  
2351 and they may be persistent or transient. Faults manifest themselves as particular events (e.g.,  
2352 errors) in the operation of a distributed system. Error detection provides capabilities to recognize  
2353 faults. Fault management includes functions to a) maintain and examine error logs, b) accept  
2354 and act upon error detection notifications, c) trace and identify faults, d) carry out sequences of  
2355 diagnostic tests, and e) correct faults. For purposes of this reference architecture, monitoring  
2356 functions such as service status and alerting are included in this functional group.

#### 2357 **Accounting Management**

2358 Enables charges to be established for the use of resources in the SOA environment, and for  
2359 costs to be identified for the use of those resources. Accounting management includes functions  
2360 to a) inform service consumers of costs incurred or resources consumed, b) enable accounting  
2361 limits to be set and tariff schedules to be associated with the use of resources, and c) enable  
2362 costs to be combined where multiple resources are invoked to achieve a given objective  
2363 (resulting in a real-world effect). For purposes of this reference architecture, related accounting  
2364 functions such as metering and billing fall into this category.

#### 2365 **Configuration Management**

2366 Identifies, exercises control over, collects data from and provides data to SOA distributed  
2367 systems for the purpose of preparing for, initializing, starting, providing for the continuous  
2368 operation of, and terminating services. Configuration management includes functions to a) set  
2369 the parameters that control the routine operation of the SOA distributed system, b) associate  
2370 names with managed resources and sets of managed resources, c) initialize and close down  
2371 managed resources, d) collect information on demand about the current condition of the SOA  
2372 distributed system, e) obtain announcements of significant changes in the condition of the SOA  
2373 distributed system, and f) change the configuration of the SOA distributed system. For purposes  
2374 of this reference architecture, related configuration management functions of service versioning  
2375 and service provisioning (i.e., supplying of services) is included in this functional category.

#### 2376 **Performance Management**

2377 Enables the behavior of resources in the SOA environment and the effectiveness of service-  
2378 oriented activities to be evaluated. Performance management includes functions to a) gather  
2379 statistical information, b) maintain and examine logs of system state histories, c) determine  
2380 system performance under natural and artificial conditions, and d) alter system modes of  
2381 operation for the purpose of conducting performance management activities. Measurements  
2382 gathered as part of performance management are used to compare against service level  
2383 agreements (SLAs).

#### 2384 **Security Management**

2385 Support the application of security policies by means of functions which include a) the creation,  
2386 deletion and control of security services and mechanisms, b) the distribution of security-related  
2387 information, and c) the reporting of security-relevant events. A more detailed treatment on the  
2388 topic of security is provided in the Security View of this SOA reference architecture.

### 2389 **5.3.2 Management Contracts and Policies**

2390 As we noted above, management can often be viewed as the application of contracts and policies to  
2391 ensure the smooth running of the SOA. Policies play an important part in managing systems both as

2392 artifacts that need to be managed and as the guiding constraints to determine how the SOA should be  
2393 managed.  
2394

### 2395 **5.3.2.1 Policies**

2396 "Although provision of management capabilities enables a service to become manageable, the extent and  
2397 degree of permissible management are defined in management policies that are associated with the  
2398 services. Management policies are used to define the obligations for, and permissions to, managing the  
2399 service." [WSA]

### 2400 **5.3.3 Management Infrastructure**

2401 In order for a service or other resource to be manageable there must be a corresponding manageability  
2402 capability that can effect that management. The particulars of this capability will vary somewhat  
2403 depending on the nature of the capability. For example, a service life-cycle manageability capability  
2404 requires the ability to start a service, to stop the service, and potentially to pause the service. Conversely,  
2405 in order to manage document-like artifacts, such as service descriptions, the capability of storing the  
2406 artifacts, controlling access to those artifacts, allowing updates of the artifacts to be deployed are all  
2407 important capabilities for managing them.

2408  
2409 Elements of a basic service management infrastructure should include the following characteristics:

2410

- 2411 • Integrate with existing security services
- 2412 • Monitoring
- 2413 • Heartbeat and Ping
- 2414 • Alerting
- 2415 • Pause/Restore/Restart Service Access
- 2416 • Logging, Auditing, Non-Repudiation
- 2417 • Runtime Version Management
- 2418 • Complement other infrastructure services (discovery, messaging, mediation)

2419

2420 \* Message Routing and Redirection

2421 \* Failover

2422 \* Load-balancing

2423

2424 \* QoS, Management of Service Level Objects and Agreements

2425 \* Availability

2426 \* Response Time

2427 \* Throughput

2428

- 2429 • Fault and Exception Management

2430

### 2431 **5.3.4 Service Life-cycle**

### 2432 **5.3.5 Service Provisioning**

2433 Requirements on a management system should be to manage the services and not the infrastructure.