

2272 Unlike many of the security responses discussed here, it is likely that the scope for automation in
2273 rejecting a repudiation attempt is limited to careful logging.

2274 **5.2.3.8 Graduated engagement**

2275 The key to managing and responding to DoS attacks is to be careful in the use of resources when
2276 responding to interaction. Put simply, a system has a choice to respond to a communication or to ignore
2277 it. In order to avoid vulnerability to DoS attacks a service provider should not commit to any interaction to
2278 a significantly greater extent than service consumers.

2279 **5.3 Services as Managed Entities Model**

2280 **Management**

2281 Management is the control of the use, configuration, and availability of resources in accordance
2282 with the policies of the stakeholders involved.

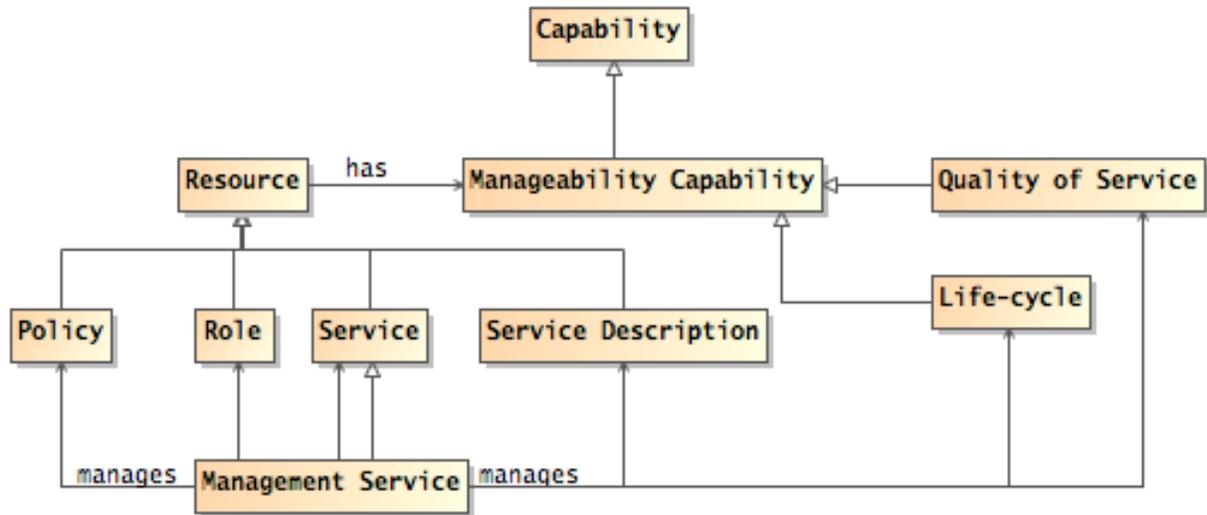
2283 There are many artifacts in a large system that may need management. As soon as there is the possibility
2284 of more than one instance of a thing, the issue of managing those things becomes relevant. Historically,
2285 systems management capabilities have been organized by the following functional groups known as
2286 “FCAPS” functions (based on the ITU-T Rec. X.700 | ISO/IEC 7498-4:1989(E) standard): Fault
2287 management, configuration management, account management, performance and security management.

2288 In the context of SOA we see many possible resources that may require management: services, service
2289 descriptions, service capabilities, policies, contracts, roles, relationships, security, and infrastructure
2290 elements. In addition, given the ecosystem nature of SOA, it is also potentially necessary to manage the
2291 business relationships between participants in the SOA.

2292 Managing systems that may be used across ownership boundaries raises issues that are not normally
2293 present when managing a system within a single ownership domain. For example, care is required
2294 managing a service when the owner of the service, the provider of the service, the host of the service and
2295 access mediators to the service may all belong to different stakeholders. In addition, it may be important
2296 to allow service consumers to communicate their requirements to the service provider so that they are
2297 satisfied in a timely manner.

2298 In fact, managing a service has quite a few similarities to using a service: suggesting that we can use the
2299 service oriented model to manage SOA systems as well as provide them. A management service would
2300 be distinguished from a non-management service more by the nature of the capabilities involved (i.e.,
2301 capabilities that relate to managing services) than by any intrinsic difference.

2302 In this model, we show how the SOA framework may apply to managing services as well as using and
2303 offering them. There are, of course, some special considerations that apply to service management which
2304 we bring out: namely that we will be managing the life-cycle of services, managing any service level
2305 attributes, managing dependencies between services and so on.



2306
2307 *Figure 34 Managing resources in an SOA*

2308 The core concept in management is that of a manageability capability:

2309 **Manageability Capability**

2310 The manageability capability of a resource is the capability that allows it to be managed with
2311 respect to some property. Note that manageability capabilities are not necessarily part of the
2312 managed entities themselves.

2313 Manageability capabilities are the core resources that management systems use to manage:
2314 each resource that may be managed in some way has a number of aspects that may be
2315 managed. For example, a service's life-cycle may be manageable, as may its Quality of Service
2316 parameter; a policy may also be managed for life-cycle but Quality of Service would not normally
2317 apply.

2318 **Life-cycle manageability**

2319 A manageability capability associated with a resource that permits the life cycle of the resource to
2320 be managed. As noted above, the life-cycle manageability capability of a resource is unlikely to
2321 reside within the resource itself (you cannot tell a system that is not running to start itself).

2322 The life-cycle management of a resource typically refers to how the resource is created, how it is
2323 destroyed and what dependencies there might exist that must be simultaneously managed.

2324 **Configuration manageability**

2325 A capability that permits the configuration of resources to be managed. Service configuration, in
2326 particular, may be complex in cases where there are dependencies between services and other
2327 resources.

2328 **Event monitoring manageability**

2329 Managing the reporting of events and faults is one of the key lower-level manageability
2330 capabilities.

2331 **Accounting manageability**

2332 A capability associated with resources that allows for the use of those resources to be measured
2333 and accounted for. This implies that not only can the *use* of resources be properly measured, but
2334 also that those *using* those resources also be properly identified.

2335 Accounting for the use of resources by participants in the SOA supports the proper budgeting and
2336 allocation of funding by participants.

- 2337 **Quality of service manageability**
- 2338 A manageability capability associated with a resource that permits any quality of service
2339 associated with the resource to be managed. Classic examples of this include bandwidth
2340 requirements and offerings associated with a service.
- 2341 **Business performance manageability**
- 2342 A manageability capability that is associated with services that permits the service's business
2343 performance to be monitored and managed. In particular, if there are business-level service level
2344 agreements that apply to a service, being able to monitor and manage those SLAs is an
2345 important role for management systems.
- 2346 Building support for arbitrary business monitoring is likely to be challenging. However, given a
2347 *measure* for determining a service's compliance to business service level agreements,
2348 management systems can monitor that performance in a way that is entirely similar to other
2349 management tasks.
- 2350 **Policy manageability**
- 2351 Where the policies associated with a resource may be complex and dynamic, so those policies
2352 themselves may require management. The ability to manage those policies (such as
2353 promulgating policies, retiring policies and ensuring that policy decision points and enforcement
2354 points are current) is a management function.
- 2355 In the particular case of policies, there is a special relationship between management and
2356 policies. Just like other artifacts, policies require management in a SOA. However, much of
2357 management is about *applying* policies also: where governance is often about what the policies
2358 regarding artifacts and services should be, a key management role is to ensure that those
2359 policies are consistently applied.
- 2360 **Management service**
- 2361 A management service is a service that manages other services and resources.
- 2362 **Management Policy**
- 2363 A management policy is a policy whose topic is a management topic. Just as with other aspects
2364 of an SOA, the management of resources within the SOA may be governed by management
2365 policies, contracts (such as SLAs).
- 2366 In a deployed system, it may well be that different aspects of the management of a given service are
2367 managed by different management services. For example, the life-cycle management of services often
2368 involves managing dependencies between services and resource requirements. Managing quality of
2369 service is often very specific to the service itself; for example, quality of service attributes for a video
2370 streaming service are quite different to those for a banking system.
- 2371 There are additional concepts of management that often also apply to IT management:
- 2372 **Systems management**
- 2373 Systems management refers to enterprise-wide maintenance and administration of distributed
2374 computer systems.
- 2375 **Network management**
- 2376 Network management refers to the maintenance and administration of large-scale networks such
2377 as computer networks and telecommunication networks. Systems and network management
2378 execute a set of functions required for controlling, planning, deploying, coordinating, and
2379 monitoring the distributed computer systems and the resources of a network.
- 2380 However, for the purposes of this Reference Architecture, while recognizing their importance, we do not
2381 focus on systems management or network management.

2382 **5.3.1 Management and Governance**

2383 The primary role of governance in the context of SOA is to allow the stakeholders in the SOA to be able
2384 to negotiate and set the key policies that govern the running of the system. Recall that in an eco-systems
2385 perspective, the goal is less to have complete fine-grained control but more to enable the individual
2386 participants to work together. Policies that are set at the governance of an SOA will tend to focus on the
2387 rules of engagement between participants – what kind of interactions are permissible, how to resolve
2388 disputes, and so on.

2389 While governance may be primarily focused on setting policies, management is more focused on
2390 realization and enforcement of policies.

2391 **5.3.2 Management Contracts and Policies**

2392 As we noted above, management can often be viewed as the application of contracts and policies to
2393 ensure the smooth running of the SOA. Policies play an important part in managing systems both as
2394 artifacts that need to be managed and as the guiding constraints to determine how the SOA should be
2395 managed.

2396

2397 **5.3.2.1 Policies**

2398 "Although provision of management capabilities enables a service to become manageable, the extent and
2399 degree of permissible management are defined in management policies that are associated with the
2400 services. Management policies are used to define the obligations for, and permissions to, managing the
2401 service." [WSA]

2402 **5.3.3 Management Infrastructure**

2403 In order for a service or other resource to be manageable there must be a corresponding manageability
2404 capability that can effect that management. The particulars of this capability will vary somewhat
2405 depending on the nature of the capability. For example, a service life-cycle manageability capability
2406 requires the ability to start a service, to stop the service, and potentially to pause the service. Conversely,
2407 in order to manage document-like artifacts, such as service descriptions, the capability of storing the
2408 artifacts, controlling access to those artifacts, allowing updates of the artifacts to be deployed are all
2409 important capabilities for managing them.

2410

2411 Elements of a basic service management infrastructure should include the following characteristics:

2412

- 2413 • Integrate with existing security services
- 2414 • Monitoring
- 2415 • Heartbeat and Ping
- 2416 • Alerting
- 2417 • Pause/Restore/Restart Service Access
- 2418 • Logging, Auditing, Non-Repudiation
- 2419 • Runtime Version Management
- 2420 • Complement other infrastructure services (discovery, messaging, mediation)

2421

2422 * Message Routing and Redirection

2423 * Failover

2424 * Load-balancing

2425

2426 * QoS, Management of Service Level Objects and Agreements

2427 * Availability

2428 * Response Time

2429 * Throughput

2430

2431 • Fault and Exception Management

2432

2433 **5.3.4 Service Life-cycle**

2434 **5.3.5 Service Provisioning**

2435 Requirements on a management system should be to manage the services and not the infrastructure.