Example is always more efficacious than precept.
Samuel Johnson

2 Make or Buy

This chapter presents four compound components:

- Material-resource management
- Facility management
- Manufacturing management
- Inventory management

2.1 Make or Buy / Material-Resource Management

What. Material resources are the things that a business uses to get things done. Material resources include the raw materials needed for manufacturing a product. Material resources also include the day-to-day supplies one needs to run a business.

Scope. Material-resource management begins with a request and ends with the fulfillment of that request, including delivery and the processing of invoice from the supplier.

Steps. Define material types and materials. Request materials, possibly indicating a preferred provider. Send a request for quotation (RFQ) to suppliers. Enter the RFQ answers you receive from those suppliers who choose to respond. Select a winning answer and issue a corresponding purchase order (PO). Receive delivery from the supplier. Enter an invoice from a supplier and post the amount (to the accounting component). Request and track service from the supplier.

Links. Track the material resources we keep in storage units (inventory management). Post costs (accounting management). Accept requests (from manufacturing, facility, and project-activity management).

Mirror images. In material-resource management, we move things into the business on an invoicing basis (from a supplier to us). In product-sale management, we move things out of the business on an invoicing basis (from us to a customer).

Components. The components within material-resource management are (Figure 2-1):

- Material resource
- Materials request
- RFQ from supplier
- PO to supplier
- Delivery from supplier
- Invoice from supplier
- Service from supplier

Moment-intervals. The main moment-intervals for material-resource management are (Figure 2-2):

- Materials request
- RFQ
- RFQ answer

- PO to supplier
- Delivery from supplier
- Invoice from supplier
- Service request
- Service from supplier

Interactions. The components work together to get things done. An example of inter-component interaction, "assess request to delivery", is shown in Figure 2-3. A sender asks a pink materials request to assess its degree of fulfillment. The request traverses from request to pink RFQ, to pink RFQ answer, to pink PO, to one or more pink deliveries. At the end, the request returns the result to the sender.

Expansion. One could expand this compound component by enhancing supplier selection, managing consignment stocks, and establishing supply chains.

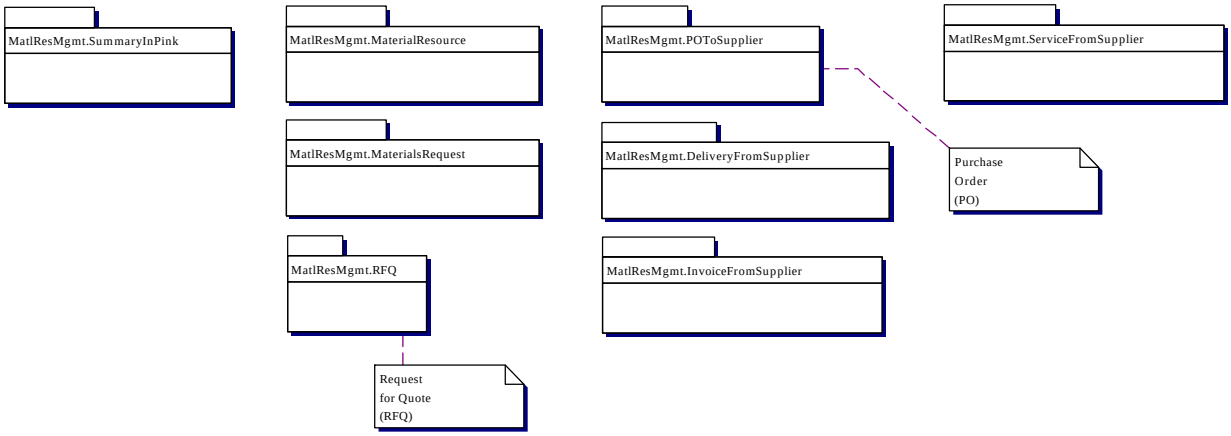

Figure 2-1. Material-resource management components.

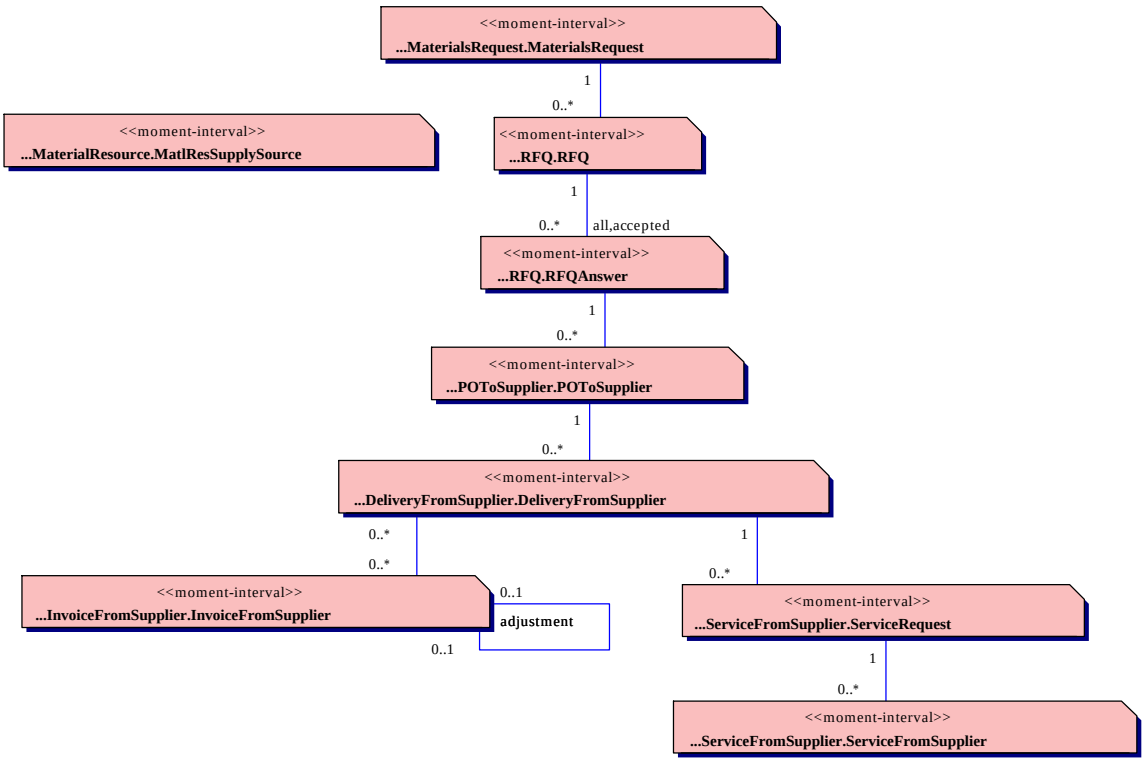

Figure 2-2. Summary in pink: material-resource management.

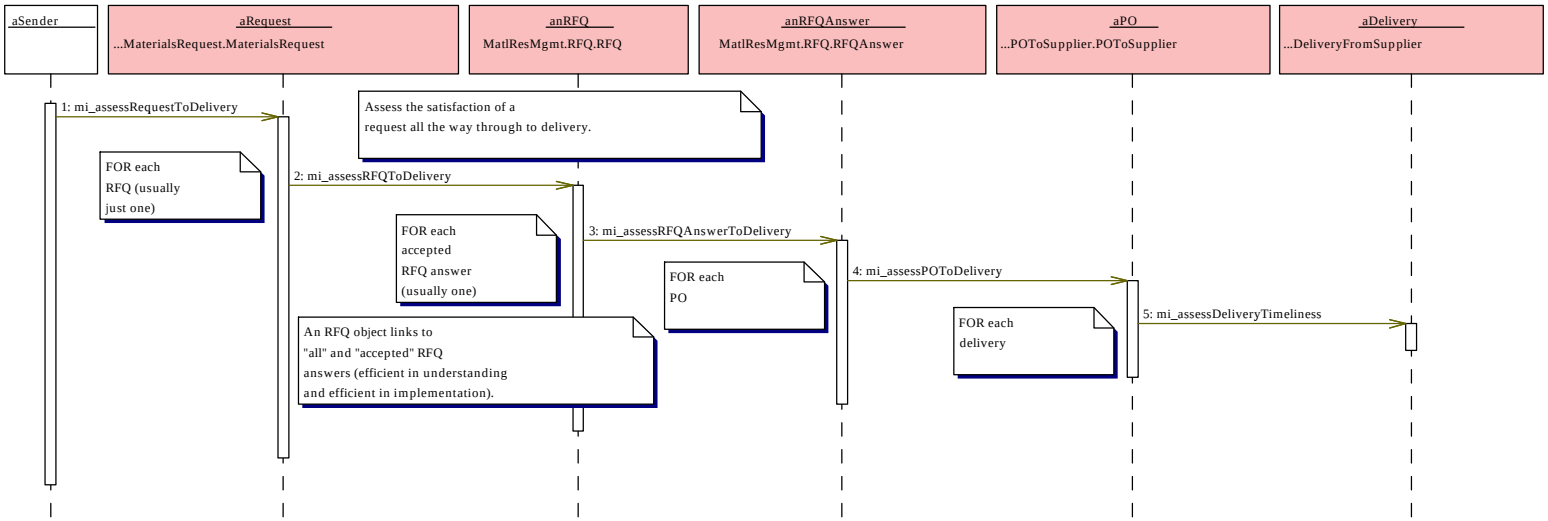

Figure 2-3. Assess request to delivery.

2.1.1 Make or Buy / Material-Resource Management / Material Resource

Guided tour. The material-resource component has two central classes: a green material resource and a blue material-resource description.

Material resource. A green material-resource is something that a business uses (for example, a specific part or a batch), is individually identifiable (it has a serial number of some kind), and is one that you find you must individually track.

If a material resource were not individually identifiable (for example, one thousand tons of hops), you would not need a green thing; instead, you could use a quantity (one thousand tons) of a blue catalog-entry-like description (hops). Moreover, if something were individually identifiable yet you needed only to track quantities (and not ever answer the question “which one?”), then again a quantity of a blue catalog-entry-like description would be sufficient.

Here's another example. A material resource (green thing) could represent a specific hard-drive subassembly, identifiable by its serial number. A material-resource description object (blue description) could represent a standard catalog-entry that applies to any hard-drive subassembly: the manufacturer is Acme, the model number is 1720, and the storage size is 10 gigabytes.

Tip. Green or blue? Use green party/place/thing when it's uniquely identifiable and you need to track it that way. Otherwise, use some quantity of a blue description instead.

A green product links to yellow roles, specific contexts of participating within the model. Those two roles are "a material resource being ordered" and "a material resource being used".

Material-resource description. This is a catalog-entry-like description of a kind of material resource. A blue material-resource description is the main description; it links to a number of other supporting blue context-specific supplemental descriptions that one can add-on as needed.

Other components use certain quantities of a material-resource description. For example, if someone requests 15 Acme Z-2 laptops, then a component might include a request detail with a quantity of 15, linked to a blue material-resource description (more specifically, blue vehicle description) that applies to each Acme Z-228.

Supply source. A pink supply source maps suppliers and material resources, indicating the interval of time, along with the timeliness and quality ratings for that supplier supplying those material resources.

Methods. Key methods include calculate quantities requested, quoted, ordered, and delivered; list the suppliers of a material resource; and list the material resources available from a supplier.

The "material resource" component is shown in Figure 2-4.

Interactions. The "list suppliers of a material resource" sequence is shown in Figure 2-5. A sender asks a blue material-resource description for a list of suppliers. The description asks each of its pink material-resource supply sources to get its active supplier; it checks its status and interval; if okay, it returns its yellow supplier object back to the sender; otherwise it returns a null value back to the sender. At the end, the material-resource description returns a list to the sender.

A pink moment-interval has an interval, some date(s), or some date-time stamp(s). So it's fair game to ask it questions like "Are you applicable on this date I'm giving you?" In addition to applicable interval, a moment-interval knows how to respond to a request for a calculation or some other result.

So a sender could make this a two-step process: first, are you valid for this request; second, please fulfill a request.

Yet that makes the sender know more about the receiver than it needs to. The sender had to know to ask about validity before asking for what it really needed.

It's better to let the sender ask for what it needs: fulfill this request. The sender knows less and interacts less with the receiver. The receiver checks is own validity, returning a null value, returning a zero, or raising an exception when it cannot honor that request (if an exception, the sender must handle it).

Tip. Validate then do? Merge into a single step for the sender, passing arguments and letting the receiver encapsulate all steps in the process. The receiver validates, performs the requested action, and returns the result to the sender.

Also note that what the sender gets back is a list of suppliers, not a list of supplier names and addresses. If the sender needs that information, it can ask a supplier (which in turn will ask its corresponding green person or organization object) for those values. So return a list of objects. Get values from that list (and then from its members) right at the point you need it (not sooner).

Tip. Values from an object several links away? Ask for the object, then ask it for the values you need. Don't pass the command through several layers of intermediaries (unless that command is useful to the intermediary as well).

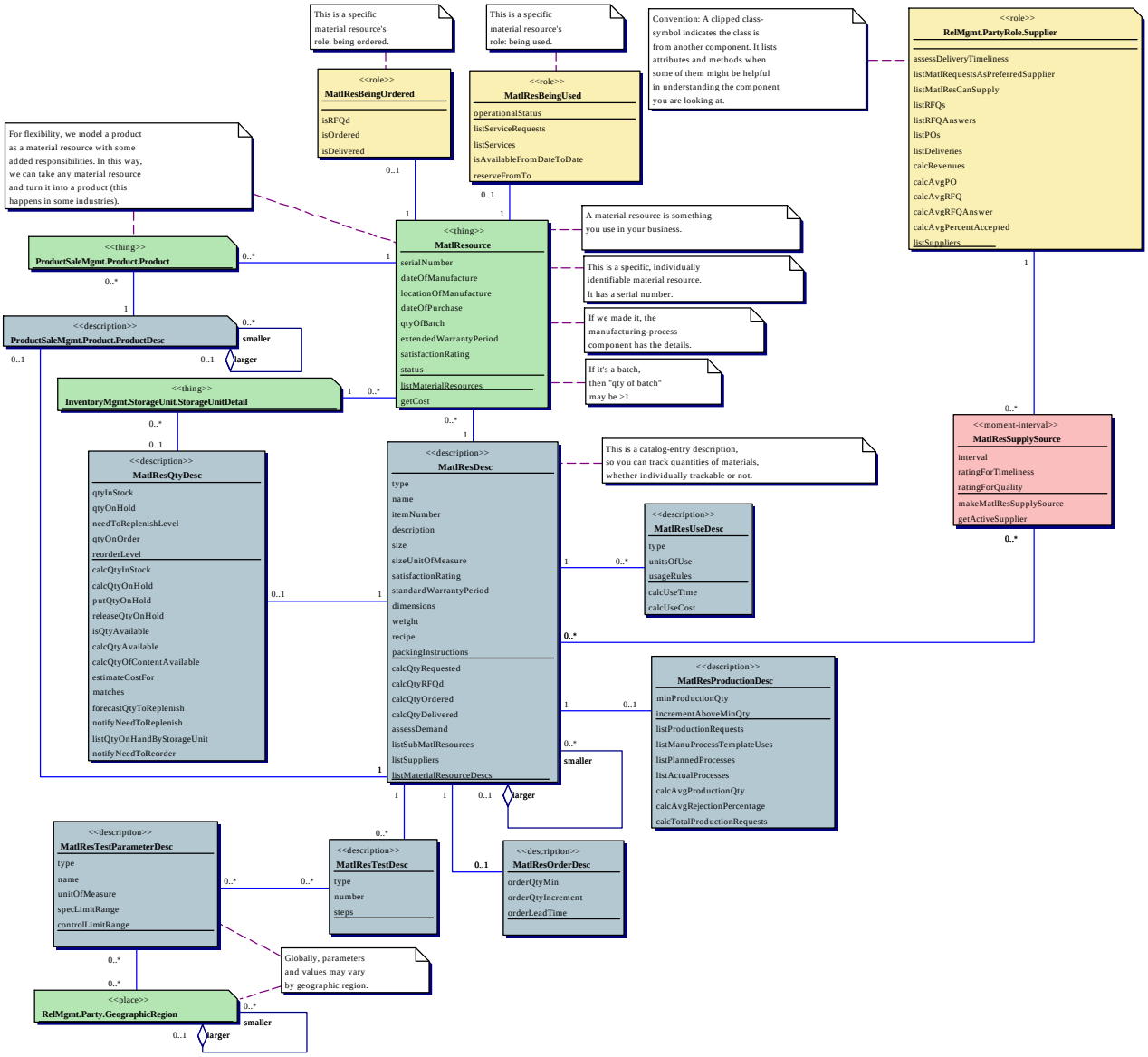

Figure 2-4. Material-resource component.

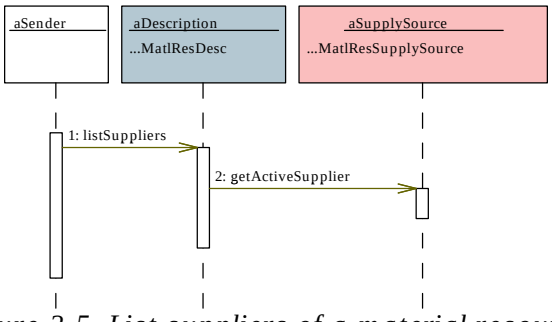

Figure 2-5. List suppliers of a material resource.

2.1.2 Make or Buy / Material-Resource Management / Materials Request

Guided tour. The materials-request component has one pink moment-interval, a materials request.

Materials request. A materials request may come from a user, from a material-resource description based upon its reorder threshold, or from an overall project-activity request, one that a material-resource request supports.

A pink materials request links to two yellow roles, materials requester and supplier. The supplier might be an internal or external supplier. The supplier might be a preferred supplier; the text tag at the end of the link near supplier is a convenient way to annotate the role that a connecting object plays. This text tag allows you to identify a role or context for that link without needing to add a separate class with the same attributes, links, and methods.

Tip. Yellow role with no added responsibilities? Express that yellow role with a text label rather than with another yellow role.

A pink materials request links to pink materials-request detail(s).

Materials-request detail. A pink materials-request detail specifies a quantity of a blue material resource description (actually a subset of the overall description, relating to quantities). Or it might link to yellow material-resource being ordered(s), which in turn links to a green material resource (in the material-resource component).

Note that the link between materials request and materials-request detail is an aggregation, showing whole and its parts, a bit of added meaning.

Tip. Association or aggregation? Association is by far the norm, the 90 percent case. Use aggregation only when you want to give the added meaning of whole-part, container-content, or group-member.

Before and after. For a materials request, the preceding pink moment-interval is project-activity request detail (in project-activity management). The subsequent pink moment-interval is RFQ

Methods. Key methods include make a material request, estimate cost, are quantities available, list materials requests for a requester, and list materials request for a supplier when that supplier is designated as a preferred supplier.

The "materials request" component is shown in Figure 2-6.

Interactions. The "is quantity available" sequence is shown in Figure 2-7. A sender asks a pink request if a quantity is available. That pink request asks each of its pink details if quantities are available. Each pink detail asks its blue material resource quantity description if quantities are available. A blue description answers the question, returning the appropriate result. At the end, the request returns the result to the sender.

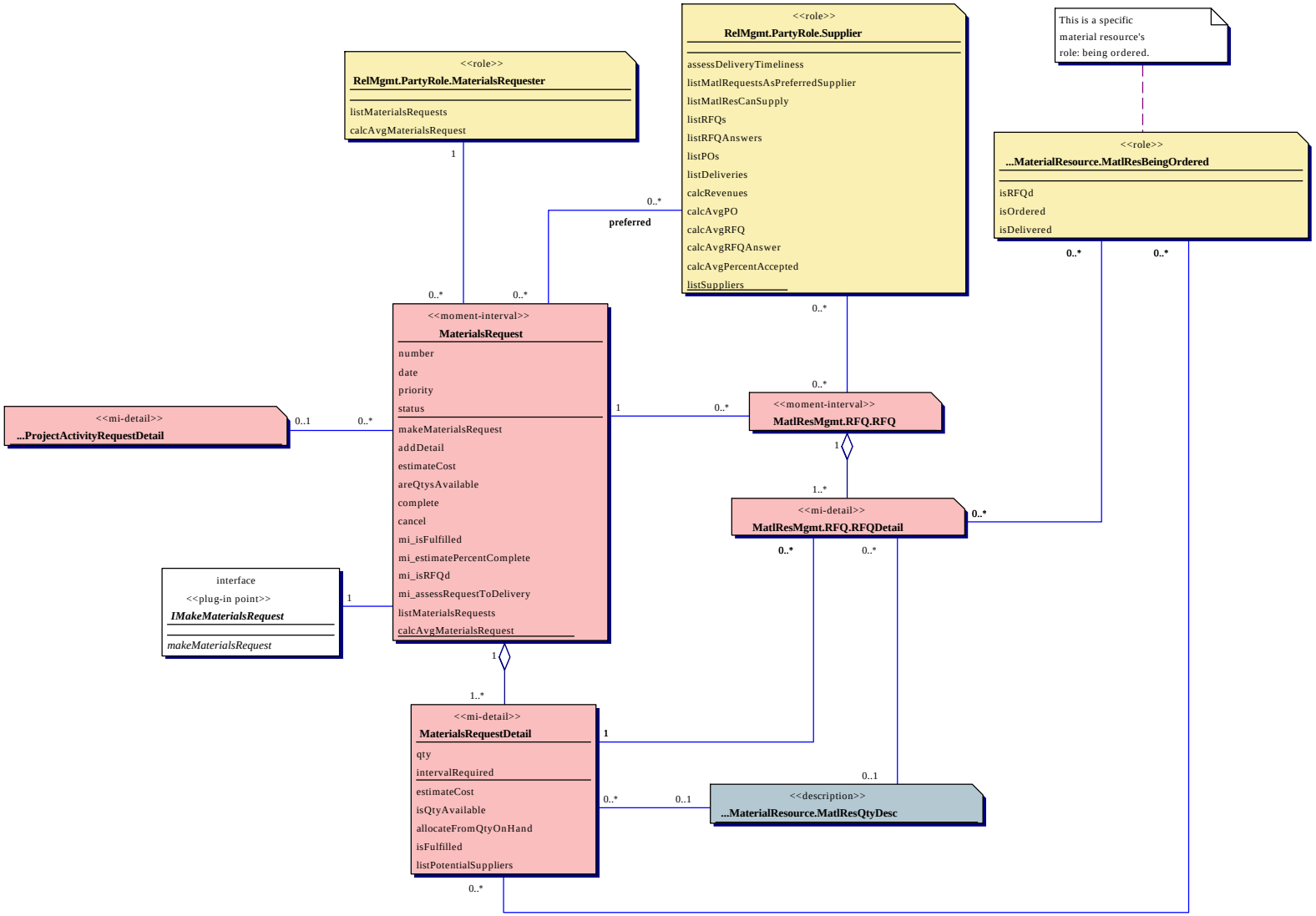

Figure 2-6. Materials-request component.

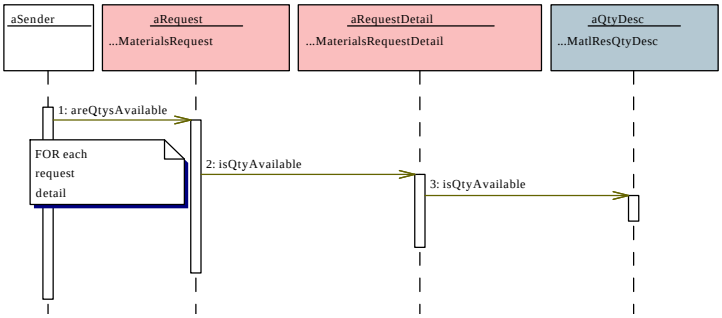

Figure 2-7. Are quantities available to satisfy a request?

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2.2 Make or Buy / Facility Management

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