Methodology Development and Administration with Decentralized System Development

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1. INTRODUCTION

1.1 Information for Software Developers:

Programmers, systems analysts, data-base designers, and others engaged in developing software routinely need to consult a huge body of instructional and reference material, including:

1. Manuals by vendors or "after market" publishers, explaining how to use the hardware, operating system, utility programs, programming languages, and other tools of the development environment.
2. Books, papers, articles, educational material, and other elements of the literature of information technology or of the application areas.
3. Manuals, reports, memos, and other documents that describe policies, standards, conventions, and recommended practices that define the organization's software development environment. Such material is called *methodology* (sometimes "standards") *documentation*. Of the three documentation categories this one has the greatest impact on the quality of the work done by the professional staff.

Methodology documentation is often developed and maintained by an internal Information Systems organization, except for a few large components, e.g. a development life cycle, sold as packaged proprietary products. Whether purchased or internally developed, this category of material is much more under the control of the using organization than the first two categories.

1.2 Assumptions about the Audience:

We assume that the programmers, systems analysts, and others who will read the methodology documentation are either competent and experienced professionals or bright and receptive trainees. In either case we can further assume[1] that the readers:

- Are actively interested in the subject matter.
- Are eager to improve their skills and learn new techniques.
- See little threat to their own creativity from a sound methodology.
- Are able to grasp and apply written concepts and techniques routinely.

1.3 Traditional Problems and Shortcomings:

Sad to say, few organizations have derived enough benefit from their methodology documentation to justify their investment in developing it. Although the causes of these failures may include organizational obstacles and inadequate training, a large part of the blame usually lies in shortcomings of the methodology documentation itself. Five common deficiencies are:

1. *Lack of structure*: The material is so disorganized that readers can't find what they're looking for.

   Such lack of structure is inevitable when the organization issues important information in the form of separate memos or as a series of "technical bulletins". It occurs even when a "standards manual" exists if the chapters or sections just present an unstructured sequence of individual "standards".

2. *Fragmentation*: The material the staff needs is scattered among multiple manuals and other documents that have no clear relationship to one another. In extreme cases of fragmentation different parts of an organization's methodology documentation are actually in conflict with one another! More often, overlapping or related topics are presented independently in inconsistent language that obscures inherent relationships, leaving the reader feeling vaguely confused.

   Fragmentation arises when an organization makes a commitment to some new methodology component without considering its impact on other, already established methodology components, or when responsibilities for methodology support and support are split among different parts of an organization.

[1] We know, of course, of organizations for which those assumptions don't hold, perhaps because of externally imposed constraints or just long-established traditions -- the "corporate culture". Some of those organizations will be better off not trying to build and retain the kind of staff that will satisfy these assumptions. Such organizations will want and need an entirely different approach to documenting standards and methodology from the highly *professional* one described here.

3. *Structural incompleteness*: There is no natural or obvious place to put certain information needed by the professional staff. Consequently, some important information either never gets written down or is issued in separate memos that are soon forgotten.

   Structural incompleteness occurs not only as a by-product of a lack of structure (1 above), but also whenever the topics in the table of contents are based more on today's specific tools and techniques than on relatively stable concepts.

4. *Arbitrariness*: The documentation is full of "rules" and "restrictions" that are not clearly related to the organization's performance objectives.

   Arbitrariness may arise when people become overzealous in their commitment to "standards" or when methodology content is unduly influenced by the tastes and personal preferences of a small group of contributors. Naturally, lists of arbitrary rules are harder to remember than a more cohesive and well-motivated methodology, and the staff is unlikely to develop much enthusiasm or a real sense of commitment to the spirit of such a methodology.

5. *Obsolescence*: Most of the methodology material was developed years earlier and no longer reflects important aspects of the hardware, the system software, or the methods and tools in actual use. Therefore the professional staff pays less and less attention to the manuals, people announce new facilities, standards, and recommended techniques through other channels, and new employees may not even be aware of the existence or the purpose of the original methodology documentation.

   Obsolescence occurs when an organization funds the development of a manual as a one-time project, but then fails to budget funds and assign continuing responsibility for updating and maintaining it.

These five shortcomings severely impair the usability of methodology documentation, its acceptance by the professional staff, and its value to the organization. In order to succeed the methodology documentation must exhibit a minimum of these deficiencies. In weighing alternative ways of organizing and preparing methodology material, therefore, we must strive above all to avoid, or at least minimize, these five shortcomings.

2. EFFECTIVE METHODOLOGY DOCUMENTATION

2.1 Integration of Subject Matter:

Among the topics commonly addressed by methodology documentation are:

1. *Project management* concepts, methods, and tools.
2. A standard system development *life cycle*
3. Methods and criteria for determining and specifying application *requirements*.
4. Techniques and tools for *system specification* (structured analysis, prototyping, etc.)
5. *Data-base design* standards and *data administration* procedures.
6. Application system *architecture* and software *design* concepts and techniques (structured design, object-oriented programming, modular structure, etc.).
7. Guidelines for evaluating and selecting *packaged software* products.
8. Techniques for *coding and testing* (structured programming, language-specific standards, etc.).
9. Standards and conventions for computer use and production *operation* (file naming, configuration limits, client-server architectures, etc.).

Although each of these areas is enormously rich in material and although many courses and textbooks treat them individually, none is fully independent of all the others. The system life cycle is the framework on which we hang most of the other methodology components. In project planning, the way we define and assign tasks during the programming phases depends on how we divide programs into modules, on the phasing of design activities, and on the level of the languages and tools the programmers will use. Our data base designs are often influenced by the nature of the programs that will operate on the data, and vice versa.

These inherent relationships seem to present a hard choice when we design methodology documentation. On the one hand, we are attracted by the apparent simplicity and economy of presenting each area independently. On the other hand, a collection of separate unrelated manuals would surely lead to serious *fragmentation* and confusing disunity for the reader.

We must resolve the issue, however, in favor of avoiding fragmentation. The "simplicity" and "economy" of a bunch of uncoordinated manuals are only illusions for the superficial reader. Once readers actually try to *use* such fragmented material, they are inevitably overwhelmed by its complexity. The negative impact on both their productivity and the quality of their work turns out ultimately to be costly for the organization.

2.2 Integration of Levels:

For each of the subject matter areas the staff must be aware of several *levels* of methodology. Some organizations recognize[2] these four levels:

[2] Using varying terminology.

Standards must be observed, unless approval to deviate[3] is granted in advance.

Conventions should be followed unless there's some definite reason[4] for deviating.

Guidelines (or "recommended practices") are purely advisory. The reader is expected to be acquainted with them, but is free to choose alternative methods.

Information ("useful techniques", "helpful hints") completes the body of material readers should know about a topic.

A critical choice an organization must make in designing its methodology documentation is between:

a. isolating the material by level, with emphasis on a pure *standards* manual (the "military approach" to methodology documentation).

b. integrating material of all levels be subject matter into a logically structured *reference* manual (the "professional approach").

This choice hinges on how the organization wants its staff to view the documentation. If, for example, a designer developing a critical module interface consults the manuals seeking an answer to:

> "What are the rules about module interfaces that I absolutely must comply with in order to get my design approved[5] and to complete my assignment?"

then a military style manual would fill the bill. On the other hand a more professionally oriented designer is more likely to want to know:

> "What do I need to know about my organization's approach to designing module interfaces in order to develop a timely and high-quality program?"

The latter attitude, of course, leads much more often to the kind of quality, both of results and of the staff itself, that most organizations seek. Nevertheless, impatient managers are sometimes tempted by the greater "concreteness" present in a methodology that focuses on mandatory *standards*[6] and by the apparent efficiency with which a reader can look up a rule without having to "plough through a lot of unessential material". They should resist such temptations. Experience confirms that the biggest contributions to productivity, quality, and manageability come not from the mandatory standards, but rather from the creative and knowledgeable application of concepts, techniques, methods, and tools that fall into the levels we've called *conventions*, *guidelines*, and *information*.

An organization that designs its methodology documentation around only mandatory standards will indeed assure some *minimum* level of quality, but it will ultimately find that it has also limited how *good* the average quality will be. A genuinely professional approach requires *integrated* methodology -- both integrated levels and integrated subject matter.

2.3 Diversity of Style and Format:

Some organizations worry too much about the style and format of their internal manuals. Efforts to establish a "uniform" style and format for all sections, sometimes promoted by overzealous technical writing specialists, are ill advised for two reasons:

1. Different topics demand different presentation techniques. Procedure format is inappropriate for tabular information like naming standards. Some topics are best conveyed through concise structures like outlines, while others need explanations in English (or the readers' natural language).
2. Material from different sources and contributors needn't be subjected to time-consuming and costly editing just for the sake of uniformity. If existing material conveys the needed information, then the organization should be able to use it without delay.

Although the style of methodology documentation needn't be uniform, it must be *good*. Within a broad and flexible approach, the material must always be clear and friendly. The reader should feel that the authors are addressing him or her as a respected colleague, not as an inferior in need of enlightenment. Any rules or seemingly arbitrary choices should be explained: Why do we need a standard here? Why is this standard appropriate?

2.4 The Volume of Material

Some of these conclusions might make us worry that the volume of material will get out of hand. While it's true that a well-written set of reference manuals will ultimately contain many pages, the size of the manuals need not be overwhelming (nor is a large size necessarily bad).

We sometimes hear someone's "rule of thumb" about how thick we should allow a standards manual to become. "If it's over a hundred pages, no one will read it." Such well-meant statements miss the point. It's not the *amount* of material that determines the readability and usefulness of methodology documentation. Rather it is the *structure* that determines how long it takes a reader to find something, and it is the *style* that determines how long it then takes to grasp the content.

It takes much less time to find a given topic in a logically structured 500-page multi-volume reference manual than

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3 Following some established procedure.

4 Possibly subject to after-the-fact explanation.

5 e.g. by a "quality assurance" function.

6 One of the silliest arguments in favor of a separate "standards" manual over an integrated "reference" manual is that it's "easier to enforce". Misguided people in quality control or review roles may disparage the whole notion of conventions and guidelines as "too hard to enforce". When unchecked such attitudes lead to a bureaucratic environment in which the original objectives of quality, productivity, and manageability are forgotten in a day-to-day struggle just to "follow the rules".

in an 80-page chronologically sequenced series of bulletins. It takes less time to read and understand a four-page well written and well motivated explanation of a topic than to decipher and remember a single page of terse arbitrary rules.

There's really only one size criterion that makes practical sense:

> Methodology documentation should be as large as it needs to be to communicate, clearly and efficiently, what the staff needs to know about the methodology.

2.5 Documentation Structure

Experience shows that a usable and manageable way of organizing methodology documentation is by *subject matter hierarchy*. If we arrange our methodology components in a natural hierarchy, the reader will know just where to look and will be able to turn directly to the relevant material. Furthermore, general, conceptual, or background material will precede related details, so that the reader can usually learn about an unfamiliar topic by reading sequentially.

Structuring problems will become even easier to solve in the next few years with the exploitation of *hypertext* technology. By making the methodology documentation accessible on-line and providing appropriate navigation paths between related topics we can cater to readers having a broad range of needs and backgrounds.

2.6 Incompleteness of Content:

In the introduction we mentioned *structural incompleteness* as a serious flaw in a set of methodology documentation. There must be a logical place to put whatever we may wish to say to the staff. That doesn't mean, however, that we must write something about *every* topic in the complete structure before we can distribute a manual to our staffs.

This key point is misunderstood surprisingly often. We've heard programming managers who had survived for years with no methodology documentation at all complain that a new reference manual is "no good" because it lacks some "essential" section!

If an organization were developing a set of documentation to sell as a product, the manuals would then have to be "complete" within their scope of subject matter. But most organizations develop methodology documentation not as an end in itself but as a tool to improve their own performance. What harm is done by empty sections within a comprehensive structure?

Note that an *empty* section in a structurally complete manual actually conveys important information. It tells the reader that the organization:

- is indeed aware of this topic and its relationship to other topics, and
- has not yet established standards, conventions, or guidelines in this area. (Therefore, the reader doesn't have to keep looking for fear of missing relevant material in some other place.)

Most importantly, an empty section invites the readers who seek guidance on that topic to take the initiative in proposing its content.

2.7 Self Contained and Bibliographic Material:

As soon as structurally complete methodology documentation exists, it becomes the authoritative source of information about its subject matter for an organization. If a vendor manual or a packaged course, for example, recommends a technique that is in conflict with the organizations own methodology documentation, then the latter takes precedence and that staff should avoid that technique.

It time, money, and talent were unlimited, an organization could simply dispense with vendor manuals and document everything its staff needs to know in its own internal methodology manuals. That would provide full control. However, given the pace of change and the volume of material, such an undertaking is impractical, even for the wealthiest organization. A practical reference manual, then, must contain a mixture of self-contained sections and references to other documents.

Whenever some existing document (a) conveys *most* of what the staff needs to know about a topic, (b) is written in a reasonably understandable way, and (c) is not dominated by examples of *bad practice*, it's hard to justify developing self-contained material on the same topic. In such cases the methodology documentation should simply refer the reader to the appropriate external publication, perhaps adding helpful hints on which parts to read first and what parts to disregard.

When an existing document contains *some* but not most of what the staff needs to know about a topic, the internally developed material can cite that document as prerequisite or background reading.

In developing and maintaining a comprehensive methodology for an organization, we should always seek existing material to reduce the need to develop our own. Vendor manuals and packaged courses are the most common sources, but useful material is increasingly available in textbooks and periodicals.

3. DEVELOPING & DISSEMINATING METHODOLOGY DOCUMENTATION IN A CENTRALIZED ORGANIZATION: THREE APPROACHES

3.1 The Failure of Standards Committees:

In the 1960's many large data-processing organizations showed their commitment to a strong standards program by establishing a *standards committee*. Some of those committees were expected to be the organization's main source of new or revised standards; others served more as a forum for discussing and reviewing proposals originating elsewhere in the organization.

In either case, a standards committee usually included a representative of each major area affected by standards, such as:

- business application development groups,
- scientific application development groups,
- computer-center operations,
- technical support functions,
- in-house training services,
- a quality assurance group,
- a central data-base management function.

If larger end-user departments had the knowledge and interest, they too might be invited to participate. If there were multiple data centers or professional staffs in different locations, each would have to be represented. A few organizations established a two-level structure: a working-level standards committee that understood the issues and would make recommendations, and a separate management-level steering committee to make decisions and give final approval.

Committees seldom developed an adequate body of methodology documentation themselves. They were just too slow, partly because of the part-time, voluntary nature of the assignments and partly because of the difficulty in arriving at a consensus. In their first few months they might produce some well-understood and urgently needed elements, such as job submittal procedures or naming standards for files and programs. However, they rarely produced conventions or guidelines, and they ignored important topics not directly related to current technology, such as project management, data-representation, or problem definition.

Equally unsuccessful were standards committees that limited themselves to reviewing proposals developed elsewhere. The diverse membership made it hard to hold a meaningful discussion of any non-trivial issue. Half the people at a meeting might have no interest in or knowledge of a subject under discussion. The long interval between meetings (typically monthly) virtually assured a delay of several months in resolving any issue that couldn't be agreed on immediately.

The requirement for positive approval action meant that inaction and delay had the effect of disapproval. Committee members often promoted their own personal tastes more than the views of the groups they were supposed to represent. In such environments the standards committees came to be viewed as bureaucratic impediments. In time most of them withered away.

3.2 Failure of the Standards Czar[7] Approach:

In a misguided attempt to move more decisively on standards, a few organizations decided simply to *issue* to their staffs a set of standards put forth by some "expert". The expert might be:

- An "old timer" staff member reputed to have expertise in some of the subject areas.
- A new staff member hired for expertise in either the subject areas or standards in general.
- An outside organization selling some methodology component as a packaged product.
- An outside consultant or, worse, a consulting firm.

Some organizations set up *multiple* standards czars, each one responsible for a different fragment of the methodology. A data-base administrator might issue standards for using the data-dictionary, a systems software support manager might issue job-control language standards, a veteran applications programmer might issue Cobol coding standards, and a course instructor might hand out standards for structured design -- with no coordination or consideration of the interfaces or inherent relationships among these areas.

Whether unified or fragmented this approach, too, almost always failed. Some of the so-called experts lacked knowledge of current technology and trends, while others failed to appreciate the particular environment, traditions, and style of the organization. But even if a standards czar were superbly qualified and issued only the most relevant and appropriate standards, this approach would still fail. It would fail because the staff would still perceive the result, whatever its merits, as an alien, imposed methodology and would resist it in subtle but effective ways.

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[7] Of course, no organization actually called these people "standards czars", but the term is convenient and descriptive of the process of issuing methodology from a central source without discussion.

The occasionally successful exceptions were a few commercially packaged methodology components, mostly "life cycle" systems consisting mainly of procedures and documentation models. Even there, however, success usually hinged upon the organization's being able to "internalize" the product through some combination of customization and flexible interpretation. Attempts to ram a product as is down the throats of the staff eventually fizzled out, perhaps after some illusory and well-publicized early "success" stories.

3.3 The Success of the Participative Approach:

If it can't assign the job to either committees or experts, then how can an organization develop and change its methodology?

We want methodology development that allows, welcomes, and publicizes participation by professionals who do the work and who will later be users of the methodology. Such participation should be broadly based. That is, instead of limiting participation to section leaders, old timers, or designated experts, we can open the methodology development process to virtually anyone on the staff who has the appropriate knowledge and who expresses the appropriate interest.

Although such broad participation might sound a bit chaotic to those accustomed either to a committee or to the czar approach, a number of large organizations have found the participative approach to be quite manageable, provided that the right structures and policies are established. In practice, only a minority of people actually do participate. Just knowing that one could participate if one wished goes a long way toward overcoming any natural resentment of "imposed" methodology. Just knowing that one's colleague at the next desk actually has made such contributions goes a long way toward making the methodology "ours".

The impact of participation on methodology content is real, not just psychological. With strong management support, a highly participative methodology development program tends to produce standards, conventions, and guidelines of substantially better quality and more current relevance than the usual product of the narrower approaches.

4. PARTICIPATIVE METHODOLOGY DEVELOPMENT

4.1 Originating New or Revised Material:

Under a participative approach, a new or revised piece of methodology documentation originates in one of three ways:

1. As the result of a project to write it (an *assigned* contribution). Organizations sometimes fund such development in response to new technology.
2. As an unsolicited contribution from someone in the organization, usually a member of the professional staff who actually use the methodology (a *voluntary* contribution). In a successful and mature methodology most material arises in this way.
3. As part of a project that is changing some aspect of the system development environment (a *mandatory* contribution).

4.2 Who Reviews and Approves New Material?

When someone proposes new or changed methodology material, the organization must quickly decide whether that material is to be accepted and become part of its official methodology. These decisions must take into account the costs and risks of various alternatives. Participants in these decisions can include line *management* at appropriate levels as well as qualified designated *reviewers* representing affected areas.

4.3 Structure of the Review:

Above all the review process must be fast and responsive. Our goal is to approve and quickly distribute any contribution that:

a. could be immediately useful to some staff members,
b. is unlikely to cause harm or confusion.

Unlike the old discredited *standards committee*, the reviewers don't meet regularly as a group. They review contributions at their own desks and at their own convenience. To avoid delay, many organizations treat inaction as equivalent to approval. Thus if no one raises an objection to proposed material within some specified time, say 3 weeks, it is considered approved.

Organizations are often pleasantly surprised at how much methodology gets adopted without objection. Nevertheless, some proposals inevitably provoke controversy. We want to resolve such issues quickly, economically, and, of course, in the best interest of all parts of the organization. Several approaches, too long to describe here, have been successful.

5. COMPLICATIONS FOR A DECENTRALIZED ORGANIZATION

5.1 Multiple Development Groups:

Instead of a single service function that develops application systems for all users in a large organization, we increasingly find multiple development groups having specialized charters and reporting to widely scattered parts of the whole organization. Although the organization may want to promote some degree of commonality in the

methodologies these groups follow, few of the separate groups have the resources to administer or maintain a strong methodology[8] program.

5.2 Global Methodology Structure:

Although the separate groups may be free to adopt any methodology *content* they wish, there are great benefits in their doing so within a common *framework* or methodology *structure*. If that structure is both complete and logically organized, as discussed earlier, then it will be able to accommodate a wide range of content with no threat to local autonomy.

Within that common structure, the organization can maintain a two-tiered[9] approach in which some content is *global* (or corporate), applying to all groups within the whole organization, and some content is *local*, applying to a single development group. The ratio of global to local content can vary widely according to the degree of decentralized authority and the needs of specific groups.

5.3 Political Realities

No matter what policies may be established at the corporate level, some groups don't welcome a common methodology program. They may resist some or all aspects of cooperative methodology development and implementation, if not openly then in many subtle ways. Such lack of enthusiasm arises from different causes, such as:

1. Local group management may sincerely believe that its problems are so unique that they can't easily fit the standards and methods developed elsewhere.
2. Some groups simply don't understand the purpose or value of a common methodology, and view it as a bureaucratic obstacle to getting their work done.
3. Some professional staff members may favor methods or tools other than those currently used in most other groups in the organization. They thus fear being forced to lower their own quality standards.
4. Some local managers may perceive common methodology as a threat to their autonomy, control, or long-term personal career objectives.

Whether the motivation is sincere or cynically political, we have to recognize reality and deal with it. A good place to start is to consider the possibility that people are sometimes *right* in believing that the organization's common methodology is inappropriate for them.

Except for a few basic policies, today's trend is toward *voluntary* participation and compliance in corporate standards and methodology activities by decentralized groups. Corporate edicts ramming detailed standards down the throats of resistant departments are not only out of fashion but also no longer work in today's world of expanding alternatives for information processing.

5.4 Geographic and Organization Culture Impacts:

The difficulty in administering a common methodology increases enormously as soon as the participating groups are not all in the same building. If responsibility for methodology coordination resides at some "headquarters" site, we can expect resentments and misunderstandings to increase in proportion to the distance from that site.

Corporate offices may be located in a city or affluent suburb, while the development groups occupy space in factories or other unglamorous facilities where people do the "real work" of the company. The difference in attitudes and daily routines is often a barrier to understanding and cooperation. Companies have lost control over information-processing standards by failing to notice the divergence between what's written in their manuals and what people do every day in the outlying locations.

A naive corporate methodology administrator may assume that the participation of local staff as reviewers and their attendance at meetings implies their commitment to the corporate methodology. After all, didn't they *agree* to these standards? But the common methodology can seem as remote as another planet to people in an isolated development group. They may well agree to some new standard and then forget about implementing it back home under day-to-day pressure.

Some geographically dispersed organizations conduct periodic *audits* of standards compliance at each site. Although the term sounds threatening and may instill hostile feelings, there may be no other way to know whether anyone is paying attention to the common methodology. It helps, obviously, to have the support of the local management to whom these groups report.

These problems get even worse in *multi-national* organizations. In addition to the usual misunderstandings and resentments, we have the sensitivities to differences in culture and work habits between corporate headquarters and foreign subsidiaries or affiliates. If the groups speak different languages, we must further add either the complication and expense of translation or the continuing irritation of people being regulated by a "foreign" methodology.

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[8] Nor is it likely that they can support other support functions, such as in-house *training*, *quality assurance*, and *data administration* as strongly as a centralized function.

[9] Large organizations may extend this notion to a third or even a fourth level.

Face-to-face contact is always helpful, the more the better. A corporate methodology administrator who visits each site for a day or two once or twice a year will inevitably be viewed as an aloof, remote, and irrelevant figure. Working together on actual projects is particularly helpful in breaking down barriers.

Each development group should have its own local methodology coordinator who distributes and interprets methodology materials to the rest of the local staff and acts an intermediary between the local staff and headquarters methodology administration. That individual often also acts as the group's methodology *reviewer*. In small organizations, of course, this isn't a full-time or even half-time role.

5.5 Local and Global Content

If participation in a common methodology program is truly *voluntary* then the development groups must be free to choose which *parts* of the total methodology they will adopt exactly as they come from headquarters and which parts they will customize to their own needs. The choice should apply to any unit of documentation, from whole chapters down to individual words.

The global methodology documentation might have to be customized for local use for one of two reasons:

1. Because it isn't *specific* enough for the actual environment
2. Because it is in conflict with what the local group wishes (or is compelled) to do.

The first category is often predictable, and customization can be built into the documentation structure. For example:

- Anything that refers to particular administrative procedures, physical locations, department names, or roles of specific people might be made a text variable for easy substitution
- Location-dependent sections or appendices would be left empty in the corporate material, encouraging each local group to write its own version.

The second category is more complex and more difficult. Different development groups might want to add, change, or delete different parts of the manuals in entirely different ways. Without infringing on the rights of these autonomous groups we should discourage unnecessary or unthinking departures from common methodology. A simple rule, which can be stated as corporate policy, is:

> Each organization is expected to follow the global corporate-level methodology, except where it has a definite reason for not doing so.

This minimal policy imposes no burden of justification, no bureaucratic approval process. It just tells the local group to think about the reasons for its deviation from corporate standards and the consequences of that deviation. The global methodology is the *default* case, which local groups can *override* whenever they feel justified in doing so. In areas of the documentation where the local group adds or changes nothing, the global methodology applies.

6. COST AND ADMINISTRATION

6.1 Corporate Level Staffing

Methodology development isn't a *project* with a definite end, but a continuing activity. Many methodology or standards programs have withered away in organizations that organized and funded them as one-time activities to be concluded with the publication of version 1 or version 2 of some manual.

When an organization decides to launch a methodology program, it is really establishing an ongoing commitment to:

1. Staff the function permanently.
2. Allocate funds for it as a recurring budget item.

Once this is accepted, an organization can choose, within a wide range of support levels. Let's look first at the *minimum* level of methodology support needed to perform the following essential activities on a timely basis:

1. Receiving global contributions and managing the review process described in section 4.
2. Editing and distributing approved material.
3. Coordinating activities with the methodology coordinators in each of the decentralized groups.
4. Answering questions of a general nature.
5. Documenting actual changes[10] to the environment or to a current practice within the organization.

Below that minimum level a methodology program will die. Updates will become infrequent, the content will become obsolete, new methods and tools in actual use will never get included, and the staff will increasingly ignore methodology publications. In times of extreme pressure to cut expenses the organization can cut the methodology budget to this minimum, but never below it. An organization that can't be reasonably sure of sustaining the minimum commitment is better off not launching the effort in the first place.

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[10] Ordinarily not funded from the methodology budget, but as a part of some project that implements such changes.

At that minimum level, the pace of methodology development will be determined by the rate of voluntary and mandatory contributions. This rate is hard to predict and in the early stages may be insufficient by itself to produce the content the organization urgently needs.

Above the minimum level an organization has wide flexibility. First, it can assign and fund certain major contributions as projects.[11] An organization typically reviews priorities annually and picks two or three areas where the expected payback will justify investment in methodology development or enhancement. Second, it can support a higher level of methodology education and consulting assistance, so as to accelerate the pace of methodology implementation among the staff.

In a decentralized organization, certain groups often pioneer new technologies or new approaches to system development. At the minimum, they should be strongly encouraged to develop and document their experience and conclusions as local additions to the methodology. With effective communication between corporate level methodology administration and the local group, many of these efforts will yield potential new global methodology as well.

6.2 Staff Education:

Almost every software development organization provides on-the-job education for its professional staff. Most large organizations maintain an internal training function responsible for developing and scheduling a curriculum of short courses presented internally. For specialized needs, people are sent to outside seminars and workshops. An allocation of five percent of the staff's time for "professional development" is common; ten percent is considered enlightened.

Much of the effort that goes into such internal training is wasted. The reasons involve both structure and content:

1. Structural Problems
   a. Lack of coherence and continuity between related courses.
   b. Poor learning environment.
   c. Failure to measure results and follow up.

2. Content Shortcomings
   a. Lack of a direct and on-going connection between what the staff needs and what the education function offers.
   b. Excessive emphasis on products or tools rather than concepts.
   c. Inadequate support of methodology content.

A well-integrated education program for information processing professionals makes no distinction between "professional education" and "methodology education". If a course is concerned with the subject matter of software development, then it is about methodology.

The organization should offer, therefore, no courses in "the methodology" or "standards". Rather there should be a range of courses on needed topics, all of which present their content in a way that is supportive of and integrated with the written methodology disseminated in manuals or other publications. When packaged courses[12] are integrated into a professional curriculum, self-study sessions should often be supplemented by group discussions of the impacts and interrelationships.

Decentralization presents even greater challenges to a coherent staff training program than to methodology documentation. Based on the common methodology structure and some global content, however, the groups can often agree on a core curriculum of courses, some internally developed, some purchased. Provided only that the local management understands the need for *any* staff training, such a curriculum can provide a basis of comparison for evaluating the skills and the training needs of isolated groups.

6.3 Justification:

Except for very small organizations, a methodology program based on a cohesive body of reference documentation is easy to justify because of the huge multiplier on the benefits it yields in productivity and quality. With a common structure and some global content, each decentralized group can choose between simply accepting the corporate-level methodology as is, at very little cost, or customizing it to suit its needs, at whatever level of investment it can justify.

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[11] Some of these will be undertaken within the decentralized groups and may or may not eventually yield material suitable for the global methodology.

[12] For example multi-media courses, or on-line tutorials.