A Study of Strategic Change, Process Alignment, and Notation:
FNGC Tap Process

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Introduction

This document presents a case study describing how Fictitious Natural Gas Company (FNGC or *Fictitious*) recognized a strategic opportunity to improve its business, adopted a new business strategy to meet that opportunity and then aligned its business processes to unify its operations with the new mission. This case contains three main sections: The case narrative, notation requirements that support FNGC's implementation and several appendices containing supporting documentation.

Although this case is a composition of experiences from many IPG clients, projects and experiences, it is not based on any particular client. Any material similarity to existing IPG clients is coincidental and unintentional.

Narrative

This narrative describes how the leadership of a fictitious natural gas company (FNGC or *Fictitious*) adopted a new business strategy and aligned its business processes to unify its operations with the new mission. To make the case manageable and useful for purposes of evaluating notation standards, this activity tracks the impacts of the strategy change down to a single business process (the gas-pipeline tap process). Then, at the detailed level of notation, presents only that portion of the execution of the process that involves the B2B interaction between the subject (FNGC) and its two facility vendors.[1] Finally, the case breaks down one side of one of the B2B transactions (the issuance and acceptance of a PO to a materials vendor) to a data-item evaluation and processing illustration. It concludes with descriptions of how the company uses its notation to keep the process functional and relevant over time.

The narrative describes eight separate but highly interrelated process design collaborations:[2]

1. It begins with the rationale for, and an overview of, the causes and implications of the **strategic shift** initiated by corporate leadership.
2. It is followed by an example of a **processes review** meeting covering only one of possibly tens or hundreds of similar reviews. In this meeting, two executives work through relevant issues and produce a hand-written process design that they will submit to the executive team for review.
3. The executive team then delegates (to a temporary process design team) the details of **engaging management** to complete a unified plan. The executive team charges the design team with producing a process-flow that: 1) meets the strategic objectives of the process; and 2) works within the relevant structures and cultural realities of the organization.

[1] To simplify the presentation, the case takes the materials from many suppliers and bundles them into a "kit" that is supplied by just two vendors (a materials supplier and a facilities construction contractor) to retain a multiple vendor scenario. These represent all external suppliers to this process for this case.
[2] These elements, and the narrative in general, are based on a composite of actual BPM implementations completed for multiple clients since 1996.

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4. This is followed by a description of the design team's failure to reach consensus, and the executive team's subsequent reassignment of this work to an individual they call a **Process Owner**.
5. The Process Owner then completes a **unified design** that includes the definition, timing and coordination of all roles. It also includes a comprehensive definition of the steps involved for each role and the circumstances under which the process will continue and/or hand-off segments to people occupying downstream roles.
6. The executive team confirms that the process adequately embodies how the right people will do the right things at the right time, and that the results of this work are likely to yield the intended critical strategic results. Then, the process owner **engages IT** to add the necessary connectivity and information management elements.
7. The narrative then describes the **user implementation** and initial adjustments to accomodate the realities and critical elements of how users actually participate in process execution.
8. Finally, it presents some of the common and important **changes** that occur over time that cause people at all levels to rely on the process notation to make the necessary and timely adjustments to keep pace with emerging market opportunities.

Strategic Shift

After an extensive industry and market evaluation following several years of poor performance due to highly leveraged commodity losses, the executive team of Fictitious Natural Gas Company (FNGC) decided to make a fundamental strategic shift away from the sale of natural gas (with its related commodity risk), to a more stable services model. This required some restructuring of their organization and its asset base. They sold assets exclusively related to gas sales and retained those that would aid them in providing exploration, extraction, transportation, storage and other services for customers who *do* trade in natural gas.

As a result of this shift, their criteria and methods of evaluating their business operations and project priorities had to change as well. Fundamentally, the economic justifications for capital projects that considered incremental cash flows from additional natural gas sales had to be revised to reflect the new pricing and revenue models associated only with services. This spawned a review of each operational process to determine its current alignment with these new strategies and resulting models.

One process that was highly impacted was the installation and maintenance of pipeline taps. In their prior model, taps represented a relatively long-term increase in sales from the additional flow of gas through the line. Because they no longer sell natural gas, their revenues end once the tap is installed (except for some small O&M on certain facilities).

Process Review: Strategic-Level Process Design & Alignment

The Vice President of Operations and the Director of Engineering met over lunch to discuss the results of an evaluation of their gas-line tap operations. They recognized that, under their previous model, the primary condition making them profitable was the additional gas sales that they facilitated. Take that away, and they not only lose a lot of

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money on each installation, but will divert scarce engineering and capital resources away from competing opportunities that *are* strategically relevant and profitable.

Hard Data

They reviewed the financial and operational data on tap installations from the past several years and, after removing incremental natural gas sales, found that Fictitious receives on average 21 tap requests per year of which it installs eight at a total present-value cost of $880,000. These taps generate a present value of revenue flows (less NG sales) of $690,000. After additional analysis of the complete record of each of these projects, these reviewers agreed that, if done properly, installation of only three of the 21 taps would have been necessary with a total present-value cost of no more than $170,000. Each of the other requests could have been legitimately disqualified early in the process if the right people were involved early enough with the right information and decision support.

Strategic Impact

Furthermore, the three tap projects that they believed Fictitious should have executed were either necessary for regulatory compliance, or their circumstances made them profitable and aided in FNGC's goal of public acceptance, profitability and good landowner relations. These three generated present-value revenues in excess of $250,000. They concluded that any process that they could implement that would have resulted in the disqualification of all but these three would have yielded a tap-project portfolio with an NPV of $80,000 ($250,000 - $170,000). This compares quite favorably to the NPV of $190,000 ($690,000 - $880,000) on the eight that were installed (excluding gas sales). Finally, the eight taps that were actually installed did *not* include one of the three important installations that these planners qualified in their processes review! They estimated the possible regulatory fines of having excluded that tap to be between $200,000 and $800,000 depending on how quickly the compliance issue could have been discovered, who discovered it and how long it took to remediate. (Incidentally, they immediately initiated an investigation into a remediation plan for the existing breach.)

Latent Impact

After the detailed and complex discussion of strategic impact, they concluded that the resulting new process will be equally as complex (in its rationale if not its structure). They acknowledged that the process is not intuitively obvious from any single role of those directly involved, and would be all but impossible to discern from any one area of the organization. Therefore, the process will need strong support and leadership from those with broad oversight.

Fundamental Response

These planners considered discontinuing the installation of taps altogether, but agreed that, except for referring retail taps and those belonging to a local distribution company (LDC), the regulations surrounding the issue of the public good would not permit it. Therefore, they turned their discussion toward finalizing a process design that would handle requests and installations:

1. appropriately, due to high risk and generally low profitability;

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2. formally and rigidly, due to low frequency and low interest/attention.

Summary of Findings & Conclusions

Finally, after discussing the final findings of the review, they arrived at the following concluding opinion: Tap installations are "sleepers" because, at their best, they are not very interesting (profitable, challenging or unusual) and therefore don't get much attention; yet, if handled without due diligence and timeliness, can be quite costly. Because of rigid regulation, handling either the tap request and/or the eventual installation poorly can create legal exposure many times greater than the total cost of the tap. To compound the problem, the relatively low frequency and generally low *production* importance of taps means that the company generally doesn't assign its top people to them and doesn't exercise or attend to these relevant competencies as much as it does its others (certainly not to the degree commensurate with its risk). Therefore, FNGC needs a formal and formally-supported business process implementation for taps that will address these circumstances and yield the correct and appropriate tap-project portfolio.

Process Objectives

Having completed their business process review and analysis, they turned to planning. Their first initiative was to derive an appropriate set of objectives to guide their process design and evaluate the eventual results.

Context Summary for Goal-Setting

As a first step toward this end, they distilled the following significant risk/success factors:[3]

- Taps are not significant business opportunities
- Taps are not very profitable and, without NG sales, have lost money overall
- Taps have high legal/regulatory risk relative to project scope/value
- Tap requests require skilled and attentive handling to maintain regulatory compliance
- Resources can be wasted on "frivolous" tap requests
- Requests handling can be costly relative to opportunity (even for disqualified taps)
- Relatively high research & planning effort is required for small scope
- Low tap frequency challenges project readiness and process currency
- Low ratio of real and/or required business per request received
- Tap process elements, that are driven by costs & standards, need frequent validation and updating
- Legal & regulatory changes need continuous consideration against current practices
- Tap project valuation must be based on profitability *and* risk management

Four Resulting Objectives

To adequately consider the above factors in reaching an appropriate and effective process design, these two executives identified the following four basic tap-process objectives:

1. Control tap projects to a degree that assures appropriate attention and resource allocation

[3] For a more detailed description of most of these, see Appendix B.

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2. Manage profitability by incurring costs only when necessary to reduce risk
3. Assure legal & regulatory compliance through decision support and proper & provable execution
4. Achieve/maintain public acceptance by honoring all appropriate requests, properly denying all disqualified requests and managing requester expectations.

Implied Process-Design Elements

After discussing the nature of these objectives and alternative practical ways to achieve them, the planners agreed on three overriding process design elements:

1. To minimize the amount of process execution (and resulting costs and resource diversion) prior to disqualification, the process should place request-qualifying expectation management steps as early in the process as is practical.
2. The process should be formalized with particular attention to:
   - the level of detail on the process itself (to minimize the risk of incomplete or uncoordinated execution);
   - the level of detail and resource support within each role (to minimize the risk of poor performance on what *is* executed).
3. To the extent possible, be prepared to respond to the following probable future emergencies:[4]
   - Change due to organizational, legal, regulatory, technological, political or industrial evolution
   - Personnel turnover due to acquisitions, expansion, contraction or changes to strategic direction
   - Competition

   They agreed that any business process management implementation must provide a way to come back to the process design at any level and make changes as extensively and frequently as they find necessary.

Process Design

Considering the process objectives and the relevant context, their conversation turned to identifying the high-level (strategic level) process flow to accomplish this. They placed a "yellow pad" on the table and began to chart the process. They identified two main phases to the process: Tap request evaluation and qualification, and, if necessary, tap installation.

Process Overview

Within the first phase, they identified three "natural" opportunities to qualify the request. They called these opportunities "gates" that the process would pass through in order to reach the final phase of installation. If a request could be appropriately disqualified, then the process would end (i.e., not pass through the gate). They ordered these gates into the process beginning with the most general, natural, least costly and least distracting (see Figure 1 on page 7).

[4] See Appendix C for an explanation of each (these are a subset of a more thorough alignment process).

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The basic objectives of each gate (which these individuals indicated in their written notes on the hand-drawn flowchart) are:

- for the first gate, to assure that only a bonafied and necessary request will pass to be processed further (it seeks to do this by spending as little time as possible getting information that is "off the top of the requester's head" and then to apply an "acid test");
- for the second gate, to verify the ability of all parties to meet all terms (here, the approach is to do only what is necessary to determine if FNGC can meet the requesters needs under terms acceptable to all);
- for the third gate, to verify fit and gain commitment to the final plan (by doing everything necessary to get to the "bottom line" before starting the project);
- for the installation, to meet all project objectives and to execute cleanly and flawlessly by bringing to bear the full weight of their front-line project management process and resources (which may be slightly different for each tap depending on what process objectives become primary for that request). By this point in the process, FNGC will no longer be interested in disqualifying the project, but is committed to doing excellent work and maximizing customer satisfaction (an important driver for projects that make it to installation).

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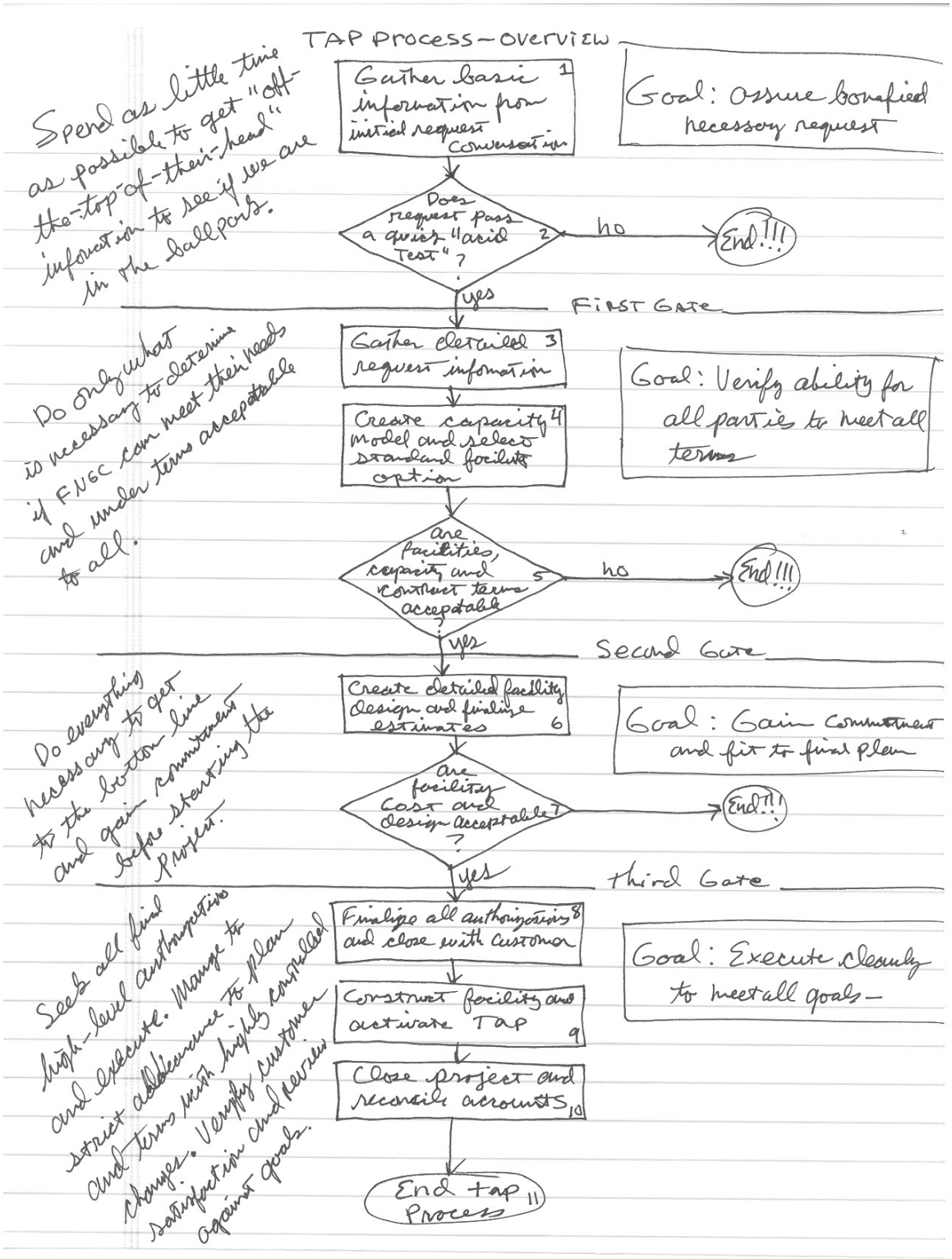

Figure 1: *Tap Process Overview*

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First Gate

The first gate was based on the information that the customer was likely to have "off the top of his head." Such as:

- his location;
- what pipeline he wants to tap;
- whether he currently has a contract with Fictitious;
- whether he is a retail customer;
- whether he is in an area with a local distribution company (LDC);
- any other *basic* information.

For this first gate, these executives agreed that they should use the easiest information that would yield the quickest qualification, and, as always, do it correctly. Therefore, they drew the flowchart for the first gate as an expansion of those flows represented on the overview for this gate (see Figure 2 on page 9). They identified 13 primary internal and external role categories and 89 high-level actions that, if executed properly, should assure that the process objectives are upheld in this gate.

This notation provides temporal flow from top to bottom, and role coordination horizontally. This part of the process presents several key elements:

1. The process begins with the customer role whose initial contact is the primary independent event[5]
2. As is usual with independent events, the company does not control this entry point into the process. Therefore, the process must account for this and provide a way to "catch" the initiating event from anywhere. For simplicity, this case assumes that the request is initiated by a phone call to an FNGC employee[6]
3. Once the basic information is collected, reviewed and evaluated, the Tap Coordinator can immediately disqualify it if:
   - it is not an interstate pipeline (he/she should refer it to retail operations);
   - the tap would normally belong to a local distribution company (refer to an LDC);
   - the customer is unwilling to accept the regulatorily-compliant cost estimate and initial deposit;
   - the full evaluation of the request identifies any other basis for disqualification
4. Finally, proper internal authorities (mainly legal and business development) must sign off to assure that all opportunities and risks have been considered for the unique qualities of the individual request.

Finally, a subtle but critical point that is always lost in a bottom-up analysis: The amount and kind of information gathered from the potential customer sets expectations. Since the primary objective of the first gate is only to qualify the request at a fundamental level, gathering more detailed information than is necessary will often send the misleading message that the request is viable enough to warrant commensurately detailed consideration. But this is not true at this point. Hence, this interaction must be limited.

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[5] Most processes begin with an independent event from one of four basic categories (a description of which is beyond the scope of the case)

[6] In fully qualified process implementations, process execution is initially constrained by how effectively it can be initiated – a process design is of little use if not applied – a good "portal" implementation will facilitate this as long as there is an evaluation process defined that routes people to where they need to be.

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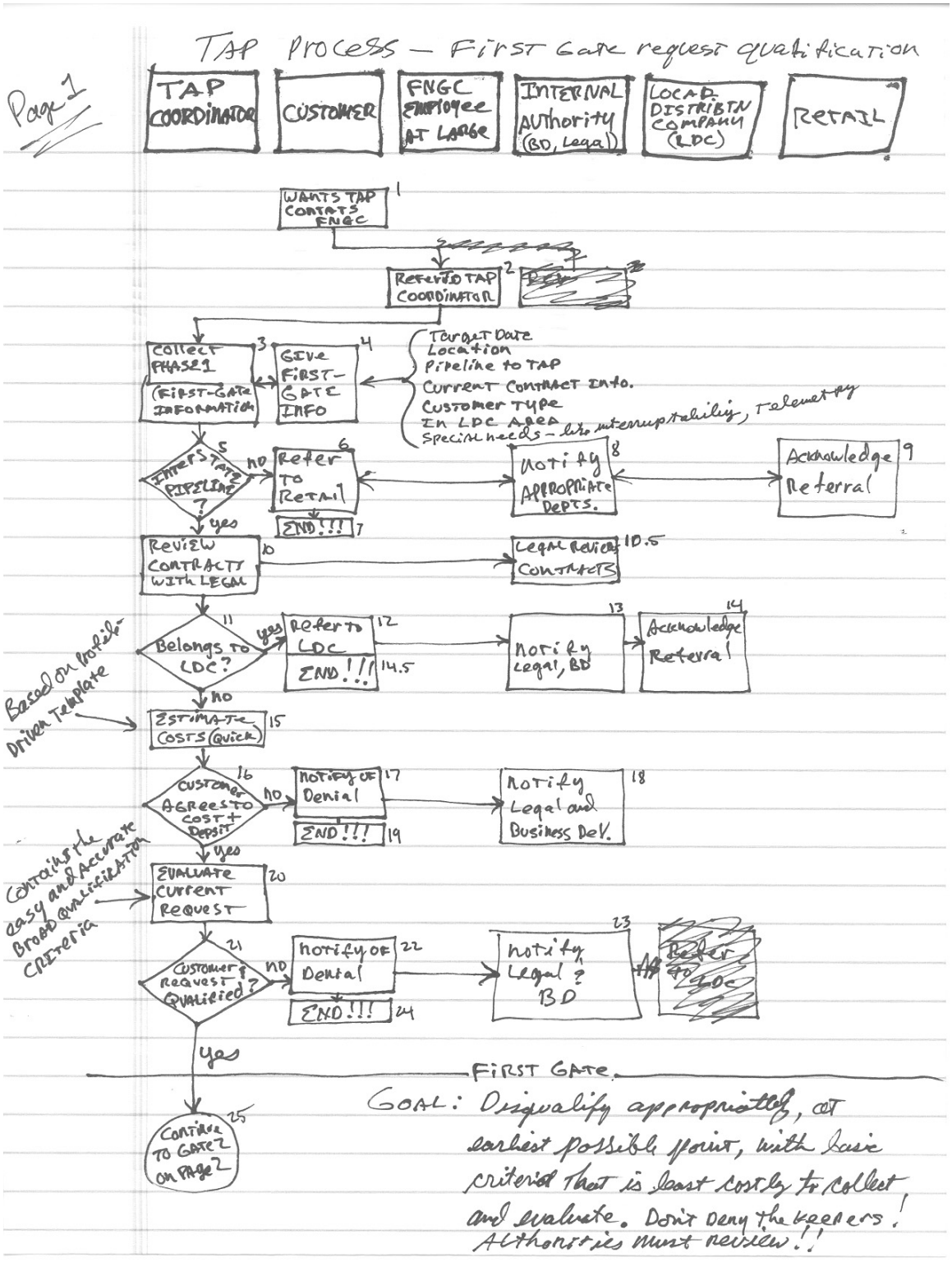

Figure 2: *Tap Process First Gate*

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Second Gate

Having passed the "acid test," the second gate verifies the ability of all parties to meet all terms. Here, the approach is to do only what is necessary to determine if FNGC can meet the requesters needs under terms acceptable to all. This gate requires and justifies the collection and use of specific project/facility information such as:

- total gas volume (MCF and therms);
- hourly demand range estimate (min & max);
- seasonality;
- peak demand (daily, weekly and monthly estimated distributions);
- pressure requirements;
- any other special needs/considerations influencing hours, pressure or volume.

For this second gate, the planners agreed that they should rely on information that is the easiest to estimate without formal (and resource intensive) modeling or simulation to get the quickest useful estimate of capacity requirements based solely on volume, demand schedule and pressure. Then, only if FNGC can reasonably meet this estimated demand schedule, it will conduct a formal evaluation to provide accurate estimates to verify final capacity requirements, and to provide the customer with an approximate cost on which to make this second-gate qualification. As a result, they drew the flowchart for the second gate as an expansion of those flows represented on the overview for this second gate (see Figure 3 on page 11).

This part of the process presents several key elements:

1. The process begins with the Tap Coordinator whose interpretation of the results of the first gate determines if the process passes to the second gate.
2. Once the basic information is collected, reviewed and evaluated, the Tap Coordinator can immediately disqualify it there is not reasonably sufficient capacity to supply the tap.
3. Once the Tap Coordinator is reasonably certain that sufficient capacity exists, and has evaluated the results of the final capacity model, the Tap Coordinator can immediately disqualify it if:
   - the final pipeline capacity is not mutually agreeable;
   - basic facility design, out-of-bounds and right-of-way constraints are not acceptable;
   - general environmental and regulatory constraints are not acceptable;
   - general contract terms are not acceptable.
4. Finally, given the objectives of this gate, no further departmental signoffs or reviews are necessary unless all general terms are accepted (the final terms are specified in the third gate).

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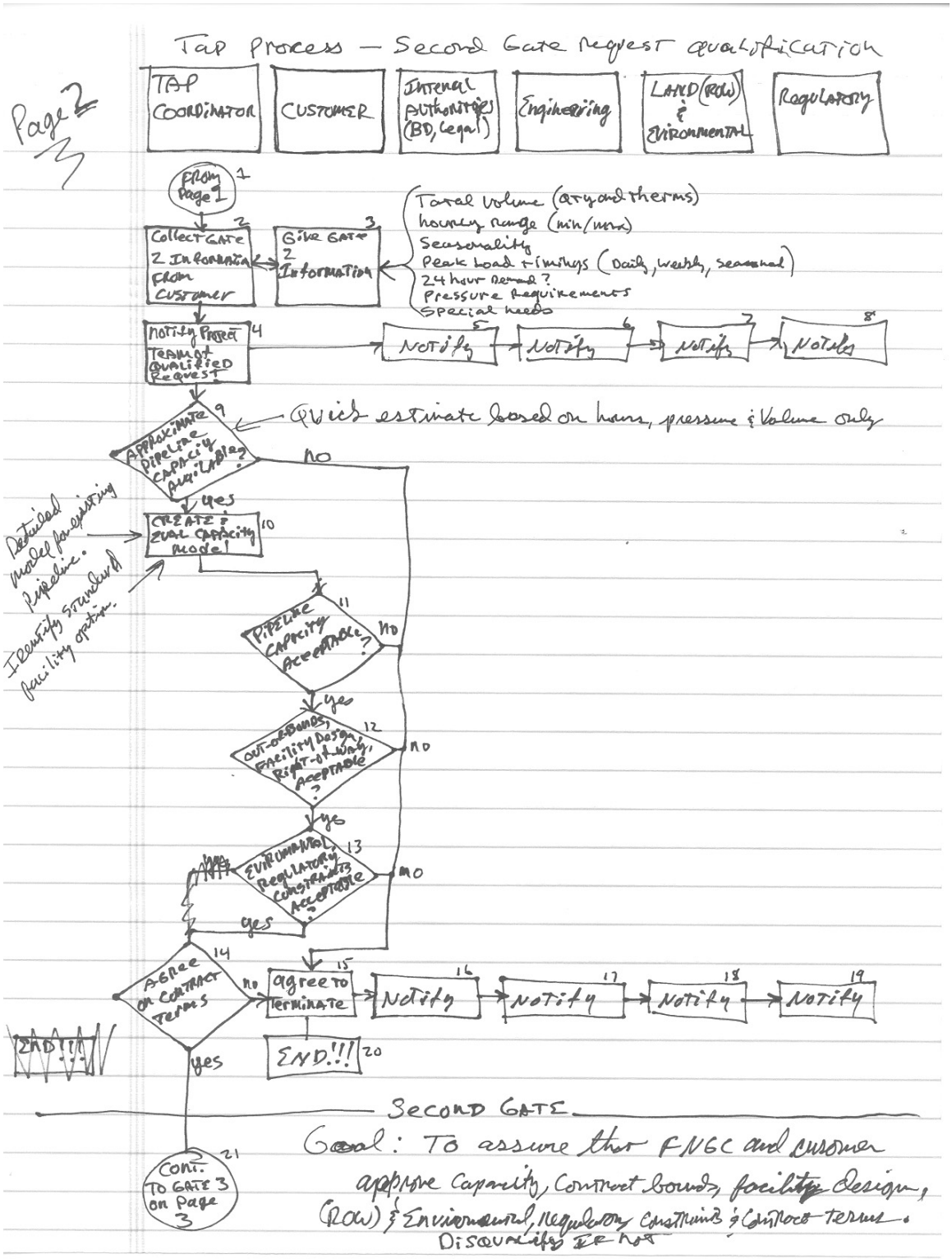

Figure 3: *Tap Process Second Gate*

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Third Gate

If the Tap Coordinator determined that the current tap request is qualified, and assuming that all parties have agreed to the general terms and constraints of the project, the third gate seeks to gain full and final commitment from all parties. This gate seeks to understand and communicate the final details of the product and facility requirements, responsibilities, costs and timing by examining:

- service type ("firm" or "best efforts");
- odorization and other product attributes;
- acceptability of normal quality fluctuations;
- which party is directly funding and managing facility construction;
- customer awareness of esoteric details (like tax gross-up on customer-funded construction);
- special or unusual requirements.

For this third gate, these executives agreed that they should rely on information that is essential for managing customer expectations and maximizing satisfaction, but that has not been included in previous analysis or information gathering (because it was not material to any criteria for request qualification). They agreed that, for this gate, they need to arrive at all finalized terms and negotiate a signed contract. As a result, they drew the flowchart for the third gate as an expansion of those flows represented on the overview for the third gate (see Figure 4 on page 13).

This part of the process presents several key elements:

1. The process begins with the Tap Coordinator whose interpretation of the results of the second gate determines if the process passes to the third gate.
2. Once the final information is collected, reviewed and evaluated, the Tap Coordinator can immediately disqualify the request if:
   - the final facility design is not mutually agreeable;
   - the final cost estimates are not acceptable;
   - the final contract terms, including funding sources and project management, are not acceptable.
3. Finally, the signing of the contract is the defining event that allows this process to pass the third gate into the installation phase.

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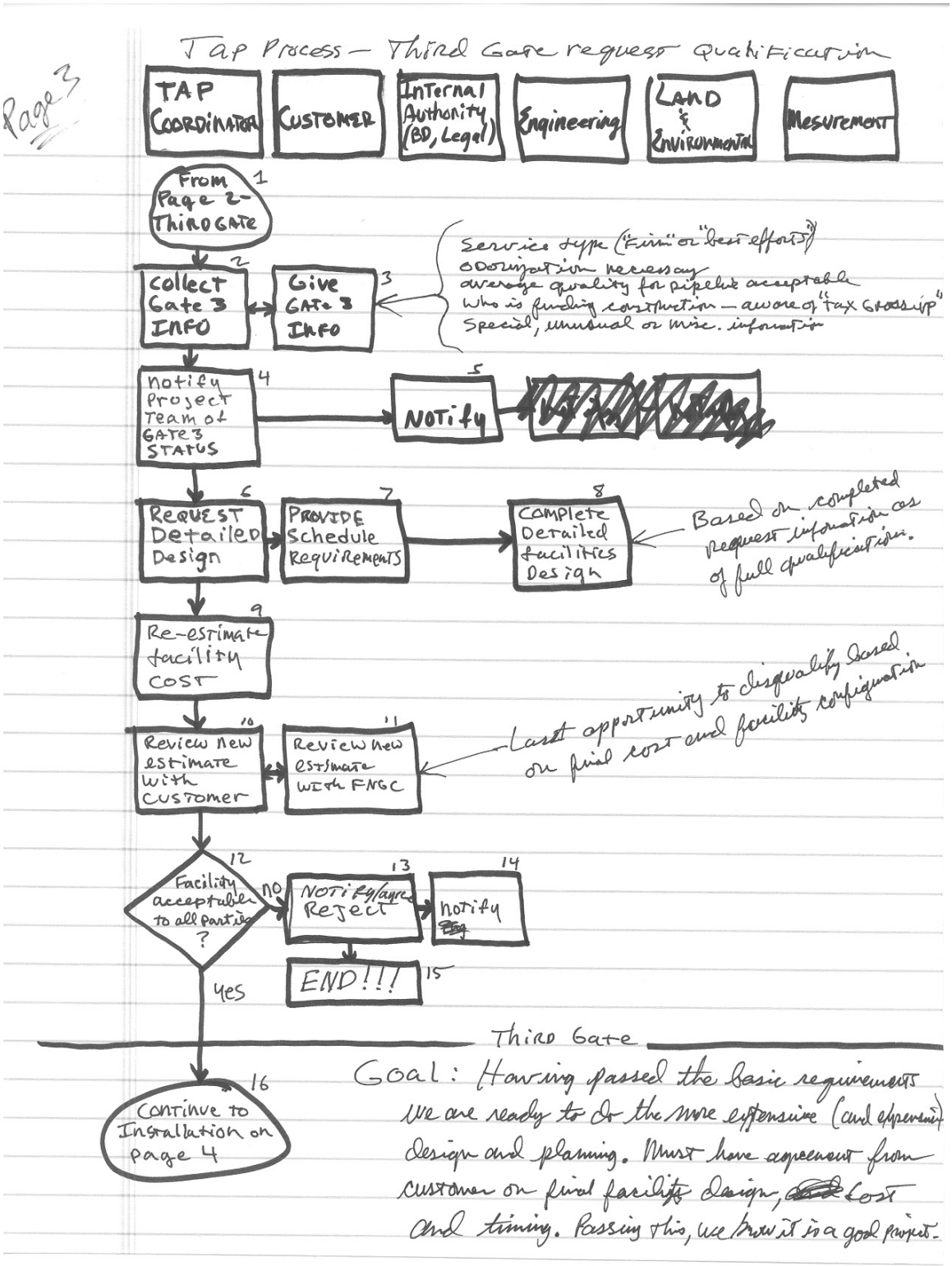

Figure 4: *Tap Process Third Gate*

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Installation

Unlike the previous three phases, the objective of installation is not to disqualify and save cost, but to maximize value to the customer. Toward this end, the first step it takes is to determine who is managing the construction of the facility. If FNGC manages construction, then it prepares the project plan and proceeds accordingly. If the customer manages construction, then FNGC adds oversight costs and related tasks to its processes, and then transfers the facility design specifications to the customer. If this results in additional contract issues, it then addresses these here. Finally, regardless of its role in construction, FNGC requests authorizations for expenditures and prepares all final executable documents (including the final contract).

Next, FNGC executes all final documents and begins the installation. If FNGC does not manage the project, then its final preparatory step is to verify the escrow account established by the customer per the contract. If FNGC does manage the project, then it will complete any final tap-specific tasks and hand off the process thread to FNGC's project-management process (this case assumes that it has a project-management process that is defined and supported by BPM notation). Finally, upon project completion (which may mean that the facility is actually placed into service or that it is abandoned), FNGC completes the appropriate final recordkeeping. As a result of these design elements, they drew the flowchart for the third gate (see Figure 5 on page 15) as an expansion of those flows represented in the overview for the installation phase (see Figure 1 on page 7).

This part of the process presents several key elements:

1. The process begins with the Tap Coordinator whose interpretation of the results of the third gate determines if the process passes to installation.
2. If FNGC manages the project, then the process requires several tasks unique to this path:
   - Project plan preparation
   - Project management
   - Project Close
3. If FNGC does not manage the project, then the process requires several tasks unique to this path:
   - Addition of oversight costs to project estimates
   - Transferal of facility design to customer
   - Verification of escrow account
   - Final collection of funds held in escrow
4. Finally, the installation will, at a more detailed level, explicitly enjoin two other processes:
   - Capital expenditure request and approval
   - Project management

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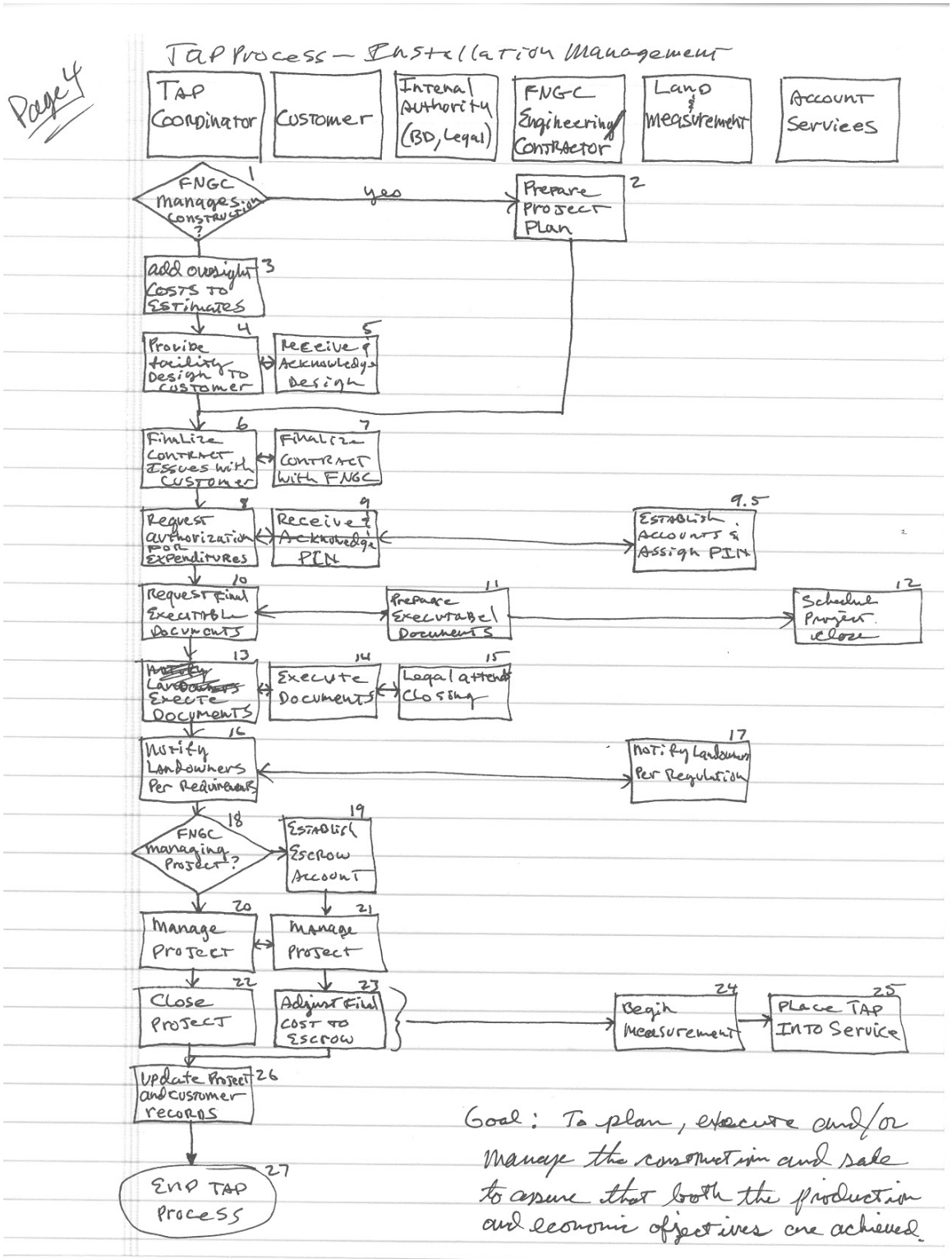

Figure 5: *Tap Process Installation*

When these two executives returned to the office, they agreed to place the finalization and formalization of this process on the agenda for their next Executive Team meeting.

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Engaging Management: Unified Level Process Design

Executive Team

When the Executive Team addressed this process in their next planning meeting, the team confirmed the legitimacy of the issue; the planners' conclusions regarding the success factors for a solution; and the general approach presented in their hand-written flowchart (which had been re-written – but not revised – by an administrative assistant using Visio®). They then delegated the detailed planning to a temporary design team composed of managers from the departments represented by the roles identified in the design.

Management Planning Team

For the roles requiring the resources that he/she manages, the planning team asked each manager to, according to the initial process flow:

1. specify the required inputs for each process segment identified;
2. chart the major steps involved in executing each of their segments;
3. identify the likely outputs and resulting outcomes that each step would produce;
4. list all additional constraints or considerations that would impact the performance of each role in the specified process segment;
5. identify any possible latent impacts on other segments of this process, and any other areas of company operations, that each segment would likely produce;
6. unify the individual departmental segments into a single flow.

The managers completed the first five of these tasks with little difficulty, but with some resistance and confusion regarding their usefulness (usefulness of both the process segments that they are addressing and their participation in the meeting).

Next, the management planning team met to consolidate all of the process steps and reconcile the outputs of each segment with the required inputs of the next downstream segment. Their objective was to unify the process and achieve agreement, buy-in and commitment to this unified tap process. This required, among other things, the accommodation of competing departmental objectives. After meeting two additional times, the temporary management planning team of managers failed to reach a consensus on a unified flow.

Process Owner

The management planning team reported its status to the Executive Team along with the individual work of each manager. Consequently, the Executive Team appointed a single individual to own the tap process and to be accountable for its success. They reassigned the task of completing a unified design to this *Process Owner*. The Executive Team endowed this individual with specific formal authority over the full process scope including the management and departmental resource commitments required to assure fully supported execution. This person also became accountable for the success of the process implementation.

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Unified-Level Process Design

This Process Owner met with each manager individually, several times in some cases, and was able to reconcile their differences and unify the tap process (see Appendix A pages 32 through 40 for the unified flowcharts). The Process Owner not only unified the process to the level of detail specified by the managers, but was able to provide greater clarity and specificity on information and transaction needs. He was able to completely specify the *needs and outcomes* for the data, transactions and other information that the process would require from systems, and he was able to specify how these needed to be processed (and under what conditions) to update company records. However, he was not always able to identify the specific systems or databases that contained the appropriate resources, nor was he able to specify the level of detail or the transaction process techniques that would assure *systems-process* integrity. Therefore, he initiated a meeting with the IT department to assist with or take over these issues.

Engaging IT: Detailed-/Execution-Level Process Design

The Process Owner met with the IT department, bringing to that meeting the full set of unified-process flowcharts contained in Appendix A. The IT department assigned a Systems Analyst to the project to assist in adding the necessary notation for the execution level. These detailed process segments are linked to, and are directly accessible from, the Process Owner's unified flowchart via linking notation that represents it (at the unified level, for example, shape 9x59 on page 9 of the flowchart in Appendix A). However, this detailed notation is itself contained on a separate detailed page (page 11 of the flowchart in Appendix A, page 41 of this document).

Case Notation Rationale

Although this case does not intend to present or suggest specific notation standards, it uses notation to communicate the content and flow of the tap process for the case. To the extent necessary, we have used a subset of the IPG notation to communicate the case process flow. Appendix A contains a legend identifying the basic meanings of the shapes and their colors.

Notation Structure

These process flowcharts are structured in layers. In this case, a minimum of the three basic layers (*strategic*, *unified* and *detailed/execution*) will always exist and will always be connected in the structure. Additionally, each of these basic layers (or levels) can have as many layers within them as is necessary and practical to meet the needs of the process. Regardless of whether additional layers are within or between the boundaries of the three basic levels, they are all connected in one of two ways: 1) directly via sub-process structures or 2) indirectly via role coordination.

Sub Processes (Layers and/or Segments Connected Directly)

Process layers are connected *directly* via the yellow "sub-process" shapes ( ) that are placeholders for the more detailed pages that begin and end with the same shape label. For example, the second page of Appendix A shows the entire tap process, complete with the gates at their strategic level (this is the top layer). Each yellow shape shows the logical placement of a sub process (or process segment) at the next level of detail: the

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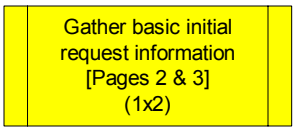
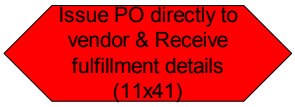
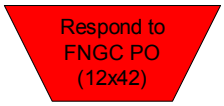
unified level in this case (although each level can have one or more sub processes defined within its same level). In this case, the step above the first gate (reproduced below) labeled *Gather basic initial request information,* shows the logical placement of this segment (pages 2 and 3 of the *unified* process flow) at the *strategic* level (pages 32 and 33 of this document).



Role Coordination (Layers and/or Segments Connected Indirectly)
Process layers are also connected *indirectly* via the initiation and subsequent recognition of coordinating process events (the coordination and process-event shapes respectively). For example, on page 11 of the flowchart in Appendix A (page 41 of this document), shape 11x41 (reproduced below) coordinates the purchase order between FNGC and the materials vendor.



With this shape, the system initiates an event by sending the purchase order request record to the vendor via the medium and format specified for that relationship.[7] That action handles error checking, success acknowledgment and any follow-up that may be required to appropriately complete the transaction. Beginning with shape 12x42 on page 12 of the flowchart in Appendix A (and reproduced below), the vendor recognizes the transaction event and processes the record.



In this example, the response is handled in the same way except that the roles are reversed: To return his response, the vendor initiates the coordinating event (shapes 12x59 or 12x67) and FNGC recognizes and processes it (shape 11x22).[8] Appendix D more fully describes the details of how this notation defines role coordination.

Execution Level

Within this context provided by the process owner, the Systems Analyst was able to create the execution-level notation that is on page 11 of the flowchart (Appendix A). It describes the specific actions seen and/or taken by users (, and shapes), and the actions and decisions made by systems (, and shapes) when FNGC initiates a tap project that it manages (page 9 in the unified process section of the flowchart). The detailed daily project management processes are handled by a separate *project management* process to which the tap process routes the Tap Coordinator after the installation phase of the tap process reaches the project initiation step.

[7] In this case, the specification for the functional elements of this transaction is detailed in a meta-data table in the system database, and the primary mechanism for delivering the request is email (although this notation is not specific to the category or form of messaging/coordinating agent).
[8] To assure that process segments coordinated between different roles are reliably and promptly executed, the system that supports the process must persistently monitor their status until all coordination reconciles.

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System-Function Presentation

Specifically, the Process Owner (who is not the Tap Coordinator) involves the Systems Analysts to handle the B2B systems integration represented by the red coordination shapes ( ) on page 11, and the vendor sub-processes ( ) on page 12 of the flowchart in Appendix A. For consistency with the rest of the document, this case represents the detailed system instructions in graphical notation form. However, *in this area only*, this does not represent the actual method that the case author employs. The author instead uses attributes, textual expressions and object references to describe the executable system instructions. However, the notation used herein does represent the substance of the actual functionality to complete the illustration. In figure 10 of Appendix A (page 13 of the flowchart), this case presents this graphical illustration of the significant data structures and processing requirements for the vendor to accept and process FNGC's native PO record. These notations are linked in the process flow by step 12x8 on page 12 of the flowchart.

The Process Owner expects this detailed- (or execution-) level notation that IT is adding to be tied to the shapes such that these instructions are accessible, readable and will move with changes that the Process Owner makes to the unified-level design. Participation in the underlying logic should be independent and self-contained so that if this step is moved at the unified level, the internal integrity of this step will not be compromised.

User Implementation

Notation Context

At this point, the tap process planners have charted the process with appropriate notation on three levels:

1. The **strategic level,** specified by the executives, defined the primary necessary roles, events, conditions, timing and steps to achieve the strategic outcomes sought (figure 1 of Appendix A).
2. The **unified level,**[9] initially specified by the executive planners and completed by the Process Owner, reconciled the department-centric objectives, resource allocations and politics with process-centric needs to achieve confirmation of practicality, participation and buy-in. This level also specifies the precise resource, data, transaction and systems support needs expressed in generic (but very specific) business terms (figures 2 through 7 of Appendix A).
3. The **detail level** (the BPMN execution level) contains the necessary transaction (B2B) elements of the process and is ready to implement (figures 8 through 10 of Appendix A).

In cooperation with the Systems Analyst, the Process Owner implemented the process. They monitored initial results closely and addressed the latent problems.

Execution Context

[9] For purposes of simplicity in the case, this is represented by a single unified level and a single process owner. In reality, processes usually must be segmented by role, and, depending on what roles exist in what departments, multiple process owners may be required to preserve the political integrity of the process across the company. For notation purposes, the single-role level is identical to the detail level.

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For this case, the implementation includes a browser-based "portal" that presents each process step to the user individually with a clear, visible statement of the action or response required of the user (this addresses the formality needs of the process). Each step also includes any and all supporting explanation, documentation or on-screen functionality the user may need. Each step also provides a way for the user to provide specific, immediate feedback to the Process Owner within the context of the current process instance. Steps in the process that do not require user interaction are initiated between user steps (this provides uninterrupted execution for the user and assures proper coordination of system tasks and transactions with the progress of the people driving the process).

Changes

Users

During process execution, users provided feedback about the process to the Process Owner in several ways. Some users provided feedback centered on the how the process flow was confusing and seemed to be inefficient. For example, one Coordinator questioned why the initial conversation with the tap requester ignored (i.e., did not require) much of the information he believed to be essential. In response, the Process Owner (in addition to an explanatory conversation with that individual) used notation elements to add language to the initial steps in the process to better explain the emphasis on request qualification above all else in that part of the process. Also, although his research showed that users rarely if ever access this kind of reference, the Process Owner also added links to documents that described the driving strategic design elements that lead to and justify the process flow.

Other users pointed out genuine flaws in process flow and processing integrity. The Process Owner changed the process flow logic directly on the flowchart at the unified level, while the Systems Analyst redrew the required flowchart elements at the detailed transactions level. Once completed, the process immediately reflected these changes and reconciled the impact of all threads in progress during the change.

Customers

Finally, a customer threatened to take legal action based on what he perceived to be a violation of federal regulations in the way his tap request was handled. The Executive Team member handling the issue was able to first show how the process was designed to comply with that regulation, and then *proved* that his specific request was, in fact, handled according to this design. He showed this by generating a report based on process execution elements tracked by the implementation environment. Furthermore, the Process Owner was able to change the process at the strategic level to clarify the related issues for future requesters. After reviewing the changes for impact on role coordination (unified level) and transaction timing and system update status (execution level), the Process Owner was able to implement the changes without further intervention and without violating the integrity of the overall process.

Continued Strategic Change

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Seven months later, the Process Owner and the executives who designed the original process flow had been either promoted or offered retirement due to a merger. The new operation sought to combine the service-excellence competencies of Fictitious, with the large gas sales volume of the suitor to exploit opportunities for synergy. This change moved the operations partially back toward FNGC's old model. Because of the notation that was in place, and the tracking and reporting features that Fictitious implemented in utilizing this standard, they were able to quickly change the tap process (beginning at the strategic level). They were able to modify the process to optimize the qualification of tap requests that now have become very desirable based on gas sales, while preserving both appropriate formality to assure proper execution, and the procedures that minimize risk. The body of business process notation became not only an essential roadmap for understanding and facilitating these changes, it served also as the agenda for what must be considered – it was the tangible legacy of the focused expertise that FNGC left to its new owners.

Surviving Legacy

Except for the new firm's advantage in starting its process review with an existing and functioning BPM, the process for this change occurred in roughly the same manner as described for Fictitious alone; but was complicated by the fact that the surviving management did not fully understand the need for the Process Owner role in assuring that the needs of the process are reconciled with the often conflicting performance objectives of managers in the individual departments. To protect the long-term viability of its product implementation, the BPM vendor initiated regular process-design training and certification for FNGC at each of the three levels. This assured the continued strategic relevance of BPM at Fictitious and, consequently, the BPM provider's reputation and continuing revenues.

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Notation Requirements

This is a description and explanation of notation elements used to meet the implementation and performance needs of the FNGC case. It is not intended to be exhaustive or prescriptive. However, in IPG's four years of notation-driven BPM implementations across multiple clients and industries, these proved to be among the most critical in terms of the creation, implementation and maintenance of a high level of strategic process performance.

Notation elements should enable a BPM vendor to implement process management initiatives that:

1. meet readability needs of planners;
2. enable real-time change and improvement;
3. support the BPM vendor's unique implementation;
4. allow any user to understand process substance & context;
5. minimize process flow "re-draw";
6. describe all events that drive processes;
7. describe all roles required for processes;
8. describe temporal flow & coordination;
9. present a practical and scalable structure;
10. allow easy integration with other processes (current & future);
11. enable processes to begin with event(s);
12. provide simple locating and editing of any step;
13. provide effective, definitive & exhaustive descriptions of object modification and use.

Meet Readability Needs

From the Strategic Planner, through each affected Process Owner, to the detailed design, notation should balance simplicity with meaning to achieve appropriate readability for each user at each level. The higher the planning level in the organization, the simpler the notation should be: Not because planners are incapable of understanding complexity, but because the fundamental categories of meaning at higher levels are not as highly diverse or symbol dependent.

Because the context for understanding process at the strategic level is based more in step descriptions, annotations, temporal and role-coordination flow (i.e., notation format), readability at this level does not depend as heavily on the precise meaning of any particular *graphical* representation as it does at the other levels. A proof of this is our common ability to present the majority of high-level process flows using a document containing text in outline form using headings and indentation. A graphical distinction between process elements is really necessary only when there is a possibility of ambiguity; this possibility increases with additional detail and complexity (i.e., at more detailed levels). For example, the author uses only two shapes for normal process flow, a task (▭) and a question or condition (◇). Because flows at the strategic level are read mostly by human beings, the planners can afford to use (and benefit by using) a simple

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set of notation elements. At the detailed level however, where business transactions and other process elements require rigorously consistent adherence to specifications, the primary focus of process definitions shifts from role coordination and temporal flow, to functional execution and object management.

This distinction is very important because at the strategic level, the diversity of planners and their collective focus on the "bold strokes" of leading their organization requires a minimization of process development barriers (such as complexity and rigor in a notations tool). Given the formative distance between their process diagrams at the strategic level and the detailed-level notation on which systems depend, a simple notations structure best accommodates this need. Again, the flow at the higher levels is generally clear simply via the text contained in the body of each element. Even our two-shaped approach above is more complex than is absolutely necessary: Because questions end with a question mark, one *could* use a rectangle as the only symbolic element and preserve the understandability of basic process flow (this is commonly seen in informal, hand-written process notation). IPG adds the diamond shape only because it is very commonly understood at this level (low cost), and because its connection points lend it to a better visual flow when there is more than one logical path (significant benefit). Other expansions of notation complexity at this level should survive a similar cost-benefit heuristic.

A much more important distinction in the case flow is that between the user-executed (white) process step and the system-executed process step (blue). Whether a rectangle or a diamond, a person reading the process flow will quickly become confused upon seeing a step requiring the user to provide information, followed immediately by a system-executed step that processes it, without some way to explain why he does not see the second step when executing the process. For example, consider the portion of the Tap Process taken from page 11 of the process flowchart (figure 6 on page 24).

Because these steps are colored differently, quick reference to the one-page legend on page 30 clarifies what the user sees versus what the system does between those steps. Therefore, we achieve simplicity by minimizing the variation and complexity of shapes (a static shape attribute), and achieve clarity through a prudent use of coloring (a dynamic shape attribute).

Note that dynamic attributes are used for finer distinctions between shapes to simplify the changes to these states (changing a step that is executed by a user to one that is executed by the system for example). This is described further later under *Minimizing Redraw*.

At the strategic level, there will rarely be either a user- or system-executed task step except when basic strategic distinctions are necessary at the level of process execution (which is possible in situations not covered in this case). At the strategic level, there will generally be user- and system-executed questions or conditions that reflect high-level policy influence, but they are generally used only to tie the broad sub-processes () that represent the more detailed execution levels into logical strategic position.

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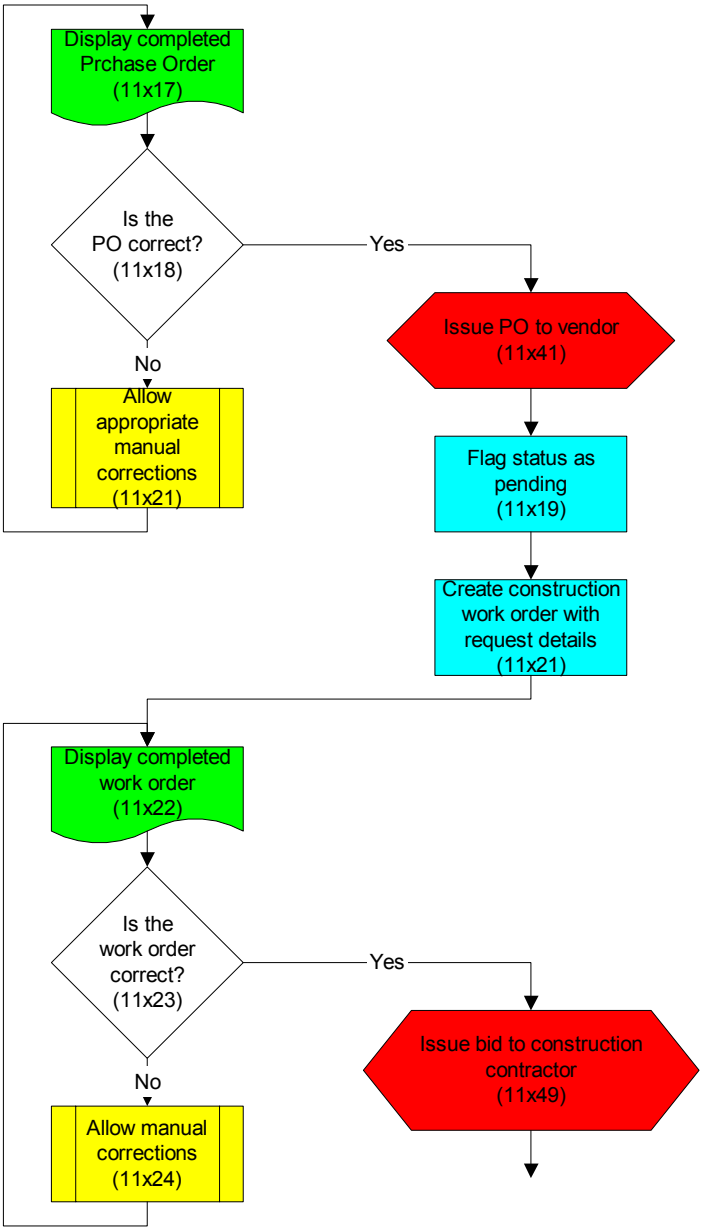

Figure 6: *Detailed Segment from Page 11 of Appendix A*

When this portion of the process is executed, the *user* sees the following series of steps:

1. Display completed purchase order
2. Is the purchase order correct? (Assume user answers *Yes*.)
3. Display completed work order
4. Is the work order correct?
5. Etc.

Yet, when looking at the flowchart, the *reader* will also see the following three additional steps:

1. Issue PO to vendor
2. Flag status as pending
3. Create construction work order with request details

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Enable Real-Time Change

Process notation should enable planners, especially the Process Owner, to adjust flow at any level even with processes and transactions in progress. It is one type of task and level of complexity to create and implement an initial process design, and quite another to change it once an organization is relying on it continuously and in real time. There are many critical issues associated with implementing process changes necessary to maintain strategic alignment of an organization's processes while these processes are in continual use. The role that notation plays in the successful orchestrations of real-time change is to:

1. identify process elements that are:
   - new
   - changed
   - impacted by new or changed elements
   - expected to be unaffected
2. specify what is different:
   - Inputs
   - Functionality
   - Attributes
   - Data Items
   - Outputs
   - Outcomes

The FNGC implementation handles these, in part, by using color of the shape boarders and the process-step-description text to provide a comprehensive and in-context view of what has changed (IPG also uses extended attributes that are read by the implementation application to get information on the specific nature of the changes). Regardless of how these are handled, the notation must provide an effective way for the implementing system to facilitate controlled change that does not damage or interfere with existing flows. Once successful, the implementing system must be able to use this information successfully facilitate this change: At a minimum this requires 1) a way to simulate the impact of the changes and 2) a way to identify and implement any remedial changes indicated by the simulation.

Support BPM Vendor

Recognizing that the high usefulness of this standard for vendors is a goal of the BPMI Notations Workgroup, the main notation-specific requirement is to suggest that a survey of object types and process approaches would reveal a greater variety of requirements and circumstances than are presented in this case. For example, the author's approach requires a separate shape to represent an event (to accommodate the event-driven model) and another to designate roles for coordination (to accommodate a focus on human-controlled execution that calls technology to support it). However, there are other providers who use a formal-request driven model that focuses on a technology-controlled execution calling humans to support it. To the extent that technology has not assumed the board-room agenda, some models will not need notation at the strategic level at all, while others, like the approach used in this case, will devote most of their design resources to this level.

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Allow Any User to Understand Process Substance & Context

Both by way of general reference and context support, process-flow notation should be available to role-players *in context* as they execute their process segment(s), and it should be understandable based on only what is *visible* in the body of notation (minimal digging, drilling or interpretation from icons or shapes alone). One psychological principle of goal attainment is visibility: Visibility of both the relevant goal and of the intermediate milestones. If an individual executing a process cannot gain an understanding of the relevance of his work to the current objective, he will be less motivated, less effective, and, most importantly, less able to exercise the appropriate human judgment that may be required along the way. Also people like having closure and an ability to measure progress. Being able to determine such things as percentage competed/remaining, steps completed/remaining, process instances pending, and personal completion rates relative to peers (or averages) all serve to provide a sense of control, progress and closure in environments where it can be difficult otherwise to perceive personal contributions.

At a minimum, the primary means by which this is accomplished is to provide a hierarchically-structured body of notation sufficient for the BPM provider to dynamically highlight a duplicate section of the notation from the strategic to the detailed level (much like a detailed relief of a specific geographical area of a map is presented in context, but in a callout over the map's larger region). For example, in the process segment shown in Figure 6 above (page 24), a user looking at a completed work order on step 11x22 should have a way to see that, at the strategic level (the first page of the flowchart), he is working in step 1x13 *Construct facility and activate tap* that is two strategic-level steps beyond the third gate and just before the final strategic-level step toward completion. From a strategic perspective, this employee can estimate that he is contributing to the last 20% or so of the end-to-end process thread. He can also see from looking at 1x13, in context with the rest of the chart on page 1, that he is working within a sub-process contained in the unified level on page 9 of the flowchart. When page 9 is presented by some provider-specific means, the user can see that step 9x58 *FNGC Manages Project* is highlighted. He can see that within the process represented by the single strategic step on page 1, he is roughly half-way through. However, 9x58 is another sub-process, the detail of which is on page 11 of the flowchart. If given the opportunity to view that page, he will see that on the sub-process represented by 9x58, his current step, *Display completed work order* (11x22) is also roughly half the way though that process. Therefore, with a quick look at one page each, the user in this example was able to fully view his place and progress in context at the strategic level on page 1, the unified level on page 9 and the detailed level on page 11. With as many pages and complex relationships as is presented herein, this structure allows a provider to easily give to any user the access necessary to quickly place his work (and his progress) in perspective from the strategic, to the detailed level.

Minimize Process Flow "Re-Draw"

Process notation should minimize, for paper and automated flows alike, the requirement to redraw process-flow notation to affect minor process change (change with dynamic attributes or a sub-structure as opposed to replacing shapes to change status attributes).

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This is closely related to the issues of readability where color and text attributes are used for the more dynamic aspects of a process step, while *shape* is used to identify the core character that, once chosen, should not need to be changed (except if the change *is* at the level of the core character of that step). For example, once the strategic and unified designs were completed, FNGC process implementation enjoyed the benefit of relatively quick implementation because their approach did not require *any* back-end technology whatsoever to run. In such instances, the process enables users to recognize and interpret events, ask the right questions, execute the right manual tasks and coordinate with each other according to the strategically aligned design. The integration of back-end technology, legacy systems and other technology tools (beyond the initial automation) is largely an act of *process maturation*. Once the process is running smoothly, these integrations can be prioritized and implemented according to a schedule driven more by strategic and operational propriety, than integration requirements. The way that automation is reflected in the notation is by color: In this case, steps that a user executes are generally white; those that the system executes are generally blue. If this distinction was made by shape, then automation would require the *replacement* of a shape as opposed to a *change* to one or more of its dynamic attributes. Depending on the application environment, shape *could* be a dynamic attribute, but to the extent that notations tools treat the shape of an object as a static attribute (as does Visio®), then users must actually replace it (and risk overwriting its other attributes). This is a requirement becomes more relevant as the process definition undergoes changes and improvements.

Recognize All Events that Drive Processes

Notations should enable the process designer to recognize all events that could potentially call to action one or more process threads in the organization. This requirement is more of a mandate for the ability of any implementation scheme to accommodate multiple entry points, and the reconciliation of multiple starts (if any), for what should be a single process thread. This has more to do with the rules governing how to interpret or translate a process flow, and what process flows need to exist, than it does with what specific notation elements should be present. To the extent that such rules are part of the notation standards, or that notation standards should accommodate such translation, this requirement can be complex. The FNGC case contains only a single independent (process initiating) event, and, therefore, a single entry point. However, it is clear in the case which internal FNGC role will "catch" this event. At a minimum, process notation should provide a way to designate multiple ambiguous process starting points that a vendor implementation can use to definitively "catch" all process drivers.

Define All Roles Required for Processes

There should be no known or identified role excluded, and all unidentified or unknown roles must be included. At first, this does not seem like an applicable requirement for notations. Indeed process and role validations are *core processes* separate in their own right. However, without a way to specify roles in general (and a variety of related role attributes) in the body of process notation, neither the individual stakeholders reviewing the processes from the notation, nor the software being used to translate the notation into other useful incarnations, will be able to accommodate the ambiguity of recognizing,

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identifying and reconciling unknown roles. This has its greatest impact on the basic ability to simply illustrate the relationships of process flow and role coordination.

For example, the FNGC case recognizes only one entry point for initiating a tap process instance: the customer-initiated call. This design assumes that all tap processes begin with the customer. This proved to be an acceptable and accurate assumption in practice because FNGC does not actively promote taps as a product. However, because FNGC does not know who its new prospective customers will be, it cannot expect a new customer to follow any specific process for initiating a new tap. Therefore, FNGC designated *Employee at Large* as the role that will receive the initiating event (the call from the customer). This required that the process design and implementation allow virtually any employee to occupy/execute this role, which it did. Once a call is handled by a known (i.e., participating) role-player, then the process can direct activity according to the designed flow.

Define Process Flow & Coordination

Notation should make it easy for the reader to recognize correct temporal and ordinal flow of process tasks and role coordination. The notation elements should be sufficient to create process structures that definitively specify the temporal and ordinal flow of the process design. It should also be able to fully describe how all relevant roles are coordinated in those flows.

Present Simple, Scalable Hierarchical Structure

Present a hierarchical structure of flow "pages" that allow the study and clarification of:

- process flow and role coordination at each level (strategic, unified and detailed/execution)
- logical process-element position and the inclusion of more detailed flows. For example, it should be a straightforward process to understand that the detailed step called *Issue PO to vendor* – step 11x41 on page 11 of the detailed level of the flowchart (page 41 of the document) – is part of the sub-process represented by step 9x58 of the unified level of the flowchart on page 9 of the flowchart (page 39 of the document). And that this, in turn, is part of the *Construct facility and activate tap* sub-process step 1x13 at the strategic level. This clarity of path from strategic to detailed level should exist for the entire process definition.

Allow Easy Integration with Other Processes

Allow the process designer to reference the appropriate entry point of any other process in the enterprise. For example, if an enterprise has an employee transition process that handles new hires, moves and terminations of employees, and it has a security process that manages access to accounts, information and systems, then the designer of the Employee Transitions process should be able to enter the security process to provide systems access to new employees, change access for employees who change positions/locations and disable/remove access for employees who are terminated. Within its development environment, notation should provide reference to the current specification(s) for the detailed inputs required by any process to be enjoined, and for each available entry point to be used in the enjoined process. It should also provide the

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specified information that will allow successful return from the called process back to the current (calling) process (at any level for both user and system steps).

Enable Processes to Begin with Event(s)

Assure that each process (and process segment) can begin with an event. Although not a requirement of notations per se, most processes can be correctly thought of as beginning with some "event." Process designs that follow this model are very efficient. IPG has identified four categories of events that underlie all process initiations. Because of the relevance and rational nature of event-driven design, notations should include explicit support for an event-driven model of process execution and role coordination. This case accomplishes this by beginning each process segment (defined either by a change of resolution/level, a change of role or both) with an event. This event is either an independent event (generally beginning each entry point of the first/initial process segment) or a dependent event (that depends on the process instance having been initiated and having survived to reach that process segment). Independent events are reasonably expected to occur during the normal course of business, but are largely unpredictable (not directly driven by existing process threads); dependent events are created by process threads that have already been initiated by some independent event.

Provide Simple Locating and Editing of Any Step

Provide a definitive, simple and direct way to identify, access and use any specific step at any level of detail. The case does this by providing a unique numeric ID for each step (or any other object) and displaying that on the flowchart itself. The FNGC implementation display this number in the title bar of the user interface (“portal”) at each step for reference during execution. The implementation environment should have some mechanism for doing this as it has proven to be essential for process evaluation and troubleshooting. Additionally, the notation should allow the vendor to implement an ability to identify any step based on:

- its function;
- its impact on a piece of information;
- its type of decision;
- its role;
- its calling process or role;
- its use of certain systems or transaction schemas;
- any other attribute that can be understood from its attributes or its existence and purpose in the process.

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