

Complex Systems Management Case Study

Re-engineering Fulfillment Operations at MicroWarehouse, Inc.

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Executive Summary

This document describes work performed at MicroWarehouse, Inc., in 2001 / 2002. During this period the corporation's Fulfillment¹ operations were re-engineered. This effort entailed a complete review of the Marketing, Sales, Finance, Warehouse, and Customer Care operations across an organization which is characterized by the following attributes:

- A \$1.2 Billion corporation, consisting of 3200 employees on three continents (multiple sites in America, centralized in Canada and the United Kingdom)
- Old, disadvantaged technology (HP3000 mainframe) whose support was being discontinued
- Thousands of Stock Keeping Units [SKU's]², which needed *Just In Time* procurement and delivery
- A broken order-taking and fulfillment process flow whose complexity was unknown because it had never been documented across the corporation
- Long-term employees who, while competent in their own domains, had erected fiefdom barriers over time; the organization was ill-equipped to operate efficiently or collaboratively
- A market situation where inability to compete on a cost-effective basis was generating significant competitive pressure by rivals

The effort described herein reflects the concept of **Innovative Orchestration** (Kawai)³. The innovation was initiated by the CIO, who perceived a need for technical infrastructure redesign, and recognized the need for an outside change agent. The model can be expressed as $I_T \rightarrow O_T \rightarrow I_M \rightarrow O_M \rightarrow O_T$. Along the way, we implemented organizational redesign in order to make the technology implementation effective. In doing so, we employed a combination of mechanistic and gardening approaches⁴, taking advantage of the organizational chaos --- and

¹ Fulfillment operations included the entire spectrum of operations, initiated by taking a Sales call, then followed by Order Processing, Purchasing, Inventory Selection, Warehouse Operations (which included Shipping), and Customer Care (the Help Desk / Response Center). Marketing operations were also in play, because advertising serves as a precursor to the Sales Call.

² A SKU is an identifier associated with a unique inventory item.

³ Kawai, Tadahiko. "The Improvised Orchestration Model of Organizational Evolution." (2005). *Managing Organizational Complexity (Philosophy, Theory, and Application)*. Information Age Publishing: Greenwich, CT, USA.

⁴ Connor, Patrick E. and Napolitano, Carol S. (2005). "Machines or Gardens, or Both?" *Managing Organizational Complexity (Philosophy, Theory, and Application)*. Information Age Publishing: Greenwich, CT, USA.

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desire for survival in a competitive environment --- in order to generate new alliances and drive emergent behavior. Virtually all of the principles identified by Richardson *et. al*⁵. were employed to deliver project success.

A key attribute of the solution is that we did not treat this problem primarily as an engineering problem, but rather one where alignment of the various organizational constituencies would result in an effective solution utilizing technology as an enabler for success.

The tactics and tools, although simple in nature, were crucial to success. The central mantra of our collective work was “Everyone must have skin in the game.” In order to ensure that we developed collective buy-in, tools included:

- Stakeholder Analysis
- Identification and co-opting of Subject Matter Experts and Key Decision Makers
- Use of “test cases” (actually, Use Cases) to define the as-is and to-be processes⁶
- Analysis of technology gaps and potential enablers
- Implementation of a collective set of ethics: “listen-verify-act-hold accountable”⁷

Bottom line? During the process of re-engineering the corporation, we:

- Designed and developed new process flows for the entire corporation (Sales, Marketing, Finance, HR, IT, Warehouse Operations, Customer Care)
- Designed and developed new job classifications and responsibilities to reflect the “to-be” environment
- Became aware of an opportunity to save \$27.8 M a year; we modified the budget (with the Board’s approval), increasing it from \$2.6M to \$5.3M to reflect increased need for bandwidth and storage / retrieval hardware.
- The re-engineering effort paid for itself within 14 months

⁵ Richardson, Kurt A., Tait, Andrew, Roos, Johan and Lissack, Michael R. (2005). “The Coherent Management of Complex Projects and the Potential Role of Group Decision Support Systems.” *Managing Organizational Complexity (Philosophy, Theory, and Application)*. Information Age Publishing: Greenwich, CT, USA.

⁶ Teams were held strictly accountable to the following when designing requirements: “If you can’t develop a Test Case for this process, then it’s not a *Requirement*... it’s merely an ill-formed *Desire*.”

⁷Other mantras: “We hate meetings. If we’re not ready to engage each other effectively then a motion to adjourn is in order”, and “If you show up late or miss a meeting, YOU get the action items.” It’s amazing how efficient our meetings became over time. Also, as a byproduct, team “norming” established collective expectations that kept non-compliant behaviors in check. Peer pressure can be a wonderful thing.

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1 Introduction

I was contacted by the Chief Information Officer at MicroWarehouse, Inc. during the Spring of 2001. I had satisfactorily completed two previous engagements for the company in the past, and although I did not know the CIO, my name was mentioned in terms of someone who knew their business and who knew how to manage complex projects.

During our preliminary discussion (by phone), the stated intent was to have me “redesign the Order Entry application interface” (which was then an ASCII-based screen) to be a “Microsoft Windows” application. I informed the CIO that his money would be better spent with a more junior person, perhaps someone right out of college, and that hiring me would not be a good use of his money. At that point, the CIO casually stated that “Well, we actually have some problems with our Fulfillment operations. They’re inefficient, and we’re under a lot of market competition to improve.”

After a face-to-face meeting with the CIO and the CEO at their corporate headquarters, I declined to accept the engagement without a preliminary assessment of the situation, but contracted to perform a two-week stakeholder analysis and develop a draft budget that would result in a set of Requirements (should that be desired).

The entire program’s success can be traced to these preliminary steps:

- Get the stakeholders involved
- Seek to understand the complete problem, rather than individual issues
- Ensure that everyone has “skin in the game”
- Make incremental decisions
- Align expectations, roles, and responsibilities
- Flexibly respond to emerging requirements

By addressing the overall corporation’s needs, rather than just the CIO’s, a holistic approach and acceptable enterprise solution was achieved. By ensuring that all essential stakeholders were involved in the solution process, proper resources and decision-making were provided. Design and requirements, information technology, training, and processes were all made effective by this simple set of initial actions; while effective program management skills were required to implement the impending changes, nothing could be more true for this engagement than the expression:

“The voyage of a thousand miles begins with a single step... but the trip is a lot smoother if it’s a step in the right direction.”

2 Relevant “Complex Systems Engineering” concepts

In that the engagement with MicroWarehouse took place before many of the current writings on Complex Systems, the following represent the concepts that most appropriately reflect what actually occurred.

2.1 Improvised Orchestration (Kawai)

The essential thrust of Kawai’s model is that individuals perform from an organizational hierarchy perspective, but have two primary modes of operation:

- 1) orchestrated (or subservient); and
- 2) improvised.

Taking the simplifying assumption that power resides at the Top and Middle levels of management (or “T” and “M”), then orchestration may be referred to as “ O_T and “ O_M ”, and improvisation may be referred to as I_T and I_M .

At MicroWarehouse, the innovation was initiated by the CIO, who perceived a need for technical infrastructure redesign, and recognized the need for an outside change agent. The model can be expressed as $I_T \rightarrow O_T \rightarrow I_M \rightarrow O_M \rightarrow O_T$. Along the way, we implemented organizational redesign in order to make the technology implementation effective.

2.2 Coherent Management of Complex Projects (Richardson et. al.)

Richardson lists 10 components of coherent management. These components were applied to the MicroWarehouse engagement at virtually every phase of the engagement:

Component	Implementation	Impact
<p>Use simple guiding principles</p>	<p>The most basic principles were instantiated from Day 1:</p> <ul style="list-style-type: none"> • Everyone is accountable to the team; decisions that affect others must be vetted appropriately. • Meetings start on time, end on time. • A motion to adjourn is always in order... especially if you're not prepared. • The project plan is <i>always</i> wrong; don't worry about it. Correct it. • Keep your eyes open for opportunity; don't settle for mediocrity. • If you can't develop a Test Case against a need, it's not a <i>requirement</i>, it's a <i>desire</i>. • We view problems from a corporate perspective, not an organizational perspective. 	<p>Individual behaviors became sublimated to group norms.</p> <p>This lack of individual autonomy was rewarded by respect for the individual's contribution, and more importantly, respect for the individual's time. A mild anti-bureaucracy mindset was introduced that eschewed rigid adaption to <i>administrivia</i>, while preserving team bonding and effected behavioral norms.</p> <p>Invention and ingenuity were publicly recognized at both the individual and team levels.</p> <p>Focus on the end-goal through testable requirements ensured that design and development work produced results which could be implemented operationally.</p>
<p>Respect mental models (and interact with them)</p>	<p>Respect for the individual was a key component, especially with regard to ingenuity and invention.</p>	<p>Individuals volunteered for the project at a very high rate. As a result, we were able to acquire Subject Matter Experts whenever we sought them.</p>

Component	Implementation	Impact
Use landscape images	The Project Charter proclaimed the objectives and criteria for success.	The Charter supported a common Vision, and set the framework for all subsequent work.
Combine and recombine	Teams were chartered with documenting their existing processes, then tasked with evaluating not only how their processes could be improved, but how they fit into the process flows from other interacting organizations.	In the process of tracing data flows through the enterprise, we discovered that \$28 million dollars in rebates from vendors were not being captured. At that point, the team re-designed a new process to improve collections; this, in turn, impacted the design of the information technology architecture.
Reorganize your multiple roles, don't hide them	Members of the formal organizational hierarchy were encouraged to recognize the opportunity to mentor their team members rather than lead the effort themselves.	Individuals were exposed to rotating roles and responsibilities, expanding their skills and opportunities to contribute to the evolving solution.
Create canyons, not canals	Individual teams were empowered to design their new processes, subservient only to the overall enterprise goals and constraints.	Unique solutions were identified, vetted, and where appropriate, implemented. This built additional satisfaction for the team members, and resulted in pre-implementation buy-in that remediated the negative impact of "change".

Component	Implementation	Impact
Tell stories	<p>At weekly status meetings, individuals were required to present their designs, innovations, status, and recommendations.</p> <p>A directed effort was made to ensure that everyone got exposure... whether they desired it or not.</p>	<p>In that ingenuity and creativity were considered as fundamental attributes of “value”, we ensured that we remained available to change and emergent requirements. Moreover, in the telling of their “stories”, individual recognition was provided, compensating in part for the loss of autonomy in a tightly-integrated teaming environment.</p> <p>Since team members knew that they would be presenting at some time or another, this had the positive effect of establishing high standards of personal performance. Nobody wanted to stand in front of their peers and say “I didn’t accomplish anything” or “I couldn’t think outside of the box.”</p> <p>Mentoring was provided for those individuals who had style or capability challenges with this new level of personal exposure. This, in turn, produced positive results in that we didn’t just “drop the individual in a lake and expect them to swim.” Team members developed a level of security from this exercise of project leadership, and overall individual performance levels were improved.</p>
Send out scouting parties	<p>We didn’t actually send out scouting parties so much as to bring in Subject Matter Experts as events warranted.</p>	<p>This ensured an injection of focused knowledge to the overall team. At the same time, the SMEs returned to their environment having been educated by interaction with the team. As a result of this interplay, many SMEs requested to permanently join the team due to our team process, the overall challenge, and the progress we were making.</p>

Component	Implementation	Impact
<p>Post and attend to road signs</p>	<p>A Communication Plan was prepared early in the process, addressing not only formal but also informal communication venues and participants. Examples included:</p> <ul style="list-style-type: none"> • A project website • Chat rooms • Status notes / Meeting Minutes • Weekly meetings • Monthly meetings <p>Teams were required to document their accomplishments, plans, and concerns. We also reviewed Risk and Contingency Plans on a weekly basis.</p>	<p>Due to the extensive approach to sharing knowledge, surprises were minimal. However, one key problem arose with determining how to best architect the knowledge stores so that people could find appropriate data quickly. One of the ways we resolved this was to appoint Points of Contact, organized by subject area.</p>
<p>Use aligned words to fuel coherence</p>	<p>As a precursor to data / process mapping, each team was required to develop a "Dictionary of Terms"⁸.</p>	<p>The ensuing review demonstrated that while MicroWarehouse shared a common vocabulary, they did not share common semantics. At the completion of Dictionary review, we not only identified misconceptions with regard to terms, but also identified preliminary opportunities for process improvement investigation. In retrospect, this was probably the most critical element of the redesign effort.</p>

⁸ See Appendix C for sample.

2.3 Machines and Gardens (Connor and Napolitano)

While historically organizations are seen as “machines”, the approach used at MicroWarehouse was to “grow” a solution... one that would be defined by the end-users themselves via acts of self-definition through as-yet undefined specific requirements. Rather, as a gardener, the leadership team established a well-bounded yet fertile environment for planting, tilling, and harvest. Even the specific “seeds” were not defined, but left up to the teams to define. The only “machine” requirement was that we needed to produce enough “food” to meet the needs of the enterprise.

3 MicroWarehouse, Inc.

3.1 Description of the business

Founded in June 1995 as a spin-off of Micro-D International, an industry leader in information and communications technology, MicroWarehouse (MWH) was aimed at focusing on the expansion of distribution channels toward the local digital market, with 3Com networking products, Quantum hard disks, and Wyse dumb terminals as its initial offerings to the digital market. With only a workforce of 12 at its original Pasig City locus, the company steadily expanded and grew in the next few years, acquiring such coveted brand names as Palm, IBM, HP, Apple, and CISCO.

With over 3,200 employees worldwide, the corporation served Corporate, individual, and Government customers. At the time of the engagement, MicroWarehouse was a \$1.2 Billion dollar company. Administrative and fulfillment services were centralized in New Jersey, Toronto, and London.

MicroWarehouse marketed and sold technology-based products: PC's, servers, laptops, network equipment, printers and standard office equipment. The number of products numbered in the thousands, and evolved with the needs of the marketplace. Given rising competition from the likes of CDW (which eventually acquired MicroWarehouse in 2003), marginalization of profit meant that the company was bordering on the edge of financial crisis. With antiquated financial and order-taking systems, the ability to squeeze additional profit was severely constrained. Moreover, there was little flexibility in the IT architecture; business rules were hard-coded in what could be characterized as “spaghetti code”. Modifications to software were fraught with danger, and had been known to cause halts to automated processing for days at a time.

3.2 Project Background

From the Project Charter:

The following are characteristics of the operating environment:

- It is complex and clumsy. Sales Reps are required to memorize extensive lists of abbreviations in order to enter data, and must traverse multiple screens to find simple information.
- The application does not reflect well on our ability to sell technology. Information is hard to find, and can lead a Customer to believe that our systems are old and inefficient. The lack of standard naming conventions and data storage fields makes it difficult to search for and deliver relevant information to the Customer.
- MACS⁹ is a difficult system to maintain. Engineering changes required to support new business initiatives are costly and slow to implement.

Problems with the underlying MACS engine have been evident for years, and a corporate decision has been made to replace MACS in the future. Given the current business environment, the investment cost (in both dollars and resource allocation) of complete system replacement is not an option. Neither, however, is continuing to patch MACS with incremental modifications. A bold, but risk-averse approach is needed. It is believed that a web-based front end will accomplish the following:

1. Leverage existing application skills and modules (e.g., MECA, Quoting Tool).
2. Allow us to create a more user-friendly interface while retaining the underlying MACS fulfillment engine.
3. Design a front-end around a “best practices” vision for the Sales, Marketing, and Customer Support organizations.
4. Immediately attack the problems residing in MACS relating to poor data collection, which impedes our ability to aggressively identify the needs of our customers (and associated Sales / Marketing opportunities).

The “web-based front-end” served as a target on which the corporation could focus... the obvious problem associated with obsolete IT infrastructure demanded a solution. However, a holistic approach was set in place to support evolving requirements as the project got underway. The first step was to determine the true state of the enterprise, and to establish executive “skin in the game.”

Processes (current and proposed)

The current Sales, Customer Care, and Marketing processes are not fully documented. One of the deliverables of this project will be the documentation of key processes

⁹ The existing HP3000-based Order Entry and Fulfillment System.

benefiting directly from the improved Order Management interface.

Proposed processes will be identified as part of the Systems Prospectus documentation.

Management support

Senior management for Sales, Marketing, Customer Care, and Operations organizations have approved the initiation of this project. The Steering Committee is composed of Geoff Wellen (Sr. VP, Sales), Mark Walsh (Exec. VP, Marketing), Susan Fazelpoor (Sr. Vice President, Customer Care), Lori Schmalkuche (Chief Financial Officer), and Jeff Gentile (Exec. Vice President, Operations).

Their active participation and counseling will be required to successfully manage this project.

Given the complexity associated with this project, Risk Assessment and Mitigation were established at project conception. Note that the Risk Assessment recognizes the implied nature of uncertain requirements:

- ***How much leeway do we have in the schedule?*** Although we would like to initiate production testing in December, there is at this time no imposed delivery date.
- ***To what extent will the implementation schedule determine our success?*** Success is not totally based upon the schedule, but a rollout in 4Q2001 is considered at this point to be desirable.

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Risk Assessment

Complexity Risk

- **Do we have the skills to complete the project?** Project management skills are not overly robust, and will need to be enhanced in order to minimize schedule and resource allocation risk. We will be implementing a rigorous Project Management methodology developed in 4Q2000 to address this issue. Although an area of concern, we believe that this area is sufficiently remediated.

The applications development and operations staff are currently supporting similar systems. Application Design and Systems Development are not considered to be areas of concern.

- **Do we have sufficient grasp of the requirements to adequately predict the level of effort?** We will need to revise existing business processes if we are to optimize the impact of AMY to the bottom line. Our ability to rapidly define new processes and their test criteria will have a direct impact on the project schedule. There is moderate risk here.
- **To what extent are we in control of the end result?** Given that this is an internally-generated project, and that the senior leaders of all pertinent business organizations are actively participating, we believe that we are fully in control of the end result.

Timing Risk

- **How much leeway do we have in the schedule?** Although we would like to initiate production testing in December, there is at this time no imposed delivery date.
- **To what extent will the implementation schedule determine our success?** Success is not totally based upon the schedule, but a rollout in 4Q2001 is considered at this point to be desirable.

Risk Mitigation

- Decisions we have made to limit risk.
 - We will attempt to leverage existing code (MECA, Quoting Tool)
 - We will attempt to leverage existing processes
 - We will not attempt a full-blown CRM installation, but will attempt to incorporate critical elements that will enhance the customer experience and increase sales.
 - We have ensured that affected organizations are actively involved in requirements gathering and management of the project.

- Controls we will implement to limit risk
 - We will implement a detailed project plan, and monitor tasks to ensure that we quickly identify any schedule slippage.
 - We will institute a comprehensive communication plan to provide critical information and support the expeditious resolution of issues
 - We will aggressively manage the development of requirements to ensure that they are complete, comprehensible, and testable.

4 The Approach: Steps to Re-Engineering a Complex System

The re-engineering process included these key components:

- Use of a project management methodology *[See Appendix A for sample documentation]*
- Stakeholder Analysis
- Identification and co-opting of Subject Matter Experts and Key Decision Makers
- Establishing clearly-defined Roles and Responsibilities, which varied by phase of the effort *[See Appendix B for sample documentation]*
- Development of common terminology *[See Appendix C for sample documentation]*
- Use of templates to define the as-is and to-be Business processes *[See Appendix D for sample documentation]*
- Analysis of technology gaps and potential enablers
- Robust use of Test Cases that link back to Business Process requirements *[See Appendix E for sample documentation]*
- Development of a Project Website, where users could find:
 - Requirements documents
 - Test documents
 - Configuration Management / Change Control Documents
 - Meeting Minutes
 - Risk Assessment / Management Plans and Status
 - Action Items
 - Proposed “screen shots” of the future interface
 - Chat forums

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- Implementation of a collective set of ethics: “listen-verify-act-hold accountable”

*NOTE: Some of the following material refers “Project AMY”. The hidden joke was that the project was named for the CFO’s daughter, and everyone in-the-know shared the secret until the Go-Live date, In the mean time, the joke became a bonding mechanism for the senior leadership, who delighted in providing vague and deflecting answers to various team members seeking to know what the acronym stood for. From my perspective, naming the project after the CFO’s daughter meant that I had created a positive bias for success from the perspective of a key influencer within the corporation; the CFO now had **personal** skin in the game.*

4.1 Determining the initial Scope and Requirements

A stakeholder analysis was conducted to ensure that all essential corporate requirements were elicited and understood; this required meeting the CEO, CIO, CFO, EVP of Marketing, EVP of Sales, Senior VP of Customer Care, and VP of HR. The VP of HR was responsible for training, and would play an essential role should job requirements need modification (or creation). Most importantly, a failure to initiate collaboration with any of these people might appear to be a political slight.

From the beginning it was recognized that, although this would be a technology project, the most difficult challenges would be found in the areas of human relations. Put more concisely, “Technology’s challenging, but it takes people to implement it.”

The following section from the Project Charter reflects the effort to elicit input from key stakeholders.

Introduction

This document represents the recommended project Charter for the development of a web-based front end to the current MACS Order Management application.

The Business Case for this project may be found in paragraph 2.3, and includes a Return on Investment / Payback Analysis. Staff from the following organizations contributed to its preparation:

- Finance
- Operations
- Information Technology
- Sales
- Marketing
- Customer Care

Paragraph 3 (Assumptions) addresses areas affecting project planning and execution (e.g., parallel initiatives, availability of key staff, etc.).

Paragraph 4 (Constraints) contains factors that may impact the design and implementation of the system, e.g., hardware specifications, software design methodologies, and staffing

issues.

The detailed scope of the project, taking into account the assumptions and constraints, is defined in paragraph 8.

Paragraph 11 documents the roles, responsibilities, and control mechanisms required to ensure that proper project management is maintained.

A single version of this document will be maintained until project completion, and changes will be distributed to all relevant business partners. Updates will be clearly identified, and revision bars will define specific areas that have changed.

Appendix A contains the Project Plan at a summary level of detail.

4.2 Establishing the “Rules of Engagement”

In that buy-in (“skin-in-the-game”) had been achieved at the corporate level, we asserted the need for project ownership at lower levels of the enterprise. As a requirement for my managing the effort, I insisted upon co-locating with MicroWarehouse’s top Director of Sales.¹⁰ In doing so, I leveraged not only his expertise in defining the problem domain and potential solutions, but also his connections with other key members of the organization. After achieving the Sales director’s buy-in, I was then able to identify and co-opt other leaders at the mid-tier.

From the start, I positioned myself as more of a “facilitator” rather than a “project manager”, and took great pains to be seen as a member of the organization rather than a “consultant”. MicroWarehouse, like many other large companies of that time period, had experienced multiple interactions with consultants who drained the corporate coffers and provided nothing but what was referred to as “Credenza-Ware”... lofty-sounding recommendations that could not be implemented. Because I had to stay clear of being painted in a similar light, I focused on utilizing the mid-tier leaders to drive innovation. Given their fulltime jobs, they were willing to let me tie together the various initiatives and monitor progress; I took great pains to ensure that individuals received recognition, and rarely took credit (even when it was deserved). The result was a sense of self-actualization by the team members, who saw this as *their* project, not one run by an outsider.

Collaboration was also enabled by the establishment of appropriate group norms. At the initial kick-off meeting, I started with the following statement:

“I hate meetings... and if I have to sit through one, here are the rules I propose:

¹⁰ He re-located from another facility, and for 6 weeks we shared a two-man office. For the most part, he conducted his management duties remotely, only returning to his facility twice a week to address personnel issues; he saw this as an opportunity to develop his primary staff, and achieved positive results in doing so. I was extremely fortunate to have him on the team.

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- 1) Meetings start on time, and end on time.
- 2) If you're supposed to present and aren't prepared, then you will be bumped to the next meeting.
- 3) If you're late to a meeting, you end up with the action items. *[People smiled and thought I was joking... until they got the Action Items. We had a very high attendance rate.]*
- 4) Meeting notes will be published within 48 hours. That is your opportunity to ensure that we were in the same meeting. Please review them, and provide correction or requests for clarification as soon as possible.
- 5) Meetings will, as a rule, last no longer than 1 hour. "The mind can absorb what the rear can endure." I will be monitoring the clock, and if we need to extend the meeting I will either seek your permission to extend it, or we will schedule a follow-up meeting.

Do these sound like appropriate rules of conduct? If not, how do we need to modify them?"

4.3 Communication

A Communication Plan was prepared prior to project initiation, and was modified as new communication requirements emerged. Elements of the plan included entries for:

- 1) Audience (e.g., Executive Management, team members, general staff, external customers, etc.)
- 2) Context
- 3) Message
- 4) Vehicle for communication (e.g., Status Report, Scheduled / Ad Hoc Meetings, Meeting Minutes, Web Site, email)
- 5) Assessment approach (measurement of communication effectiveness)

All teams were required to develop their own plans, and effectiveness was reviewed on a periodic basis to maximize the flow of appropriate information. We implemented a project website for much of our communications; by making information transparently accessible, we kept email traffic to a minimum, and recipients did not feel that they were being smothered with "junk mail".

4.4 Decision-making

One of the keys to effective project management is to provide clear avenues for decision-making, and to document those decisions (and alternatives that were not chosen) so that organizational learning occurs.

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4.4.1 Steering Committee

Prior to project kick-off, a Steering Committee consisting of the key executive stakeholders was initiated. The Steering Committee was responsible for all decision-making which affected strategic direction, risk management, and changes to budget. One of the benefits of this organizational construct was effective maintenance of high-value relationships in a complex and changing environment.

4.4.2 Documentation

All critical decisions were documented, and signatures (electronic or written) were attached to milestone deliverables, such as:

- Project Charter
- System Prospectus
- System Requirements
- System Design
- System Integration Test
- System Transition Plan
- System Training Plan
- Budget Reviews
- Risk Assessment / Risk Mitigation Reviews

This formalism in an otherwise informal project environment ensured that key decision-makers were not only kept informed, but also involved at critical times in the evolution of the enterprise. The following vignette represents an example of this approach's effectiveness:

At the System Design Review, the EVP of Marketing was reviewing screen shots of a proposed User interface. He spoke up, and said that he didn't see an implied link to a Marketing Feedback subsystem. I noted that no such subsystem had been defined in the System Requirements. The EVP took exception with my response, to which I responded, "You signed the System Requirements document; please show me where the Marketing Feedback subsystem is defined."

After taking three minutes to flip through the System Requirements document, the EVP acknowledged that no such subsystem had been identified.

Given this opportunity to emphasize our approach toward decision-making and Risk Management, I then collaboratively stated the following:

“There’s good news here. We have an excellent team, and can create this subsystem for you. However, we have limited resources in both schedule and money. I will take the action to prepare a budget for the effort, and provide it to you within 72 hours. Regardless of the estimate, here are your choices:

- a. You can use your *Project Reserve* money¹¹ to add this functionality to the current release (but the schedule will most likely need to slip);
- b. You can increase the project budget; or
- c. You can delay implementation of this functionality until a future release.”

At that point, the EVP of Marketing chose “c.”, and the meeting continued. He had been *heard*, the Change Management process had been demonstrated, and our standard of collaborative decision-making reinforced.

4.5 Requirements Analysis

4.5.1 Development of Common Terminology

MicroWarehouse, like other corporations, had over time developed insular organizations which had their own agendas, strengths, and weaknesses. Knowledge was not necessarily shared, and processes were not documented. Other than establishing appropriate team norms, the essential key to success was undoubtedly establishment of a “Common Dictionary of Terms.”¹²

4.5.2 Incorporation of Training and HR... why?

A system or process is effective only if it can be effectively used. With that in mind, and recognizing that the enterprise would need to modify its processes as new capabilities emerged, the implications for Training were self-evident. Similar to the philosophy that “if you can’t test it, it’s not a requirement”, we also employed the mantra that “if you can’t train for it, it’s not worth having.” As a result, all requirements were reviewed for trainability.

Likewise, we realized that processes would most likely need to change in order to effectively implement a new technological solution. As new processes and capabilities emerged (reflecting the evolving requirements), we vetted these against the need to modify job descriptions and

¹¹ 15% of the budget was held in “management reserve”; it was monitored at all budget meetings, and was always referred to as “Your Money”, not the project manager’s money. In that the executives considered it a personal resource to potentially be used elsewhere, this limited arbitrary changes in Scope.

¹² See Appendix C for sample documentation.

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classifications. The resulting collaboration enabled us to bypass several sub-optimal system designs, and facilitated early User Testing in that system designers and architects received proactive feedback. “Testability” of the solution was substantially improved.

4.5.3 Incorporation of IT staff ... why?

Early involvement by all constituents was essential to project success. We ensured that all Business Requirements were reviewed early in the process for feasibility; the resulting collaboration also produced innovative suggestions regarding opportunities to implement new technological solutions.

4.5.4 Understanding and Developing the Requirements

In parallel with developing the Common Dictionary, the project teams were chartered (by area of expertise) to document their existing processes. The teams bought into the concept that “if we don’t understand what we’re doing, how can we improve it?”

Simple discovery processes using “Sticky Notes” were used to document both the processes and the data used to implement them [see Appendix D for the template]. This technique not only identified key choke points in the existing process, but identified required functionality and data elements. IT participation ensured that sufficient detail was documented. As part of this effort, test criteria were developed, job skills identified, and training issues discussed.

Ever central to our focus was the strategy of “focusing on the end-goal, then work backwards to make it happen.”

4.5.5 Feedback / peer review

Collaboration and information sharing are essential elements in modifying a complex enterprise. One of the ways we overcame that challenge was review of individual team findings in a larger venue. In doing so, we accomplished two objectives:

- 1) We leveraged the ingenuity and creativity of the entire organization; and
- 2) We ensured collaborative “skin in the game” by developing joint ownership of requirements.

4.5.6 Sharing the results / feedback

Meeting minutes, requirements documentation, project notes, Action Items, and project planning documents were published on the project website. Additionally, in order to ensure that we had collective buy-in on important matters, feedback was actively solicited from every meeting participant. It was not only important to “get it right”, it was important to develop a *common perspective* on the issues, challenges, and solutions.

4.5.7 Configuration Management / Change Control

Recognizing the complex and shifting nature of the changes that were facing the enterprise, we instituted Change Management / Change Control procedures for all requirements, designs,

Training, and Test documents. Again, changes were reviewed, approved / disapproved, and published for review by all constituents. The ensuing interaction contributed to joint ownership of deliverables and expectations.

4.6 Design, Development, Testing, and Transition

The same approach and techniques employed in development of Business Requirements were employed in the remaining phases of system delivery. However, there were some key components that deserve recognition:

- HR design of new job requirements and job categories
- Training development of preliminary materials
- Change Management / Change Control
- Monitoring of budget (both schedule and dollars)
- Communication

During User Test, all policies, procedures, training, and failover processes were tested prior to final data conversion and transition to the new operational environment. Due to the early integration of Business, IT, Help Desk, Training, HR, and Test staff during the Requirements, Design, and Development phases we ran into very few challenges which were not easily overcome or remedied.

5 Summary

Re-engineering the Fulfillment process at MicroWarehouse represented all the challenges associated with a complex enterprise:

- Multiple entities with their own perspectives
- Evolving requirements
- Non-aligned priorities
- People, process, and technology issues

In moving from the “as-is” to the “to-be” environments, the principles identified by Richardson *et. al.* were followed:

- Use simple guiding principles
- Respect mental models (and interact with them)
- Use landscape images
- Combine and recombine
- Reorganize your multiple roles, don't hide them

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- Create canyons, not canals
- Tell stories
- Send out scouting parties
- Post and attend to road signs
- Use aligned words to fuel coherence

The overriding mandate to “ensure that everyone has skin in the game”, associated with early collaboration by all stakeholders / constituencies produced a new enterprise, no less complex, but one aligned with respect to purpose and enhanced operational capabilities.

6 Appendices

A: Sample Methodology Documentation

B: Roles and Responsibilities Matrix

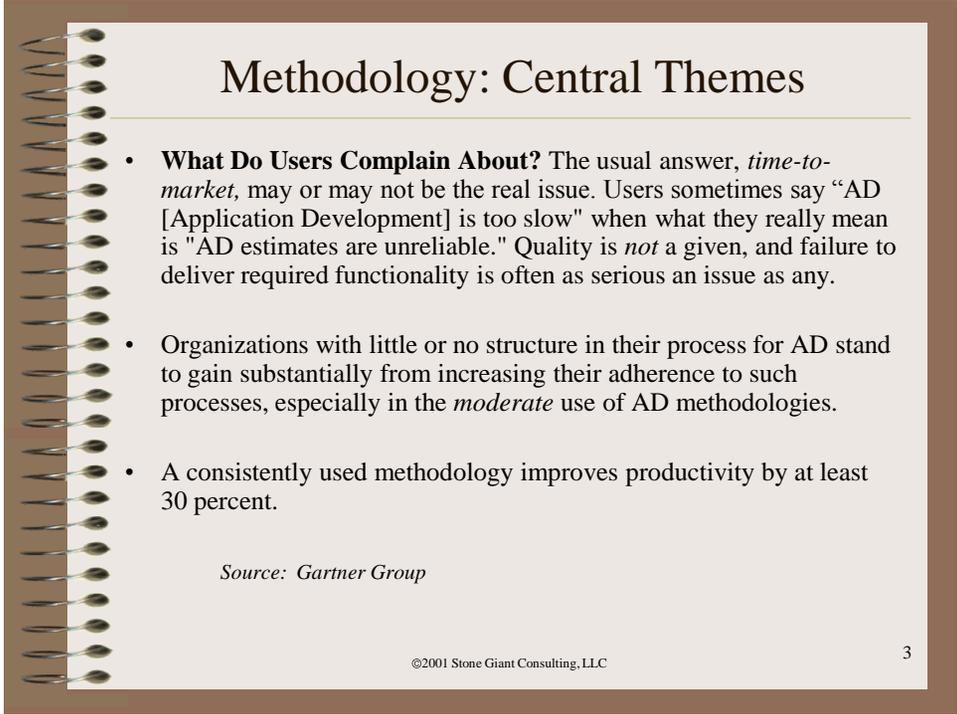
C: Common Dictionary [sample]

D: Business Process Template

E: Test Case Sample

F: References

Appendix A: Sample Project Methodology Documentation

A graphic of a spiral-bound notebook with a brown cover and a light beige page. The spiral binding is on the left side. The page contains the following text:

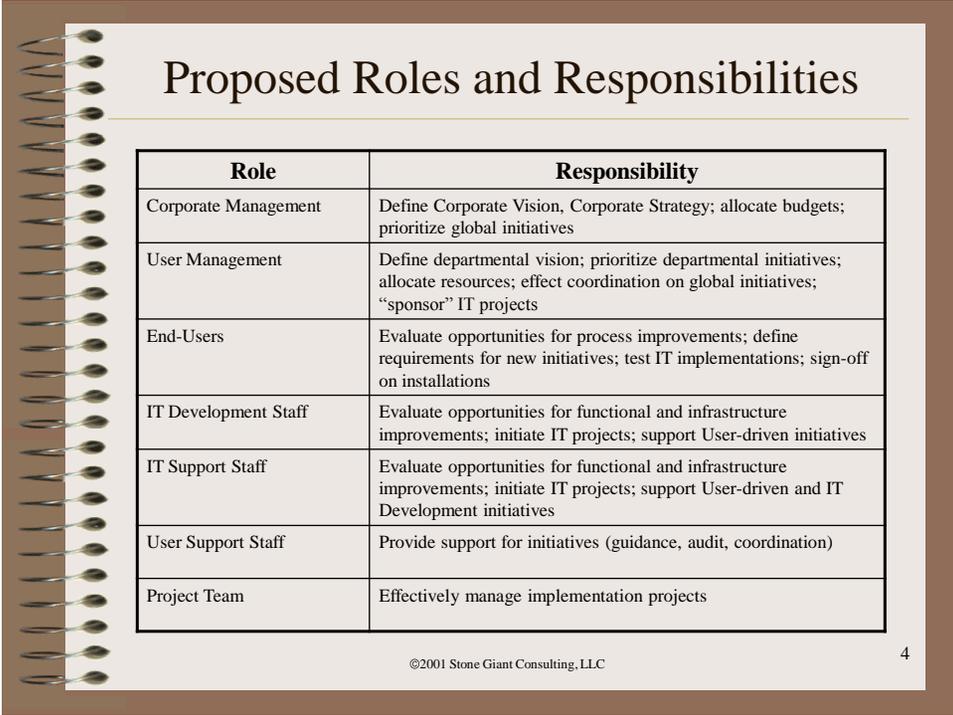
Methodology: Central Themes

- **What Do Users Complain About?** The usual answer, *time-to-market*, may or may not be the real issue. Users sometimes say “AD [Application Development] is too slow” when what they really mean is “AD estimates are unreliable.” Quality is *not* a given, and failure to deliver required functionality is often as serious an issue as any.
- Organizations with little or no structure in their process for AD stand to gain substantially from increasing their adherence to such processes, especially in the *moderate* use of AD methodologies.
- A consistently used methodology improves productivity by at least 30 percent.

Source: Gartner Group

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3

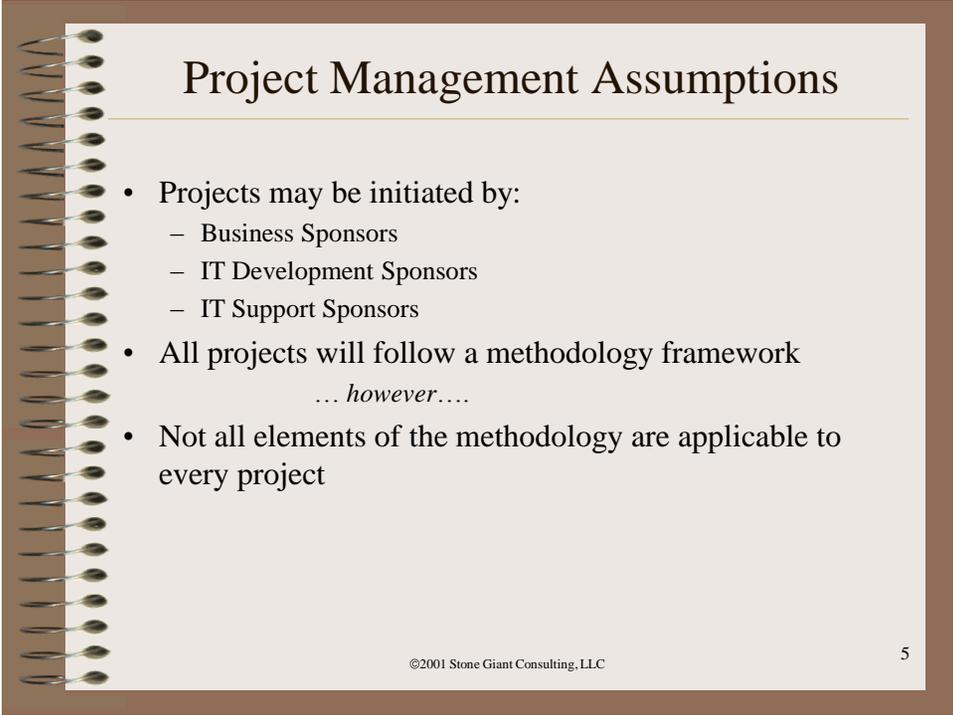


Proposed Roles and Responsibilities

Role	Responsibility
Corporate Management	Define Corporate Vision, Corporate Strategy; allocate budgets; prioritize global initiatives
User Management	Define departmental vision; prioritize departmental initiatives; allocate resources; effect coordination on global initiatives; "sponsor" IT projects
End-Users	Evaluate opportunities for process improvements; define requirements for new initiatives; test IT implementations; sign-off on installations
IT Development Staff	Evaluate opportunities for functional and infrastructure improvements; initiate IT projects; support User-driven initiatives
IT Support Staff	Evaluate opportunities for functional and infrastructure improvements; initiate IT projects; support User-driven and IT Development initiatives
User Support Staff	Provide support for initiatives (guidance, audit, coordination)
Project Team	Effectively manage implementation projects

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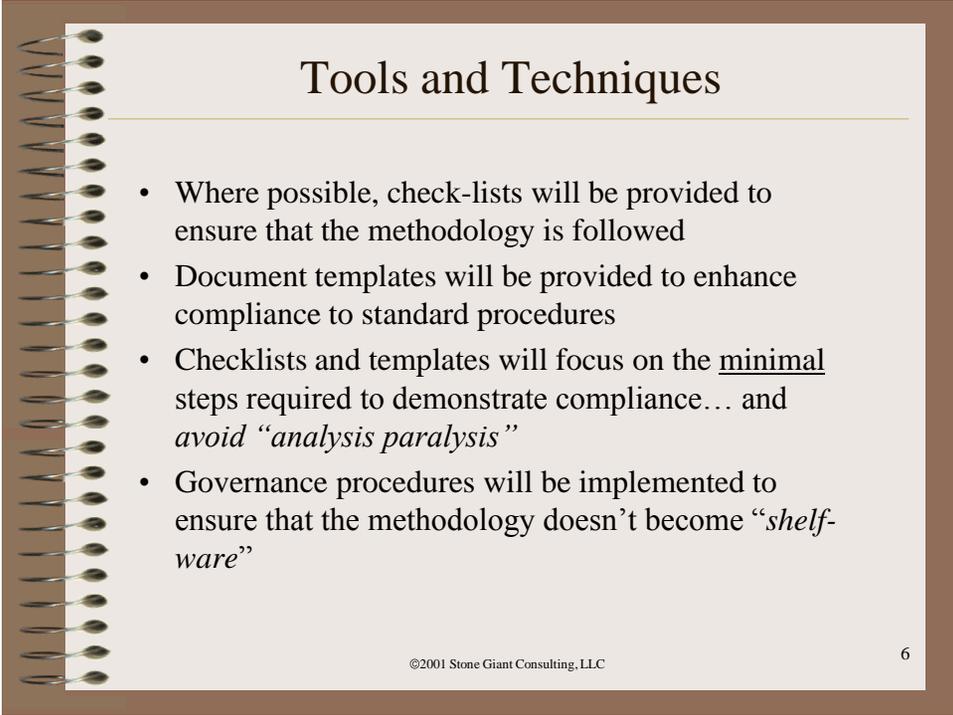
4

A graphic of a spiral-bound notebook with a brown cover and a light beige page. The spiral binding is on the left side. The page contains the title "Project Management Assumptions" and a bulleted list of assumptions. At the bottom of the page, there is a copyright notice and the number 5.

Project Management Assumptions

- Projects may be initiated by:
 - Business Sponsors
 - IT Development Sponsors
 - IT Support Sponsors
- All projects will follow a methodology framework
... however....
- Not all elements of the methodology are applicable to every project

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A graphic of a spiral-bound notebook with a brown cover and a light beige page. The spiral binding is on the left side. The page contains the title "Tools and Techniques" and a bulleted list of four items. At the bottom of the page, there is a copyright notice and the number 6.

Tools and Techniques

- Where possible, check-lists will be provided to ensure that the methodology is followed
- Document templates will be provided to enhance compliance to standard procedures
- Checklists and templates will focus on the minimal steps required to demonstrate compliance... and avoid “*analysis paralysis*”
- Governance procedures will be implemented to ensure that the methodology doesn’t become “*shelf-ware*”

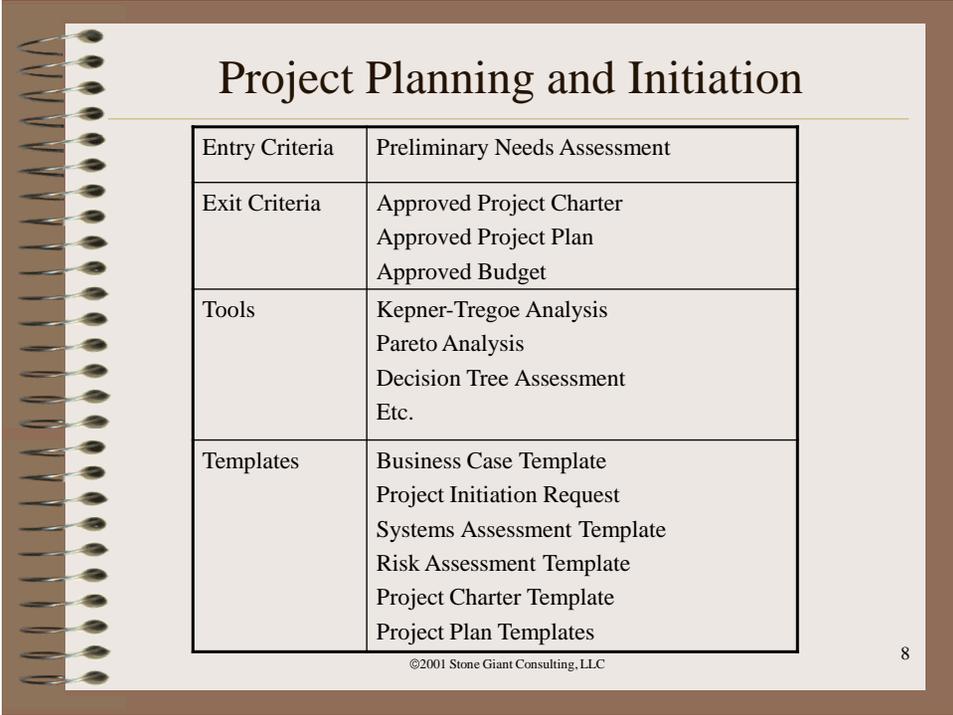
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Methodology Components Overview

Project Planning and Initiation	<i>Project Justification and Scoping</i> <i>Initial Budget Approval</i>	
Requirements Analysis	<i>System Requirements Analysis</i> <i>Budget Assessment / Confirmation</i>	<i>Product Evaluation / Recommendation</i>
Solution Definition	<i>System Delivery Specification</i> <i>Budget Assessment / Confirmation</i>	<i>Product Acquisition / Installation</i>
Design	<i>Technical Systems Design</i> <i>Budget Assessment / Confirmation</i>	
Build	<i>Technical Implementation</i>	<i>User Procedure Development</i>
Test	<i>System and User Acceptance Testing</i>	
Transition	<i>Roll-Out / Hand-off to Maintenance</i>	

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Project Planning and Initiation

Entry Criteria	Preliminary Needs Assessment
Exit Criteria	Approved Project Charter Approved Project Plan Approved Budget
Tools	Kepner-Tregoe Analysis Pareto Analysis Decision Tree Assessment Etc.
Templates	Business Case Template Project Initiation Request Systems Assessment Template Risk Assessment Template Project Charter Template Project Plan Templates

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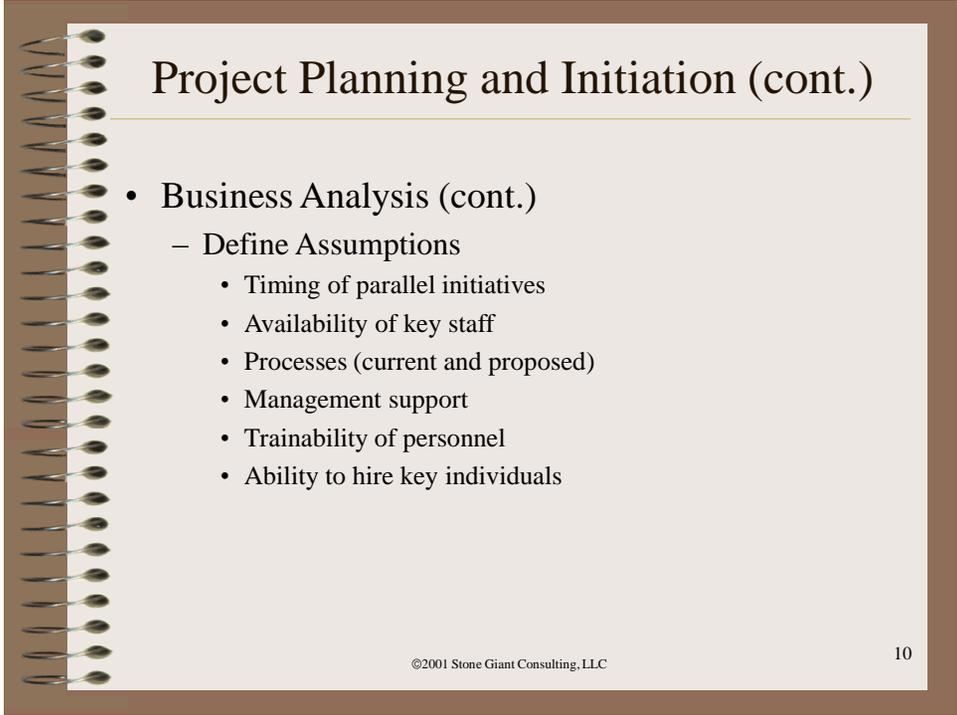
A graphic of a spiral-bound notebook with a brown cover and a silver spiral binding on the left side. The notebook is open to a page with a light beige background and a brown border. The page contains a title and a bulleted list.

Project Planning and Initiation (cont.)

- Business Analysis
 - Define Business Objectives
 - Current situation
 - Desired end-state
 - Anticipated cost of maintaining the status-quo
 - Lost revenues
 - Lost market-share
 - Legal implications
 - Staff inefficiencies
 - Inability to advance the Business strategy
 - Anticipated benefits

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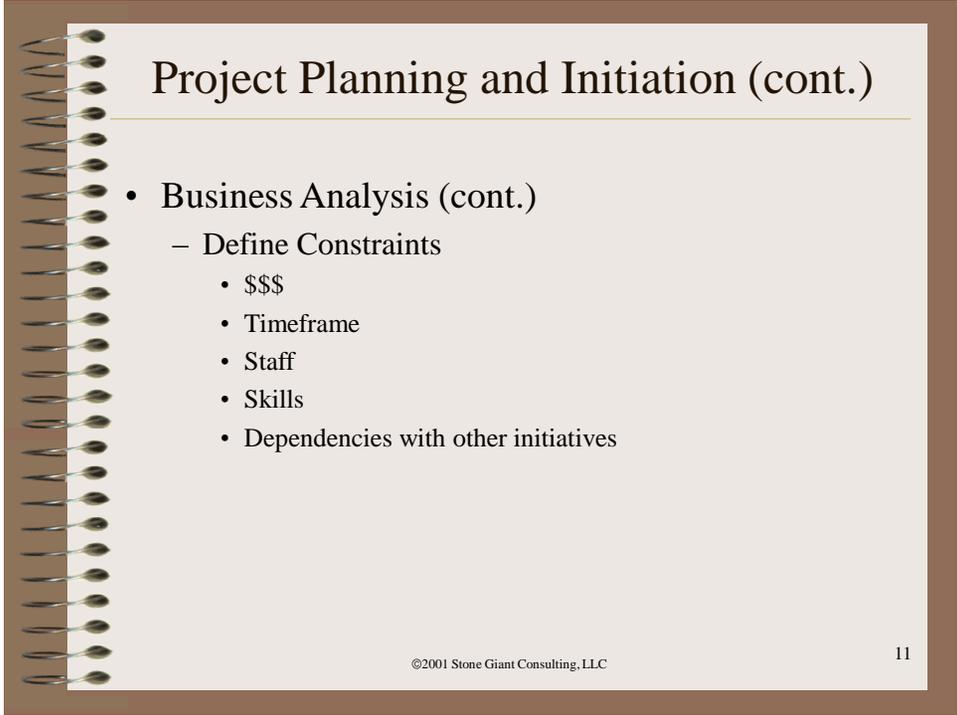
A graphic of a spiral-bound notebook with a brown cover and a light beige page. The spiral binding is on the left side. The page contains the following text:

Project Planning and Initiation (cont.)

- **Business Analysis (cont.)**
 - Define Assumptions
 - Timing of parallel initiatives
 - Availability of key staff
 - Processes (current and proposed)
 - Management support
 - Trainability of personnel
 - Ability to hire key individuals

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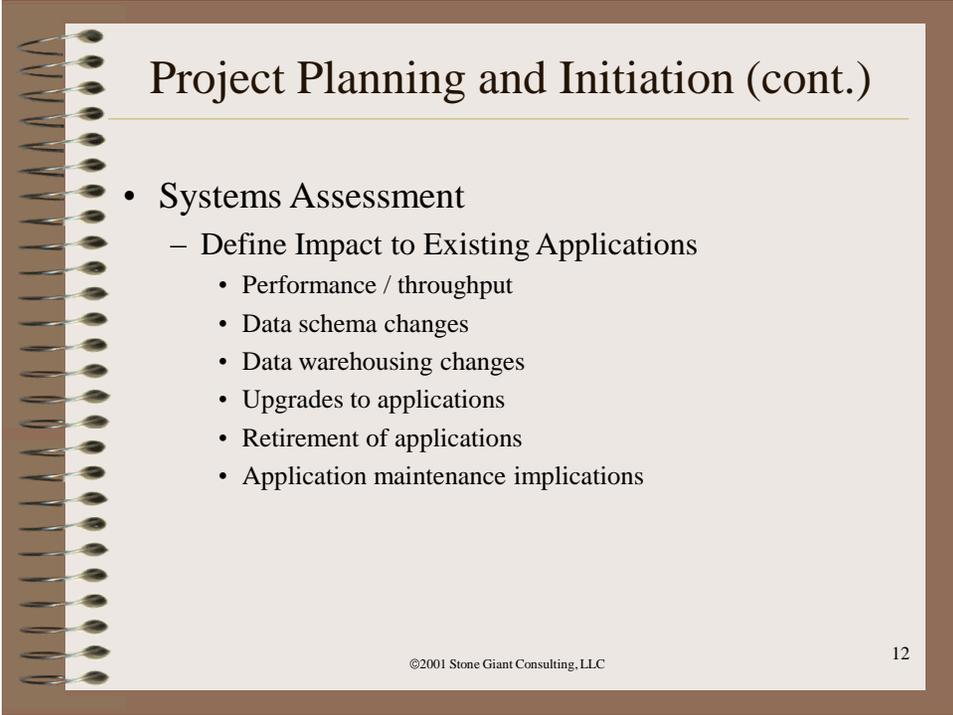
10

A graphic of a spiral-bound notebook with a brown cover and a silver spiral binding on the left side. The notebook is open to a page with a light beige background and a brown border. The page contains a title, a section header, and a list of items.

Project Planning and Initiation (cont.)

- Business Analysis (cont.)
 - Define Constraints
 - \$\$\$
 - Timeframe
 - Staff
 - Skills
 - Dependencies with other initiatives

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A graphic of a spiral-bound notebook with a brown cover and a light beige page. The spiral binding is on the left side. The page contains the following text:

Project Planning and Initiation (cont.)

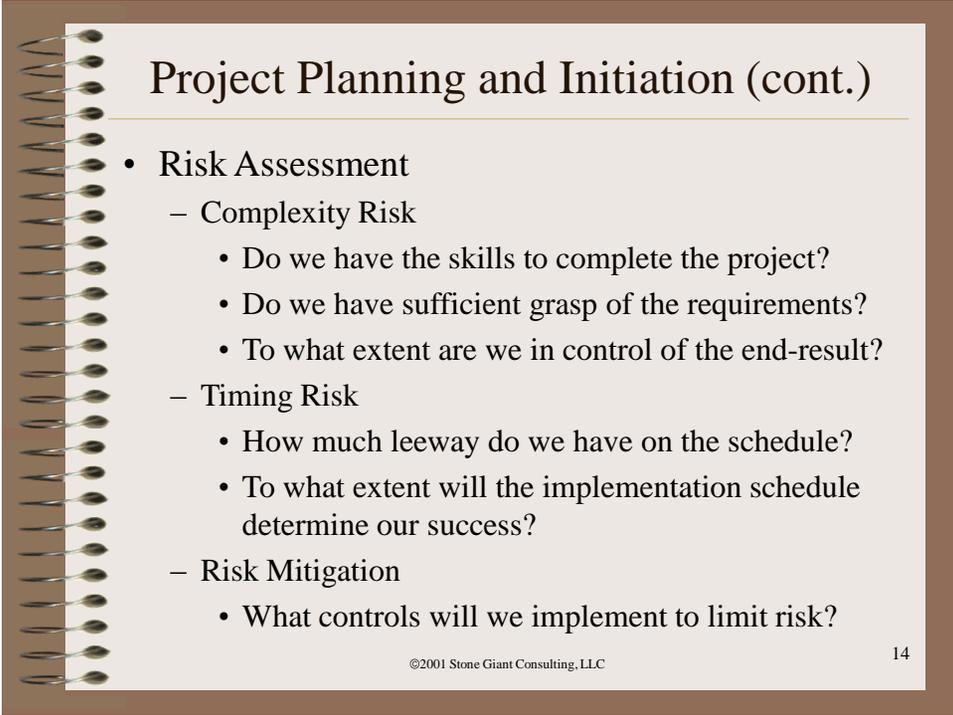
- **Systems Assessment**
 - Define Impact to Existing Applications
 - Performance / throughput
 - Data schema changes
 - Data warehousing changes
 - Upgrades to applications
 - Retirement of applications
 - Application maintenance implications

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Project Planning and Initiation (cont.)

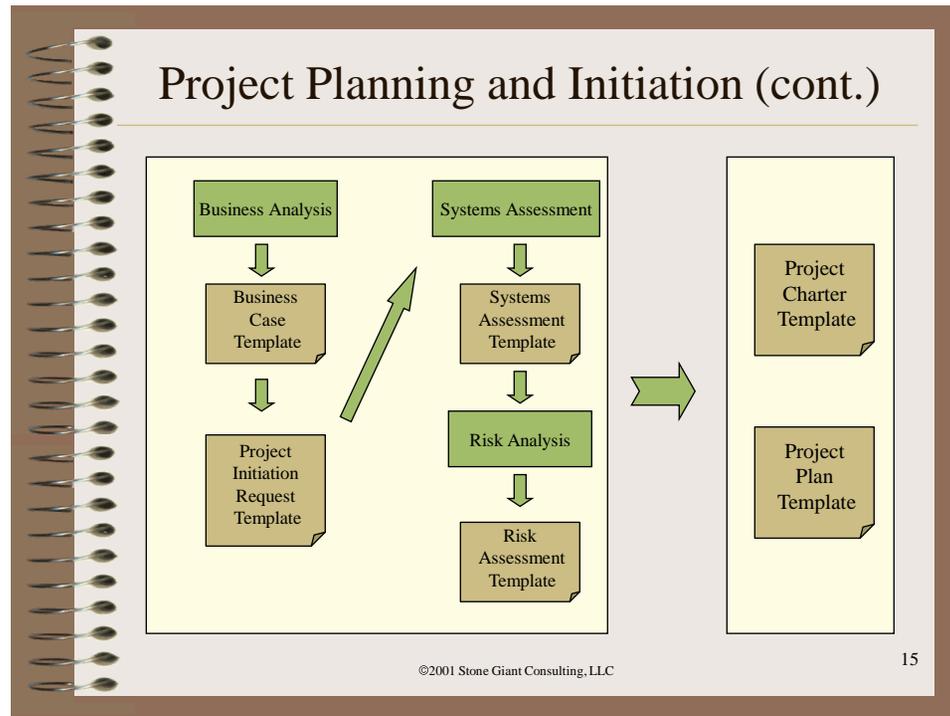
- Systems Assessment (cont.)
 - Define Impact to Existing Infrastructure
 - Performance / throughput
 - New hardware requirements
 - New applications / tools requirements
 - Network upgrades (bandwidth, connectivity, etc.)
 - Maintenance
 - Backups
 - Installation scripts
 - Reports
 - Updates to existing reports
 - Requirements for new reports
 - Security
 - Impact to Systems Infrastructure Strategy

A graphic of a spiral-bound notebook with a brown cover and a light beige page. The spiral binding is on the left side. The page contains the following text:

Project Planning and Initiation (cont.)

- Risk Assessment
 - Complexity Risk
 - Do we have the skills to complete the project?
 - Do we have sufficient grasp of the requirements?
 - To what extent are we in control of the end-result?
 - Timing Risk
 - How much leeway do we have on the schedule?
 - To what extent will the implementation schedule determine our success?
 - Risk Mitigation
 - What controls will we implement to limit risk?

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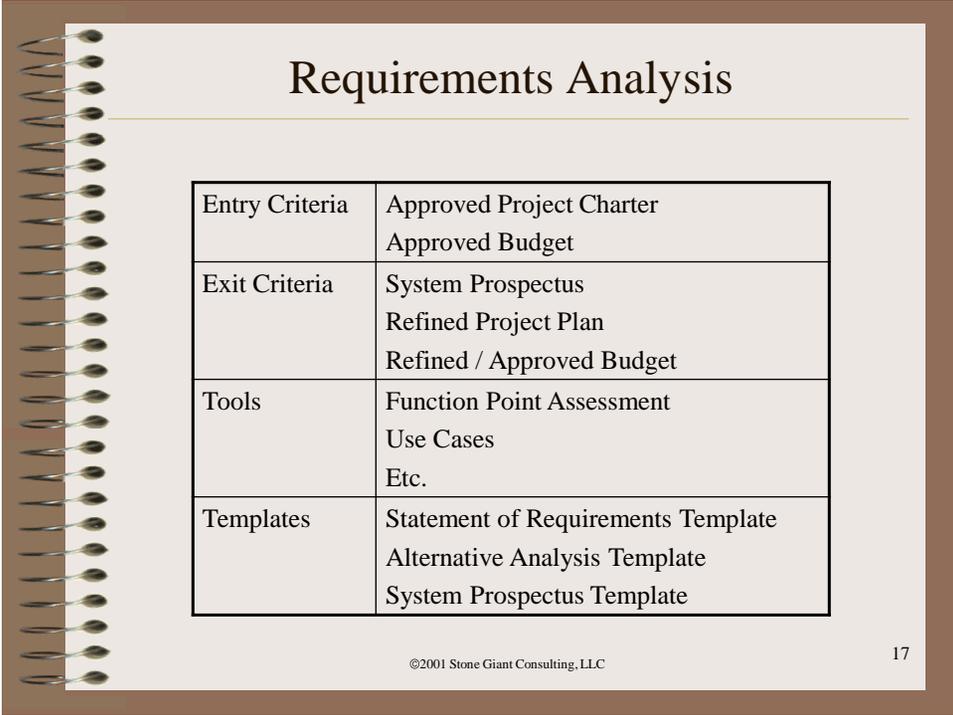
A graphic of a spiral-bound notebook with a brown cover and a light beige page. The spiral binding is on the left side. The page contains the following text:

Project Planning and Initiation (cont.)

- A Project Charter
 - Identifies project scope
 - Identifies project Risk and Risk Mitigation
 - Identifies budgetary requirements
 - Identifies key project team members
 - Identifies key milestones
 - Defines the acceptable implementation timeframe
- Approval of the Charter authorizes entry into the Requirements Analysis phase

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Requirements Analysis

Entry Criteria	Approved Project Charter Approved Budget
Exit Criteria	System Prospectus Refined Project Plan Refined / Approved Budget
Tools	Function Point Assessment Use Cases Etc.
Templates	Statement of Requirements Template Alternative Analysis Template System Prospectus Template

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Appendix B: Role and Responsibility Template

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		Corporate Management	User Management	End-Users	IT Development	IT Support	User Support	Project Team
Phase	Responsibility							
Project Initiation	Preliminary Needs Assessment (Business)							
	Preliminary Needs Assessment (IT)							
	Define current Business process							
	Define current IT process							
	Define desired end-state (Business)							
	Define desired end-state (IT)							
	Define assumptions (Business)							
	Define assumptions (IT)							
	Define constraints (Business)							
	Define constraints (IT)							
	Define impact to existing applications							
	Define impact to existing infrastructure							
	Risk Assessment							
	Develop project milestones							
	Develop project plan							
	Authorize expenditure of resources							
Authorize assignment of staff								
Requirements Analysis	Confirm project scope							
	Establish user requirements							
	Model process and data requirements							
	Establish functional requirements							
	Analyze solution alternatives							
	Recommend solution							
	Refine Project Plan							
	Refine Budget							
Authorize project plan / resource expenditures								

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Phase	Responsibility	Corporate Management	User Management	End-Users	IT Development	IT Support	User Support	Project Team
Solution Definition	Define user interfaces							
	Define user report requirements							
	Define system report requirements							
	Define usability requirements							
	Define data requirements							
	Define functional sub-system requirements							
	Define security and control requirements							
	Determine vendor selection criteria							
	Evaluate vendors							
	Evaluate vendor products							
	Perform pilots / demos							
	Refine Project Plan							
	Refine Budget							
	Authorize project plan / resource expenditures							

Appendix C: Common Dictionary [sample]

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Credit Terms/Definitions

AMY project

July 2001

Apple Loan – Open Account involving Apple, MBNA, and end-user customer. Special procedure requiring additional interfaces and steps between parties. Offline procedures needed to support involving Sales, Customer Service, Financial Services and ?

Payer Account – SGA account that is to be invoiced for Open Account transaction.

Caller/Buyer Account – SGA account that placing order.

Ship-to Account- SGA account where order is to be shipped to.

Open Account – account establish for commercial customers by which product is shipped and terms of net 30 are to given.

Net 30 – credit extended for 30 days.

Credit Limit- dollar amount entered into MACS assigned to particular Buyer or Caller Account to force order to stop for credit review.

Dynamic Credit Limit – calculated credit limit based on customers buying, and paying pattern.

DSO- (days sales outstanding) a calculation that represents the number of days worth of receivables to exhaust or deplete current open AR balance.

CDM – Credit Decision Model. Model used to calculate initiate release/hold/financial review credit decision for a pending order.

OM – Order Management model within MACS.

OA – OA module within MACS.

AMEX Lease – American Express Financing Leases. Separate approval process.

Third Party Lease – lease other than AMEX lease involving a lessee, lessor and vendor/supplier which is MicroWarehouse.

Customer Actions

List of customer actions and their definitions as they exist in SGA:

Commonly used actions have been prefixed with an *.

U	Updated Customer
*C	Credit cut off
R	Do not rent (not used)

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G	Ghost customer
X	Active-DO not call
V	Valid customer
*A	Active customer
Y	At agency (not used)
D	Dormant
M	MLNA
Q	Reactivation
*B	Bad customer
*P	Do not promote Was use to stop sending catalogs
*F	For convenience only
N	Nixie
T	Target

Customer Status

List of customer statuses and their definitions:

Commonly used statuses have been prefixed with an *.

*C	Customer
G	Gift to name
M	MLNA
R	Requisitioner
*S	Ship to Name
*B	Bill to name
*F	Fraud Customer
*H	Hold
O	Over credit limit
T	Super site
Y	Cancel B/O
D	Merged
G	Ghost Customer

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*I	Inquiry
P	Promotional
E	Seed Name
A	Purchase Agent
V	Various statuses

Past Due Balance – Open invoices greater than 30 days old

Aging – Open AR balance broken down into:

Current = 1-30 days from invoice

1-30 = 1-30 days past due

31-60

61-90

90-120

120+

Pay Methods:

OA – Open Account

WT – Wire Transfer

PC – Personal Check (prepaid)

LG – AMEX Leasing

HQ – Hold for Quote

AL – Apple loan

AX- American Express Credit Card

VI – Visa

MC – MasterCard

DI – Discover

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Authorization Code – for credit card transactions, code that is supplied by credit card processing house letting us know if the transaction was approved.

Decline Code – provided by credit card processor which defines the reason for non-approval.

Paymentech – current credit card processor.

Appendix D: Business Process Template

Business Process _____

Office:

[Name of the office]

Process Name:

[Name of the process, and official abbreviation, if any]

Parent Business Activity/Process:

[Name of the parent business activity or process, if any]

Description:

[Briefly explain the purpose of the business process.]

Primary Product(s):

[List the primary product(s), and explain, if necessary. Identify the customer for each primary product.]

Trigger(s):

[List the event(s) that trigger the process. (Triggers can be a calendar date, as well as an actual event.)]

Subprocesses:

[If the process is subdivided, list the subprocesses here.]

Standard Path Events/Activities:

[List the important activities and/or events that occur as part of the standard path for this process. If an activity or event occurs in a specific subprocess, identify the subprocess that includes the activity/event. Note any locations where an alternative path breaks off from the standard path.]

Alternative Path Events/Activities:

[List the important activities and/or events that occur as part of the alternative path for this process, beginning with a note on where the alternative path breaks off from the standard

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path, and ending with a note on where the alternative path rejoins the standard path, if it does. If an activity or event occurs in a specific subprocess, identify the subprocess that includes the activity/event.]

Inputs:

[List the inputs to the process, and explain, if necessary. Identify the source of the input. If the input is specific to a subprocess, identify the subprocess.]

Secondary Products:

[List the biproducts, or minor outputs that result from the process. Identify the customer for each output. If the secondary product is specific to a subprocess, identify the subprocess.]

Participants:

[List the participants (actors) in the process, and explain their function briefly. If the participant is active only in a specific subprocess, identify the subprocess.]

Appendix E: Test Case Sample

Unit Test: AMY Front End		Prepared By: Janet Krehely	Date: 9/29/01
		Amended By:	Date:
Release # Phase 1	Release Date: TBD	Data Dependence: Items are available with each customization code.	
Sub Cycle: 18	Sub-Cycle Name: Customization		
Objective: Testing the Functionality and Behavior of the Customization Processes			
Tester:	Date:	Business Owner: Mindy Powlishen	
Operating System:	Browser Type:	Director/Manager/sign off:	Date:

18.7	Customization AP 4.4.18.3.3	When a part number is entered onto an order that has been assigned customization code AP, a pop-up screen will display with the fields assigned to the customization code. The system will provide 3 lines for the User to obtain the following information. <ul style="list-style-type: none"> • Card Member Ref# 17 Text characters • CL Category Code 1 Text character • Employee Badge ID 6 Text characters 		
18.8	Pass to MACS 4.4.18.3.1	Functionality of the customization code still needs to be passed through MACS so little will be changed after the order is completed and submitted in AMY. Place an order with an item linked to a customization code Make sure that the customization feeds to MACS and PKMS.		
18.9	Additional Items with customization 4.4.18.3.5	The user can enter the next part number on the order. If it is assigned a customization code, AMY will display another pop-up screen associated with its customization. Place an order with multiple items with customization. Make sure the customization prompts in AMY and feeds thru to MACS and PKMS.		

Appendix F: References

References

Various documents © Stone Giant Consulting (2001 – 2002).

Connor, Patrick E. and Napolitano, Carol S. (2005). “Machines or Gardens, or Both?” *Managing Organizational Complexity (Philosophy, Theory, and Application)*. Information Age Publishing: Greenwich, CT, USA.

Kawai, Tadahiko. “The Improvised Orchestration Model of Organizational Evolution.” (2005). *Managing Organizational Complexity (Philosophy, Theory, and Application)*. Information Age Publishing: Greenwich, CT, USA.

Richardson, Kurt A., Tait, Andrew, Roos, Johan and Lissack, Michael R. (2005). “The Coherent Management of Complex Projects and the Potential Role of Group Decision Support Systems.” *Managing Organizational Complexity (Philosophy, Theory, and Application)*. Information Age Publishing: Greenwich, CT, USA.