Defining Business Requirements

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Some Background

We will quickly cover:

• Who are you? Who am I? (aka Introductions)
• Why are we here?
• Important things that are NOT in scope today
• Schedule for today
Who are you?
(And more importantly, Why are you here?)

• Website says that you are:
  - Agency Executives
  - Chief Administrative Officers
  - Chief Information Officers
  - City Managers
  - Computer Operations Managers
  - Contracts Managers
  - County Administrators
  - Data Processing Managers
  - Department Directors
  - Deputy Directors
  - Elected Officials
  - Finance Officers
  - Information Security Officers
  - IT Directors
  - MIS Directors
  - Procurement Officials
  - Program Managers
  - Programmers
  - Project Managers
  - Senior Program Analysts
  - Telecommunications Managers
  - Web Managers

• Website says that you are here to:
  - Receive training on defining requirements
  - Review some case studies
  - Learn some “best practices” to help improve your skills at defining requirements
Who are you really,
and why are you really here?
The Premise
(True now … or true soon)

• Defining Business Requirements is typically the responsibility of the Business Analyst role

• You may be a "business analyst," “a modeler", etc.
  – You discover facts about your business.
  – You facilitate communication between business experts.
  – You help specify the way the business will work.
  – You provide these specifications to a technical staff (internal or maybe a vendor) that will implement not only databases and applications but perhaps a restructured organization, new business procedures and new business locations as well.

• In order to do this right, you likely will need a whole bunch of models!
The Analyst/Designer’s Job

“… demonstrates the ability and inclination to tolerate chaos, ambiguity, and lack of knowledge and to function effectively in spite of them.”

Position description for Senior Analyst/Designer at a major software company.
Why Are We Here?

WORKSHOP “DEFINITION”

• Intentions
  – Understand what business requirements are
  – Understand how a full-spectrum of requirements fit together
  – Pick up some tips that might be useful on your projects

• Values
  – More practical than theoretical

• Focus
  – Business requirements & modeling (not system requirements & modeling)
  – Key aspects (what, how, when, where, who)

• Context
  – Our time is short and our topic is large
Who Am I?

- **Advanced Strategies, Inc.**
  - Founded 1988 – do this work, consult, and teach
  - 17 years of data modeling
  - 17 years of full business modeling
  - Small company, mostly large clients: *federal, state and local governments, airlines, banks, manufacturing, insurance, construction, automotive, telecommunications, utilities, software companies, etc.*

- **Craig Carter**
  - Have been working in NY State for the last 3 years
    - E.g. NY Dept of Labor, OSC (FOCAS project)
  - 6 years with Advanced Strategies
  - Process modeling – 25+ years (programmer/analyst)
  - Data modeling – 20+ years (data analyst)
  - Event modeling – 10+ years (data/business analyst)
  - Location modeling – 5+ years (business analyst)
  - Organization modeling – 5+ years (business analyst)
How this Material Evolved

1. We’ve been doing this every day for many years
2. We are always looking for new approaches
   - Conferences, like this one
   - Publications
   - Our own ideas
   - People we meet on projects
3. We try things that look promising
4. We keep what works and abandon what doesn’t
   (i.e. no particular axe to grind)
Very Important Things That Are NOT in Scope Today

- Is Defining Requirements a Good Thing?
  - Assumption: yes

- Methodology
  - Not: SDLC, JAD sessions, Agile development, … etc.
  - Methodology examples will be generic (seen as a Framework)

- Style/Notation
  - I will use a particular style, but I’m not advocating/selling it

- Tools
  - Very basic tools were used (something everyone could afford to own), you can own/find better

- Presentation
  - Not: How much to put on one page, the way to word requirements so you can sue your vendor later,… etc.
There are **LOTS** of ways to approach this work.

This workshop will highlight:
1. What has worked well for us
2. What is typically most useful in most efforts

**Goal:**
- You will be able to take away ideas that you can use in your current environment – not to promote a whole new way of doing things.
Table of Contents

• Some Background (0:05)
• Foundation Concepts (0:15 min.)
• Quality Requirements (0:30 min.)
• Types of Business Models (2:00)
  – Business Object (Data) Models
  – A Quick Demo
  – Business Process Models
  – Business Event Models
  – Business Location Models
  – Business Socio-Political (Organization) Models
• Packaging Requirements for Phase Next (0:45)
• A Case Study (0:45)
• Assessments/Checklists/Walkthroughs – Adding Quality (0:45)
• Some Wrap Up (0:10)
Administrative Items

- Breaks – one in the AM and one in the PM
- Lunch -
- Something not clear, have a question, if I say something stupid, or I'm not making sense...
  - Please Speak Up
- We will proceed informally
Foundation Concepts

We will discuss:

• Business Facts
• Frameworks
• Business Analysis & Requirements
The Term “Business”

• When we (Advanced Strategies) use the term “Business” we mean the activity of providing services and products, and the people who provide these services and products regardless of the sector.

• This definition can refer to commercial ventures, government organizations, charitable enterprises, etc.

• Don’t get hung up on the term. When I say “Business”, you think, “the Business of Government”.
Business Facts

• We will use this term to mean any truth about the business

• May be:
  – About the way the business currently works
  – About the way the business will work in the future
Types of Business Facts

- **Facts of Life** are the things in the business not likely to change (unless the nature of the business changes).

- **Facts of Policy** are the rules, laws, or conventions that define and govern the conduct of the business on a continuing basis.

- **Facts of Implementation** are the limitations imposed by the construction of a system (Not business facts but how the business is implemented).
Types of Business Facts

• Why is it important to differentiate between Types of Facts.

• What kind of Requirements are we including in our specification?

(This will become clearer as we discuss Types of Requirements)
Types of Business Facts

• Also, Before adding any fact to the Requirements, ask two questions:
  – It is true? (This is actually a fact about the business)
  – Do we care? (Is it pertinent to the scope of the effort we are working on)

• It is amazing how much time we spend arguing about the accuracy of something that is out of scope.
Frameworks

• Anything complex can more easily be understood and dealt with if meaningful parts can be seen in a well-integrated context of a whole.

• We will use a framework similar to the Zachman framework.
  – I’ll point out where things are different, but we won’t dwell on it.
Frameworks

- More on Zachman

- See even more on the Zachman Framework at www.zifa.com
# Basic Development Framework

<table>
<thead>
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<th>Planner's View</th>
<th>Effort Focus</th>
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| Strategy Model (Scope) | EFFORT DEFINITION  
(purpose and vision; goals and objectives; guiding principles, focus) |
| Business Model (Owner's View) | EFFORT REQUIREMENTS  
(WHAT the system “is” and “must do” independent of technology) |
| Architect's Model (Designer's View) | DESIGN OF THE EFFORT’S SOLUTION(S)  
(How the system will be implemented using technology) |
| Technology Model (Builder's View) | REALIZATION OF THE EFFORT’S SOLUTION(S)  
(the actual, technical implementation of the system) |
| Functioning Organization and Systems | EFFECTIVE BUSINESS |
What are Requirements?

Common Definitions

• Webster’s Ninth New Collegiate Dictionary defines requirements as:
  – “something required; something wanted or needed”

• IEEE Standard 729 defines requirements as:
  – (1) a condition or capability needed by a user to solve a problem or achieve an objective;
  – (2) a condition or capability that must be met or possessed by a system… to satisfy a contract, standard, specification or other formally imposed document.
What are Requirements?

• To understand what requirements are we must first agree to why and when we define them
  – Business Requirements
  – Effort (Project/Program) Requirements (sub-set of Business Requirements)
  – System Requirements

• Requirements vs. Specifications Dilemma
Types of Requirements

- Business Requirements
  - Program
  - Effort
  - System
- Effort Requirements
- System Requirements
Business Analysis
(A quick context)

“The Business”

Pains, hopes, fears, problems, opportunities, mandates, etc.

Business facts + Business conditions + Business possibilities

Mechanized solution

Business need

Business requirements

Design & Deliver a Mechanized Solution

Determine Business Need

Business Analysis
Business Analysis

We will think of business analysis as an activity with three parts.

1. **Discovery**: Understand & document current business facts (as-is)

2. **Assessment**: Identify business conditions and possibilities

3. **Specification**: Define business requirements (to-be)
Business Analysis
• **Requirement of the Business** – which suggest a “need of the business”. Requirements imply what we need to meet our intentions but express no bias on the next steps (Functional Requirements - The functionality we desire of a problem solution).

• **Specification of the Design** – which suggest a “target of a design” (Non-Functional Requirements - The qualities we desire of a problem solution other than those concerning its functionality, e.g. its robustness, its efficiency, its security, its extensibility, its maintainability, its portability, etc.).

“Technology can only deliver outputs. It takes people, and processes to deliver outcomes. It takes strategy to ensure they are the results you want.”

– Peter Hutchinson – Public Strategies Group
Quality Requirements

We will discuss:

• Inspection Checklist
• Business Driven
• Intellectually Manageability
• A Robust set of Traceable Techniques
• Implementation Independence
Excerpts from an Inspection Checklist
(The ones most often missed)

• All items needed to specify the solution to the problem have been included
• Each item is exact, there is a single interpretation, the meaning of each item is understood, and the specification is easy to read.
• No item conflicts with another item in the specification
• Each item is pertinent to the problem and its solution
• Each item can be traced to its origin in the problem environment.
• The requirements specifications are a statement of the requirements that must be satisfied by the problem solution, and they are not obscured by proposed solutions to the problem.

Ideas for Avoiding Common Problems with Requirements

- The business problem must be clearly defined including the business objectives that will solve the business problem - **Business Driven**
- Specify the solution to the problem and each requirement is pertinent to the problem and can be traced to its origin in the problem - **Follow a Robust set of Traceable Techniques**
- Each requirement has only a single interpretation, are easy to read and do not conflict with each other - **Intellectually Manageable**
- The requirements are not obscured by proposed solutions to the problem - **Implementation Independent**
Business Driven

Specified Set of Business Results

“Begin with the end in mind”
– Steven Covey
Business Driven

Everything is done to achieve some business purpose.

On time, within budget, and with expected functionality is an accomplishment. However, it is not necessarily success.

Success is measured by realized business impacts.

Expected End Results
Business Driven Motivations

Hopefully you have:

Business Intentions

- Make a profit
- Help the environment
- Enrich the employees life

Project Intentions

- Increase profit in Florida operations
- Have healthier employees

System Intentions

- New System: streamlined & less expensive
- New Location: build employee health clubs that use solar power
Business Driven Projects

• Business Requirements are often defined as part of a “project”
• The project may be stated as an “IT project” or as a “Business project”
• Projects have different levels of business impact goals (none, improvement, reengineering, reinvention, etc.)

“The kinds of projects that once delivered “IT solutions” are now expected to deliver full “business solutions” – and rightfully so.”

– Steve Farrell DAMA 2005
Business Driven Projects

• The kind of business requirements we need (and the kind of models we produce) is determined by what is driving the project – and each project is unique.

• The project may be a:
  – “Data warehouse project”
  – “Process improvement project”
  – “Technology update project”
  – “ERP project”
  – “Org redesign project”
  – Etc.
Business Driven Projects

In the past

• Projects addressed one area and didn’t impact the others too much
  – Develop a new application (process & some data)
  – Build a new database (data)
  – Shuffle around the employees in a reorg (organization)

Today

• Everything in business is so interrelated, most projects will impact all aspects of the business
• We need to be able to handle it
# Basic Development Framework

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| **PROJECT DEFINITION** | • **Intentions**: The purposes or reasons that the effort is undertaken; the results that are expected from the effort  
• **Values**: The set of beliefs, trade-offs, and judgment-guidelines that govern the results and their obtainment.  
• **Focus**: A Statement of the domain of the solution; what portion of the world (e.g. business) can be examined and potentially included in the development of the solution.  
• **Context**: Other parameters that should be commonly established, considered, and monitored in the conduct of the effort and the development of its deliverables. | **EFFORT REQUIREMENTS**  
(WHAT the system “is” and “must do” independent of technology) |
| **Business Model** | **Architect’s Model** | **DESIGN OF THE EFFORT’S SOLUTION(S)**  
(How the system will be implemented using technology) |
| **Owner’s View** | **Designer’s View** | |  
**Technology Model** | **Builder’s View** | **REALIZATION OF THE EFFORT’S SOLUTION(S)**  
(the actual, technical implementation of the system) |
| **Functioning Organization and Systems** | | **EFFECTIVE BUSINESS** |
Intellectual Manageability

• Intellectual manageability is a principle that instructs us to never work on any thing that is too large to handle mentally. It is one of the most fundamental ways to manage complexity.

• Some applications of this principle are:
  – Only attempt to work on one thing at a time.
  – If a single task is too large, decompose it into sub-tasks.
  – Draw a picture. It is worth a thousand words.
  – Work on a fragment of the problem at a time. When the fragment is completed, integrate the result into the whole. This is especially useful when modeling
5 Aspects of Business

- Process
- Event
- Objects/Data
- Location
- Socio-Political
5 Kinds of Business Requirements

- Business Process Requirements
- Business Event Requirements
- Business Object/Data Requirements
- Business Location Requirements
- Business Socio-Political Requirements
# Basic Development Framework

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Robust Set of Techniques

• What do we mean by robust set?
  – The Techniques cover all aspects of the business
  – Transformation of work products. All work from a previous step is incorporated into the next step. Nothing is overlooked and nothing is done twice.
  – Reduction of Ambiguity. Requirement have only a single interpretation, are easy to read and do not conflict with each other

• Business Modeling fits this description
Models

What is a Model?

• "A small object, that represents another, often larger object"
  *American Heritage Dictionary*

• “A tentative description of something accounting for certain kinds of properties from a given focus.”
  – Examples:
    • Road map of the U.S.
    • Company's Organization Chart
    • Data flow diagram of processing payroll
    • Entity Relationship diagram of materials stored in warehouse

• Model := Diagram + Text
Models
Purpose

• To clearly document facts
• To facilitate better communication
  – Audience? … they speak to intended group(s)
• To lead to a later actualization of a solution
  – As a specification of what is needed
  – As a vehicle to test what was delivered
Models

Model structure

• **We will focus on those:**
  – Consisting of nodes and links
  – Documented in diagrams & text

• **Other kinds include:**
  – Matrices and other instruments
  – Illustrations
  – 3-D depictions
  – Prototypes
  – Narrative
  – Etc.
Models
Nodes & Links

• Nodes
  – Represent the key elements of the perspective, E.g. entities, activities, states, locations, parties …
  – Are the basic building block of the model

PERSON

CAR
Models
Nodes & Links

• Links
  – Links represent a meaningful association between nodes
  – In most type of diagrams, the nodes are easier to discover and articulate than the links.
Models
Nodes & Links

• Links
  – There can be different types of associations between the same set of nodes

Diagram:
- Warehouse
- Retail Outlet
- Phone
- Road
- Schedule Hearing
- Notify Participants of Hearing
- Hearing date
Models

Types of Models
- By stage
  - Current state: “as is”, “as built”, “old”, …
  - Future state: “to be”, “proposed”, “new”, …
- By level of detail
  - Framing models
  - Detailed models
Business Models

Purpose

- To understand & document business facts
- To facilitate better business communication
  - Audience: Business people
  - Audience: Technical people
- To lead to a later actualization of a business solution
  - As a specification for an improved business
  - As a vehicle to test the business quality of what resulted.
5 Kinds of Business Models

- Business Process Model
- Business Event Model
- Business Object/Data Model
- Business Location Model
- Business Socio-Political Model
5 Kinds of Business Models

Key concepts:

• They are all interrelated!
  – It is just one thing, seen from different angles
  – (Why we prefer a circle to a row)
  – This will be key in determining what to represent in what kind of model

• There is WAY too much information to be able to model in any normal project. You must decide in each project what to analyze and what to allow to work out on its own.
5 Kinds of Business Models

Key concepts – each kind has:

• A different purpose
• Strengths
• Weaknesses – things it is not intended to do
• A variety of approach possibilities
5+ Diagram Types

- Activity Flow Diagram
- State Transition Diagram
- Entity-Relationship Diagram
- Location Channel Diagram
- Party Affiliation Diagram
2 Other Key “Threads”
(That we will not emphasize in this workshop)

Enabling Media

- “Technology”, in the broadest sense
- Business analysis should include: enabling media discovery, assessment, and specification of direction.
- System design should include full enabling media specification for business requirements in all threads

Motivation

- The “Why” part of the equation
- The basic motivation chain:
  - Business intentions are stated in plans (strategic, operational, tactical)
  - Projects are initiated to meet business intentions
  - Business models support project intentions
Implementation Independent

- The Requirements Documents should represent a “mechanization free” model of the proposed system. It does however reflect some of the “mandated” and/or “generally accepted business policies and practices” required to have a complete functional specification.

- Delaying implementation decisions allow for the best selection of the most recent technology.

\[ NT + OP = EOP! \]  
(New Technology plus Old Processes equals Expensive Old Processes!)

– Ruth Walters of the Walters Group (formerly Assistant Deputy Comptroller – NYS OSC)
Types of Business Requirements & Models

We will discuss:

- Business Object (Data) Requirements & Models
- A Quick Demo
- Business Process Requirements & Models
- Business Event Requirements & Models
- Business Location Requirements & Models
- Business Socio-Political (Organization) Requirements & Models

And:

- Some cross-model considerations
Types of Business Models

For each type:

- Purpose
- Sample diagram
- Nodes & links
- Typical kinds of nodes/links
- Other considerations
- Cross-reference to other models
- Exercise
- Business improvement opportunities
Business Object (Data) Model

Purpose

• To represent:
  – Business object concepts and terminology
    E.g. What is a “product”?  
    E.g. What is an “order”? 
    E.g. What is a “Budget Cert”? 
  – Business information requirements
    E.g. What do we need to know about products?  
    E.g. What do we need to know about orders?  
    E.g. What do we need to know about Budget Certs? 

• Typically, to provide the foundation for:
  – Data store designs … data stores
Business Object (Data) Model
Sample Diagram – Entity Relationship Diagram

- Entities:
  - Rectangle with the name of the entity in the center. The name is typically a noun or noun phrase.

- Relationships:
  - Diamonds with lines connecting the entities that are involved. A star indicates anchor entity. The name is typically a verb or verb phrase.
Business Object (Data) Model

Nodes & Links

• Nodes: Entities
• Links: Relationships
• Also: Attributes
Business Object (Data) Model

Typical Kinds of Entities

• All sorts of “things”
  – Products, vehicles, documents, blood samples, monkeys, diseases, furniture items, etc, etc.

• As well as these sorts of “things”
  – Processes/activities/procedures
  – Locations/sites
  – Parties/organizations/people
  – Events/occurrences
Business Object (Data) Model
Typical Kinds of Entities

• All sorts of “things” *(What)*
  – Products, vehicles, documents, blood samples, monkeys, diseases, furniture items, etc, etc.

• As well as these sorts of “things” *(What)*
  – Processes/activities/procedures *(How)*
  – Locations/sites *(Where)*
  – Partiesorganizations/people *(Who)*
  – Events/occurrences *(When)*
Business Object (Data) Model
Considerations

• For these kind of things:
  – Processes/activities/procedures
  – Locations/sites
  – Parties/organizations/people
  – Events/occurrences

• When do you include these in your object/data model?
• When do you care about them, but do not include them in your object/data model?
Business Object (Data) Model
Considerations

- **When do you include** these in your object/data model?
  - When concepts/terms need to be clarified
    - What is a “field office”?
    - What is an “applicant”?
    - What is a “cancellation”?
    - What is a “project Activity”?
  - When information requirements exist
    - For each field office: What is the address? When was it established? What inventory items are stored there? Etc.
    - For each project Activity: What steps are included? What is the expected duration? Who has been assigned to do the Activity? Etc.
Business Object (Data) Model
Considerations

• When do you care about them, but do not include them in your object/data model?

  – When we don’t need to “track” them, but:
    – We need to “do” them (Activities)
    – We need to “be there” (Locations)
    – We need to “serve” them (Parties)
    – We need to “respond” to them (Events)

• Then, they are described only on the other models
• (Of course, they can be in both)
Business Object (Data) Model

Typical Kinds of Relationships

• contains/consists of/includes/ …
• classifies/categorizes
• is assigned to
• Is affiliated with (is married to/is member of/ …)
• employs
• purchases
• is prerequisite for
• steals from
• (and a million more)
Later, we will discuss specific cross-reference documents (e.g. data to process)
Business Object (Data) Model

Exercise

- **Scope**: This Symposium/Conference

- **Part 1**: List 3-5 key ‘things’

- **Part 2**: Sketch an ERD
  - Add a few relationships
  - Add a few attributes

*Option: Pick a simple scope from your organization or area of interest (however we will discuss the exercise above)*
A Quick Demo

We will discuss:

– How to Get Started
– Working with Groups
– Focus Statements
– What a modeling session looks like
Business Process Model

Purpose

• To represent:
  – Business work requirements
    E.g. How do we fill an order?
    E.g. How do we hire a new employee?

• Typically, to provide the foundation for:
  – Application procedural designs … code
  – Manual procedure designs … procedure guides
Business Process Model

Sample diagrams

Process Map - with swimlanes

Data Flow Diagram

Activity Diagram

Functional Decomposition Diagram

Use Case Diagram
Business Process Model
Nodes & Links

*Depend on the emphasized view*

Nodes: Activities

Links:
• Depend on the diagram type
• Options include:
  – Control – what is the order of the activities?
  – Data/material dependencies – what is the activity input/output?
  – Performer – who does the activity?
  – Interface – who/what provides input/output?
  – Hierarchy – how do activities roll-up & break-down?
Business Process Model

Nodes & Links

“Process Map”

Nodes: Activities
Links: Control

Also:
– Performer (often in swim lanes)
– Location (sometimes in swim lanes)
Business Process Model

Nodes & Links

“Data Flow Diagram”

Nodes: Activities
Links: Data and material dependencies

Also:
– Interfaces
– Control (usually limited to triggers and other non-data/material dependencies)
– Performer (often annotated)
– Location (sometimes annotated)
Business Process Model

Typical Kinds of Processes

• Develop a plan
• Develop a budget
• Hire an employee
• Manufacture a product
• Receive a payment
• Repair a vehicle
• Fulfill an order
• Provide a service
• Respond to an inquiry
• Etc. Etc.
Business Process Model

Typical Kinds of Activities

• Receive/Get/Obtain …
• Review/Evaluate/Verify …
• Determine/Calculate …
• Produce/Develop/Create/Draft/Prepare/Establish …
• Conduct/Monitor/Assess/Specify/Design …
• Assign/Allocate/Appoint …
• Prioritize/Rank …
• Deliver/Issue/Return/Send…
• Etc, Etc.
Business Process Model
Direct Cross-reference to Other Models

As we have seen, this is very common

• Objects/data (What)
  – What data is required to do the work?
  – What data is produced by the work?

• Locations/sites (Where)
  – Where is the work done?

• Parties/organizations/people (Who)
  – Who does the work?
  – Who is the recipient of the work?

• Events/occurrences (When)
  – When is the work done? (triggers)
Business Process Model

Exercise

• **Scope**: This Symposium/Conference

• **Part 1**: List 2-3 key processes

• **Part 2**: Pick one, and sketch a DFD or Logic Flow Diagram
Business Event Model

Purpose

• To represent: Business timing requirements
  E.g. What external events does the business need to respond to?
  E.g. For each event, how will the business respond?
  E.g. Does an event change the state (status) of anything?

• Typically, to provide the foundation for:
  – Application trigger designs … menus, icons, auto-execute, etc.
  – Manual procedure trigger designs … operating procedures
  – Status tracking and reporting
Business Event Model
Sample Diagram – State Transition Diagram

Application is received

INITIALLY SUBMITTED TO I&P DEV APPL
- Review for completeness
- Forward package to P&Z

Application transferred to P&Z

SUBMITTED TO P&Z DEV APPL
- Review for Zoning Compliance
Business Event Model
Sample Diagram – State Transition Diagram

Real Estate Listing
State Transition Diagram
March 1, 2003
EN/0022 vsd

Listing signed
- Obtain Information about Property

ACTIVE LISTING
- Advertise Property
- Conduct Open House

Contract signed
- Collect Deposit Fee
  Listing expiration date arrives

UNDER CONTRACT LISTING
- Schedule Building Inspection

Contract voided
- Determine Refund Amount
  - Return Refundable Fees

Contract closed
- Collect Commission

SOLD LISTING
- Return Keys
  - Throw Party

EXPIRED LISTING
- Return Keys
  - Try to Get New Listing
Business Event Model

Nodes & Links

- **Nodes: States** (of an entity, relationship, or aggregate)
- **Links: Events**

- **Also:**
  - Activities
  - State transitions
Business Event Model

Typical Kinds of States

- **Early in the life cycle**
  - Potential
  - Candidate
  - Pending
  - Received
  - Assigned

- **Midstream**
  - Active (often a super state) vs. Inactive
  - Approved, Authorized, Eligible,
  - (Many kinds here)

- **End of the life cycle**
  - Closed
  - Resolved, Completed, Terminated,
  - Expired, Denied, Withdrawn
  - Appealed
Business Event Model

Typical Kinds of Events

• Time Events
  – Point in time reached (Dec 31, Apr 15, 5:00 PM, etc.)
  – Time period reached (10 days passed, etc.)

• Business Events
  – Order received
  – Customer complains
  – Petition filed
  – Etc. (*a million of these*)

• Natural Events
  – Hurricane hits
Business Event Model
Direct Cross-reference to Other Models

• Objects/data *(What)*
  – Which entities, relationships, or aggregates have a life-cycle worth examining?

• Processes/activities *(How)*
  – What activities/processed are triggered?

• Locations/sites *(Where)*
  – *(typically not in this model)*

• Parties/organizations/people *(Who)*
  – *(typically not in this model)*
Business Event Model

Exercise

• Scope: This Symposium/Conference

• Part 1:
  – List 3-5 key related events, or
  – Identify an entity that has an interesting life-cycle

• Part 2: Sketch a STD
Business Location Model

Purpose

• To represent:
  – Business location requirements
    E.g. Where do we need to conduct business?
    E.g. What support is needed in those places?
    E.g. What needs to get from place to place?

• Typically, to provide the foundation for:
  – Facility designs … facilities
  – Network designs … communication networks & transportation networks
Business Location Model
Sample Diagram – Site Channel Diagram

- Sites/Locations:
  - Triangle with the name of the location in the center. The name is typically a noun or noun phrase

- Channels:
  - Arrows connecting the locations together. The arrow head indicates direction.
Business Location Model

Nodes & Links

- Nodes: Locations (Sites)
- Links: Channels
- Also: Cargo (may be data, people, other)
Business Location Model

Typical Kinds of Locations

• Whose location?
  – Internal - controlled by you
  – External - customer, vendor, partner, public…

• Nature of the location?
  – Geographic areas - boundary-oriented
    • State, territory, neighborhood, campus, …
  – Sites - point-oriented
    • Typically “addressable”
    • (see next page)
Business Location Model

Typical Kinds of Sites

• Facility (place with a purpose)
  – Office (corporate, regional, local), Store, Plant, Warehouse, Lab, School, Courthouse, Server room, Kitchen, etc.

• Building

• Land spot (construction site, test site, etc.)

• Mobile site
  – Vehicle
  – Participant

• “Any connected site”

• “Any site” (connected or not)
Business Location Model

Typical Kinds of Channels

- **Data**
  - Data “from” one location “to” another location
  - (Note: this is less relevant when there is a web assumption)

- **Control**
  - Triggers: OK to begin an activity

- **Material**
  - Signed or original documents
  - Equipment and supplies

- **Participants**
  - Staff movement
  - Customer movement
  - Etc.
Business Location Model

Direct Cross-reference to Other Models

• **Objects/data** (*What*)
  – Where does data/material need to move between locations?

• **Processes/activities** (*How*)
  – *(typically not in this model)*

• **Parties/organizations/people** (*Who*)
  – Where do parties move between locations?

• **Events/occurrences** (*When*)
  – Where do triggers need to be communicated across locations?
Business Location Model

Exercise

• **Scope**: This Symposium/Conference

• **Part 1**: List 3-5 key locations (sites)

• **Part 2**: Sketch a LCD
  – Add a few channels
Business Socio-Political Model

Purpose

• To represent: Business “organizational” requirements
  E.g. What external organizations, social/political groups need to be accommodated?
  E.g. What organization structure will best support our goals?
  E.g. What roles are needed to conduct the business?

• Typically, to provide the foundation for:
  – Organization designs … organization structure & job positions
  – External interface requirements (in part)
Business Socio-Political Model
Sample Diagram – Party Affiliation Diagram

Calvert County Government

Department of Public Works (DPW)

Inspections & Permits (I&P)
  - Supervisor
  - Administrators

Planning & Zoning (P&Z)
  - Reviewers
  - House Nbrs

APPLICANT
Business Socio-Political Model
Sample Diagram – Party Affiliation Diagram

“Police Agencies”
- Maryland State Police (MSP)
- Calvert County Sheriff’s Office (CCSO)
- Calvert County Detention Center (CCDC)
  - DC Administrator
  - Supervisor
  - Correctional Officer (CC)

“Courts”
- District Court of Maryland
- Circuit Court of Calvert County

“Control Center (911)”
- Division Chief
- Communications Supervisor
- Dispatch Supervisors (4)
- Call Takers
- Dispatchers

“Public Defenders Office”
- State’s Attorney’s Office (SOA)
  - State’s Attorney (elected)
  - Deputy State’s Attorney

Citizen
(Caller, Victim, Witness, Suspect, Prisoner, Inmate, Defendant)
Business Socio-Political Model

Sample Diagram – Org Chart

Admin Support Assistant

Customer Services Chief

Customer Services Senior IT Project Manager

Meeting Management Technology Team Lead

CSCs Team Lead

Technical Writer (for Customer Services)

Remote/Field Staff Support (Dom. & Intl.) Team Lead

Media Engineer

Video-Conferencing Lead

Application Administrator

Service Desk Lead

CSC Lead

Hardware Pool Lead Technician

CSC HW/SW Technician

CSC HW/SW Engineer

CSC SW Engineer – Special Applications

Hardware Pool Technician
Business Socio-Political Model

Nodes & Links

“Party-Affiliation Diagram”

- Nodes: Parties
- Links: Affiliations
  - Provider – End Customer
  - Provider – Other Customer
  - Org Parent – Org Child
  - Collaboration
  - Other

- Also: Roles – *normal or customary activities expected to be performed by someone.*
Business Socio-Political Model
Nodes & Links

“Org Chart”
• Nodes: Org Units
• Links: Affiliations
  – Org Parent – Org Child
  – Provider – Internal Customer (maybe)
  – Collaboration (maybe)

• Also: Positions – "designed" roles, usually with accountabilities, pay grades, etc.
Business Socio-Political Model

Typical Kinds of Parties

• Your organization
  – Multiple “legal entities”?
  – Org units
  – Roles, positions, and perhaps specific individuals

• Some others are very clear
  – Corporations
  – Governmental agencies
  – Non-profit organizations

• Some are less clear
  – Neighborhoods
  – Populations
    • Potential electric car drivers
    • Hemorrhoid sufferers
    • Etc.
Business Socio-Political Model
Typical Kinds of Roles

• Performing
  – Coordinator, Facilitator
  – Architect, Engineer, Technician
  – Specialist, Analyst
  – Administrator, Clerk, Support
  – Technical writer
  – Etc.

• Leadership
  – Team lead
  – Project manager
  – Etc.

• Management
  – Executive
  – Manager
  – Etc.
Business Socio-Political Model

Typical Kinds of Affiliations

• **Customer** (Provider – End Customer)
  – Current customer, potential customer, etc.
• **Vendor** (Provider – End Customer)
  – Current vendor, preferred vendor, potential vendor, etc.
• **Provider – Other Customer**
  – Internal vendor or customer
  – Intermediate vendor or customer
• **Org Parent – Org Child**
  – Parent company & subsidiary
  – Org units
    • Direct (work & admin, accountability)
    • Indirect (functional accountability) – “dotted line”
• **Partner** (Collaboration)
  – Legal partnerships
  – Working relationships (formal or informal)
• **Competitor**
• **Substitution**
Business Socio-Political Model

Direct Cross-reference to Other Models

- **Objects/data** *(What)*
  - *(typically not in this model)*

- **Processes/activities** *(How)*
  - *(typically not in this model)*

- **Locations/sites** *(Where)*
  - *(typically not in this model)*

- **Events/occurrences** *(When)*
  - *(typically not in this model)*
Business Socio-Political Model

Exercise

• **Scope:** This Symposium/Conference

• **Part 1:** List 3-5 key parties

• **Part 2:** Sketch a PAD
  – Add a few affiliations
## Business Socio-Political Model

### Role Profile Matrix

<table>
<thead>
<tr>
<th>Role Description</th>
<th>Permit Administrator</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Description</td>
<td>Clerical staff who administer the permitting records</td>
<td>Technically skilled in areas of review, including environmental impact and zoning regulations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
</tr>
<tr>
<td>Literacy - Subject Area</td>
</tr>
<tr>
<td>Literacy - Technical</td>
</tr>
<tr>
<td>Cultural Considerations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand to Gain</td>
</tr>
<tr>
<td>Stand to Lose</td>
</tr>
</tbody>
</table>
Cross-model Considerations

• Each model focuses on one aspect of the same thing (the business)

• To be “complete” each model would need to be fully cross referenced to each of the other aspects. In most projects, this is not practical.
Cross-model Considerations

• Options:
  – Do cross-referencing in the base models
    • In some cases, it is an integral part of the base model
    • In some cases, it can be diagram annotation or text information
  – Create cross-reference matrices (see next page)
    • Can be formal and complete, i.e. a specification
    • Can be a sketch, i.e. a rough overview

• Do whatever your needs dictate and your time allows
Cross-reference Matrices

All combinations are sometimes needed. Here are some of the most useful:

- **Object/Data**
  - Data-activity (CRUD)
  - Data-role (CRUD)
  - Data-location

- **Process (or Activity)**
  - Activity-data
  - Activity-location
  - Activity-role
  - Activity-event (trigger)

- **Location**
  - Location-activity
  - Location-party
  - Location-role

- **Organization**
  - Role-activity
  - Role-location

- **Event**
  - Event-activity
  - Event-location
  - Event-role

This is where a good tool is very handy!
## Cross-reference Matrices
### Sample Data-Activity (CRUD) Matrix

<table>
<thead>
<tr>
<th>Activity</th>
<th>Customer Name</th>
<th>Delivery Address</th>
<th>Item Price</th>
<th>Telephone</th>
<th>Order Item</th>
<th>Order Quantity</th>
<th>Order Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive Order</td>
<td>CRU</td>
<td>CRU</td>
<td>R</td>
<td>CRU</td>
<td>C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Determine Order Price</td>
<td></td>
<td></td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>....</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Cross-reference Matrices

## Sample Role-Process Matrix

<table>
<thead>
<tr>
<th>Role</th>
<th>Management Processes</th>
<th>Financial Mgt Processes</th>
<th>Admin Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Manage Franchisor Relations</td>
<td>Manage AP</td>
<td></td>
</tr>
<tr>
<td>Director</td>
<td>Manage the Franchise Activities</td>
<td>Process Payroll</td>
<td></td>
</tr>
<tr>
<td>Bookkeeper</td>
<td></td>
<td>Process Payment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process Cancellation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manage AP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make Bank Deposit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Day-end Financials</td>
<td></td>
</tr>
<tr>
<td>Sales Rep</td>
<td>Sell Memberships</td>
<td>Process Cancellation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process Payroll</td>
<td></td>
</tr>
<tr>
<td>Office Manager</td>
<td>Manage the Facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reception</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Answer Phones</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pay Rent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchase Supplies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Send and Receive Shipments</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coordinate Centre Cleaning</td>
<td></td>
</tr>
</tbody>
</table>
An All-Model Exercise
Object (Data), Process, Event, Location, Socio-Political

Which model(s) should describe each of these facts:
1. We need to know which people completed which activities
2. We get an order, check inventory, pack it and ship it.
3. All customer inquiries are handled by a customer relationship representative
4. The sales department has three divisions
5. The sales center has four sales rooms
6. When prosecution drops a case, we consider it “closed”
7. When the prosecution drops a case, we need to notify all the parties and cancel any scheduled hearings
8. Each car has a make, model, and vehicle identification number
Packaging Requirements for Phase Next

We will discuss:

– What is the Next Phase
– A common Scenario
– Requirements Template
– What if the Scenario changes?
# What is the Next Phase?

**Design, of course!!** Just put the requirements in a box and throw them over the wall to the designer! Done!!

<table>
<thead>
<tr>
<th></th>
<th>Object/Data</th>
<th>Process</th>
<th>Event</th>
<th>Location</th>
<th>Socio-Political</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy Model (Scope)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planner's View</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business Model</strong></td>
<td>Object/Data</td>
<td>Process</td>
<td>Event</td>
<td>Location</td>
<td>Socio-Political</td>
</tr>
<tr>
<td>Owner's View</td>
<td>Requirements</td>
<td>Requirements</td>
<td>Requirements</td>
<td>Requirements</td>
<td>Requirements</td>
</tr>
<tr>
<td><strong>Architect's Model</strong></td>
<td>Object/Data</td>
<td>Process</td>
<td>Event</td>
<td>Location</td>
<td>Socio-Political</td>
</tr>
<tr>
<td>Designer's View</td>
<td>Design</td>
<td>Design</td>
<td>Design</td>
<td>Design</td>
<td></td>
</tr>
<tr>
<td><strong>Technology Model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Builder's View</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Functioning, Organization and Systems</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROJECT DEFINITION**
Intentions, Values, Focus, Context
What is the Next Phase?

• Actually the answer depends on:
  – The type of project (e.g. IT, reorganization, process improvement, etc.)
  – Who will be doing the design and realization of the project
  – The relationship you wish to have with those who are doing the design and realization of the project
  – Your methodology – For our discussion we will assume the standard waterfall (or some cool proprietary methodology that is a lot like it)
Design Premises for Scenario A

• Lets assume a common scenario:
  – The type of project – IT (product doesn’t exist already)
  – Who will be doing the design and realization of the project – In-house Development
  – The relationship you wish to have with those who are doing the design and realization of the project
    – We trust them to come up with the best design to meet the business requirements with little technical input
Requirements Documents

• Normally a requirements specification is considered to be complete.

• This means that it contains all of the things that are necessary and none that are not.

• However, in reality, it may contain just enough of the requirements for the effort to move along, with the remaining unspecified requirements (usually technical requirements) to be added later.

Note: Whichever the case, it should be stated.
Requirements Template

• Before we introduce a Template for Requirements, 2 Premises to consider:

  – **Important Premise 1**: Templates should be used to guide your thinking, not replace it!!!

  – **Important Premise 2**: Every situation is unique.

• Should two Requirements Documents ever follow the exact same Template?
Requirements Template

- **Requirement Documents typically contain the following sections:**
  - **Introduction** – The Introduction includes the purpose of the requirements, the status and completeness of the document, an overview of the effort and high level descriptions of what is included in the document. Document control information is also often included.
  - **Project Vision** - This is an overview of the project definition.
  - **Business Requirements** (Functional Requirements) – A business requirement is something that is necessary for the conduct of business. It is independent of the way in which it will be enabled, or the “solution”. We are assuming that for almost any business requirement, there is more than one way it can be designed and implemented (enabled or solution).
  - **Solution (Technology) Directions/Requirements** (Non Functional Requirements) - A solution requirement is something that is necessary to enable the business requirements. It is a requirement for the product that will be delivered. A combination of business requirements wrapped in some technology (enabling media). A solution requirement might involve automation or it might require something from a manual system.
Requirements Template

Introduction

• **Purpose of this Document** - The basic purpose of the document (e.g. Initiate the Design Phase, Select a Software Package, Complete the Design. Could also include any unique purpose for this specific document.

• **Completeness of this Document** – A statement describing the status and completeness of the document:
  - Example 1 – This specification is complete. Each stated requirement must be achieved and no other requirements are desired.
  - Example 2 – This specification is accurate, but not complete. Each stated requirement must be achieved, and we expect other requirements to be discovered as the effort continues. We feel that the specification is complete enough to meet the purpose stated above.

• **Overview of This Document** – An executive summary of the information contained in the requirements document. A high level description of the need.

• **Sections of the Document** - Descriptions intended to act a both a high level table of contents as well as an extended Executive Summary

• **Other Related Documents** – Either referenced or included. Documents might include:
  - Enterprise Strategic Plan
  - Project Definition
  - …

• **Document Control** – Any document controls included. These are optional and are based on the organizations document and change control procedures. Information might include: Author(s), Affiliation of Author(s), Date Created, Date Last Updated, Version Number, etc.
Requirements Template

Project Vision

Project Vision includes:

- An overview of the project definition, including stakeholders, business intentions, values, focus (scope, perspectives, etc.), and context (constraints, risks, etc.).
- In some cases, it might make sense to include the entire project definition.

Note: although this is technically not requirements, it does give the background for the motivations that the requirements are based on.
Requirements Template
Business (Functional) Requirements

Business Requirements – The models and text describing the requirements of the business

- Business Object/Data Requirements
  - Business Object/Data Model
    - Object Model Diagram -
    - Object Model Text
      - Entities
        » Name: - The name of the entity (in upper case).
        » Definition/ Description: - A statement that clearly describes the entity.
        » Examples: - Optionally, examples may be used to clarify the definition above.
        » Policies/Business Rules: - Any business policies or rules that define, constrain, or have any bearing on the entity.
        » Sensitivity: - Any considerations at the entity level.
        » Attributes: - A unique property of the entity.
        » Component Type: - Describes the sub class of the entity. Types include: entity, super-type, subtype and associative.
        » Metrics/Volume: - For any measurements related to the entity. Volume refers to the estimated number of occurrences of interest over a given period of time.
Requirements Template
Business (Functional) Requirements (Continued)

Business Requirements (Continued)

• Object Model Text (continued)
  – Relationships
    » Name: - The name of the relationship.
    » Definition/ Description: - A statement that clearly describes the relationship.
    » Examples: - Optionally, examples may be used to clarify the definition above.
    » Policies/Business Rules: - Any business policies or rules that define, constrain, or have any bearing on the relationship.
    » Sensitivity: - Any considerations at the relationship level.
    » Attributes: - A unique property of the relationship.
    » Metrics/Volume: - For any measurements related to the relationship. Volume refers to the estimated number of occurrences of interest over a given period of time.
Requirements Template
Business (Functional) Requirements (Continued)

Business Requirements (Continued)
  • Object Model Text (continued)
    – Attributes
      » Name: - The name of the attribute in title case.
      » Definition/ Description: - A statement that clearly describes the attribute.
      » Examples: - Optionally, examples may be used to clarify the definition above.
      » Policies/Business Rules: - Any business policies or rules that define, constrain, or have any bearing on the attribute.
      » Sensitivity: - Any considerations for the attribute.
      » Component Types: - Describes the sub class of the attribute. Types include: attribute, unique identifier, repeating, derived.
      » Edit Criteria: - The domain and valid values of an attribute.
      » Name of Entity or Relationship: - This is the entity or relationship that this attribute belongs to.
# Requirements Template

## Business (Functional) Requirements (Continued)

### Business Requirements (Continued)

- **Business Process Requirements**
  - **Business Process Model**
    - **Process Model Diagram(s)**
    - **Process Model Text**
      - **Processes**
        - **ID:** A numeric identifier used as a reference between the diagram and the text.
        - **Name:** The name of the process (in mixed case).
        - **Definition:** A statement that clearly describes the process.
        - **Examples:** Optionally, examples may be used to clarify the definition above.
        - **Exception:** Any exception to the process. When will this process not be followed?
        - **Processor:** The person or thing which does the process.
        - **Trigger:** The event or occurrence which initiates the process.
        - **Policies/Business Rules:** Any business policies or rules that define, constrain, or have any bearing on the process.
        - **Sensitivity:** Any considerations at the process level.
        - **Metrics:** Volumes: Estimate of the number of occurrences of interest over a given time period. Frequencies: Estimate of the number of times the process repeats over a given time period. Durations: Estimate of the length of time the process lasts/continues. Error Rates: The rate of error in executing the process due to mistakes or uncontrollable factors.
Data Flows

- **Name:** - The name of the data flow
- **Description:** - A Statement that clearly defines the data flow
- **Definition:** - A description of the data that is being moved/flowed, including the data elements if known
- **Examples:** - Optionally, several examples may be used to clarify the definition above.
- **Exception:** - Any exception to the data flow. When will this data not be moved/flowed? When is a diversion allowed or called for?
- **Policies/Business Rules:** - Any business policies or rules that define, constrain, or have any bearing on the data flow.
- **Sensitivity:** - Any considerations at the data flow level.
- **Metrics:** - Volume: Estimate of the number of occurrences of interest over a given time period. Frequency: Estimate of the number of times the data flow repeats over a given time period. Error Rate: - Estimate of the rate of error in the data flow due to mistakes or uncontrollable factors
Requirements Template
Business (Functional) Requirements (Continued)

Business Requirements (Continued)

– Data Stores
   » **ID:** - A numeric identifier used as a reference between the diagram and the text.
   » **Name:** - The name of the data store.
   » **Description:** - A description of the data being stored
   » **Definition:** - A statement that clearly defines the data store, including the data elements if known.
   » **Examples:** - Optionally, several examples may be used to clarify the definition above.
   » **Policies/Business Rules:** - Includes the role, purpose or function of the data store
   » **Sensitivity:** - Any considerations at the data store level.
   » **Metrics:** - **Volume:** Estimate of the number of occurrences of interest over a given time period.

– External Entities
   » These are organizations and people with which the solution interacts. This interaction may be face-to-face, through the mail, through email, via fax, through a web application, etc.
   » Interactions can include the exchange of data, money, or materials (contracts, parcels, ad material, etc.)
Business Requirements (Continued)

- Business Event Requirements
  - Business Event Model
    - Event Model Diagram(s)
    - Event Model Text
      - Events
        » **Name:** - The name of the state (in all capital letters)
        » **Definition:** - A statement that clearly describes the state. This will typically be a general description but may include attribute values and/or relationship participation as part of the definition.
        » **Examples:** - Several examples are required to clarify the definition above.
        » **Policies/Business Rules:** - Any business policies or rules that define, constrain, or have any bearing on the state.
        » **Sensitivity:** - Any considerations at the state level.
        » **Metrics:** - **Volume:** Estimate of the number of occurrences of interest over a given time period. **Duration:** Estimate of the length of time the state lasts/continues
Business Requirements (Continued)

- Business Event Requirements
  - Business Event Model
    - States
      - **Name:** - The name of the event (in mixed case)
      - **Definition:** - A statement that clearly describes the event.
      - **Initiation Point:** - Who, where, how – or whatever is relevant.
      - **Detection Point:** - Who, where, how – or whatever is relevant.
      - **Examples:** - Several examples are required to clarify the definition above.
      - **Policies/Business Rules:** - Any business policies or rules that define, constrain, or have any bearing on the event.
      - **Sensitivity:** - Any considerations at the event level.
      - **Metrics:** - Volume: Estimate of the number of occurrences of interest over a given time period.
Business Requirements (Continued)

• Business Event Requirements
  – Business Event Model
    – State Transition
      » Name: - The name of state prior to the transition
      » From State: - The name of state prior to the transition
      » To State: - The name of state after the transition
      » Event Triggers: - (May be more than one event that can cause transition)
      » Guards: - Description of guard(s), if any
      » Activities: - Activities triggered by the state transition
Business Requirements (Continued)

- Business Location Requirements
  - Business Location Model
    - Location Model Diagram(s)
    - Location Model Text
  - Sites
    » **Name:** - The name of the state (in all capital letters)
    » **Definition:** - A statement that clearly describes the location. This will typically be a general description.
    » **Examples:** - Several examples are required to clarify the definition above.
    » **Policies/Business Rules:** - Any business policies or rules that define, constrain, or have any bearing on the site.
    » **Time zone:** - Time Zone the Site is located in
    » **Geo-political considerations:** Local laws, Local culture (holidays, customs, etc.)
Business Requirements (Continued)

- Business Location Requirements
  - Channels
    » **Name:** - The name of the state (in all capital letters)
    » **Definition:** - A statement that clearly describes the location. This will typically be a general description.
    » **Examples:** - Several examples are required to clarify the definition above.
    » **Policies/Business Rules:** - Any business policies or rules that define, constrain, or have any bearing on the site.
    » **Distance**
    » **Other traffic**
    » **Quality requirements**
    » **Volume:** Transport volumes, Transport rates (Min,max.avg.), Error rates
Requirements Template
Business (Functional) Requirements (Continued)

Business Requirements (Continued)

- Business Socio-Political Requirements
  - Business Socio-Political Model
    - Party
      » **Name:** - The name of the Party
      » **Definition:** - A statement that clearly describes the party. This will typically be a general description.
      » **Examples:** - Several examples are required to clarify the definition above.
      » **Policies/Business Rules:** - Any business policies or rules that define, constrain, or have any bearing on the Party.
      » **Mission:** Mission statement if available
      » **Governance policy**
      » **Cultural considerations:** Reward systems, etc.
      » **Role Names/Responsibilities**
Business Requirements (Continued)

- Business Socio-Political Requirements
  - Business Socio-Political Model
    - Affiliation
      » Name: - The name of the Affiliation
      » Definition: - A statement that clearly describes the affiliation. This will typically be a general description.
      » Examples: - Several examples are required to clarify the definition above.
      » Policies/Business Rules: - Any business policies or rules that define, constrain, or have any bearing on the affiliation.
Requirements Template
Solution (Technology) Directions/Requirements (Non Functional Requirements)

Solution “Directions” are not absolute constraints. They must be met unless a different proposed solution can be justified. Solution “Requirements” are absolute constraints. They must be met.

• Architectural Design

This section shows the conceptual physical design of the system components and their interrelationships. This includes the databases, the processing subsystems, the servers, and the users.

– Conceptual Architecture: The conceptual architecture is developed as a shared image of what the resulting product might look like and what may be possible within the time and cost constraints of the project. It represents what may be included in the immediate solution, but also indicates directions and hopes for the more long term future
Business Requirements Example

**Business Requirements**
- Business Object/Data Requirements
  - Business Object/Data Model
  - Object Model Diagram
Business Requirements Example

Business Requirements – The models and text describing the requirements of the business

- Business Object/Data Requirements
  - Business Object/Data Model
    - Object Model Diagram -
    - Object Model Text
      - Entities
        » Name: PERSON
        » Definition/ Description: An individual of interest.
        » Examples: John Smith, Mary Doe
        » Policies/Business Rules: We only collect information about adult PERSONs (18 or older).
        » Sensitivity: Anyone can view a PERSON’s name.
        » Attributes: First Name, Late Name and Date of Birth
        » Component Type: Subtype Entity
        » Metrics/Volume: 300/month
Business Requirements Example

Business Requirements (Continued)

- Object Model Text (continued)
  - Relationships
    » **Name:** PARTY desires to change PROPERTY
    » **Definition/ Description:** The application for the modification of a property by an applicant.
    » **Examples:** ABC Construction Firm applies for new construction, Joe Smith desires to add an addition to his home.
    » **Policies/Business Rules:** Application can be made by more than one PARTY (e.g. by a consortium)
    » **Sensitivity:** Only share the application information with the parties involved or with individuals within the department
    » **Attributes:** Date of Application, Type of Change
    » **Metrics/Volume:** 100/month
Business Requirements (Continued)

- Object Model Text (continued)
  - Attributes
    - **Name:** Type of Change
    - **Definition/ Description:** Indicates the type of change to the property desired by the applicant.
    - **Examples:** New Construction
    - **Policies/Business Rules:** There can be only one type of change per application.
    - **Sensitivity:** Any one in the department can see the type of change.
    - **Component Types:** Attribute
    - **Edit Criteria:** Valid Values are: New Construction, Additional Construction, Demolition
    - **Name of Entity or Relationship:** DEVELOPMENT APPLICATION
Another Design Scenario

• Lets assume a different scenario:
  – The type of project - IT
  – Who will be doing the design and realization of the project – Sending out an RFP (product doesn’t exist already)
  – The relationship you wish to have with those who are doing the design and realization of the project
    – We trust them to come up with the best design to meet the business requirements. Enough technical input to describe technical directions and constraints. (Partnership Driven contract)
How does this Scenario change things?

• Do models still work as Requirements if the work is being out-sourced?

• What if I have a technical vendor who doesn’t know how to read models?

• So then what is different?
Adding Context

• **Adding a “Story” to the Business Requirements**
  – For a vendor to really solve your problem they have to really understand the world you live in. You need to tell them your story.
  – Requirements are typically created within the context of the business. Sharing that context helps clarify the story. The most common techniques for sharing context are:
    • Stories and Scenarios
    • Business Use Cases (Please note the word *Business*)
• **Develop Grant Agreement**
  – The State program staff determines that it is time to start planning for the next Energy or Weatherization year and develops the criteria for the grant agreements. Weatherization budgets are determined and entered at the state and available for the local provider weatherization staff. Budgets for the Energy Assistance Program are not known at this time. The local provider takes information from the current plan and brings it forward to the new energy year and modifies the plan information. The plan is incomplete and will not be complete until the budgets are final. The state has the opportunity to review the plan and give feedback to the local provider...
## Business Use Case Example

### Review Insurance Agent License Application

<table>
<thead>
<tr>
<th>#</th>
<th>Main Scenario</th>
<th>Extensions</th>
</tr>
</thead>
</table>
| 1 | Verify that all attachments are present  
   + BCA Form  
   + Company appointment form  
   + If they are applying for Surplus Lines, they must show proof of a $10K bond.  
   + 30 Hours basic education certificate including exam test scores  
   + 15 Hour education specific to the line of authority they are applying for i.e. {P/C, LAH} including exam test scores  
   + Letter of certification from resident state. [Non-resident only]: | If not correct, record status as deficient and issue a deficiency letter. |
| 2 | Make sure all required information is on application: Full Legal Name, Resident address, Date of Birth, SS#, Appointing Company Name or NAIC#, Company Address, Lines of Authority being appointed, | If any required information is missing, record status as deficient and issue a deficiency letter. |
| 3 | Review questions for any “yes answers”: prior convictions, administrative actions, and delinquent taxes. | A. In some cases the staff member feels that it is not within their authority to clear the application and refers it to enforcement. The status is recorded as referred.  
B. In some cases the staff member feels more information is needed. The status is recorded as deficient and a deficiency letter is issued.  
C1. If answer is yes to delinquent taxes, contact revenue for tax clearance.  
C2a. If Revenue does not object, we record this information.  
C2b. If Revenue objects, we record this information and issue an ineligibility letter |
| 4 | Make sure application is signed and dated. | If not correct, record status as deficient and issue a deficiency letter. |
| 5 | ... | |
Adding Context

• Adding more Technical Directions (Non Functional Requirements)
  – Vendors are likely also unfamiliar with:
    • Your current technical environment.
    • Your hopes and dreams for having are really great technical environment, some day.
Solution (Technology) Directions/Requirements (Continued)

- Hardware/Software Directions/Requirements
  - Technology to utilize – Technologies that we want the solution to be based on. Requirements must be met while Directions are strong preferences that should be adhered to unless valid justification is made. Types of Directions and Requirements include:
    - Existing technical platforms.
    - Object inheritance and reusability.
    - Web services – publish our own and utilize third party web services
    - Other platforms to consider
    - Future compatibility with hardware and software vendors
    - Third Party Dues Processor. Franchises to be encouraged and preferred vendors.

- Current technology to avoid
  - Problem or incompatible technologies, vendors and services
Requirements Template
Solution (Technology) Directions/Requirements

Solution (Technology) Directions/Requirements (Continued)
• Hardware/Software Requirements
  – Supported Technologies
    • Browsers
    • Video Players
    • Etc.
  – Minimal/Recommended System Requirements
Another Design Scenario

• Let's assume a different scenario:
  – The type of project - IT
  – Who will be doing the design and realization of the project – Sending out an RFP (looking for an existing product)
  – The relationship you wish to have with those who are doing the design and realization of the project – We’re spending an awful lot of money here and we want to make sure we are able to get the most out of the existing product and not miss any hidden licensing costs (Contract Driven)
How does this Scenario change things?

- Do models still work as Requirements if the product already exists?

- Do stories, scenarios and use cases still work as Requirements if the product already exists?

- So then what is different?
Adding Subject Evaluation

• Up to this point the evaluation of the design’s compliance to the requirements will be mostly subjective. There is nothing wrong with that, but sometimes we want more objective methods of evaluation.

• One of the most common methods is turning models and stories into Checkbox Requirements

• If the goal is Checkbox Requirements, do we still need models?
Example – Checkbox Requirements

Examples from an RFP for a Financial System from a Southern State:

<table>
<thead>
<tr>
<th>ID</th>
<th>Requirement</th>
<th>Priority</th>
<th>Code</th>
<th>Cost of Modification</th>
<th>Comment</th>
</tr>
</thead>
</table>
| DGR-006 | Maintain the proposed data classification structure for the State as described below. Within each structure, the data classification elements are listed hierarchically from highest to lowest.  
  - Strategic Program;  
  - Activity;  
  - Organization (state, agency, division, section, unit);  
  - Fund;  
  - Appropriation;  
  - General Ledger Account;  
  - Object;  
  - Grant;                                                                                                                                   |          |      |                      |         |
| DGR-010 | Provide the appropriate accounting treatment automatically for each fund type in accordance with GAAP as promulgated by GASB. Both statewide and agency accounting requirements need to be accommodated.                                                                                   |          |      |                      |         |
| DOB-003 | Allow authorized users to correlate objects into appropriations.                                                                                                                                             |          |      |                      |         |
| FAR-001 | Provide a central file for storing all customer / non-vendor payee related information (e.g., address, name). This functionality is to track (e.g., identify, record, inquire, report) separate from the State procurement system, the counter-party for a non-vendor business event / document / transaction, such as, but not limited to revenue, employee reimbursement, claims or tax-refund expenditure. |          |      |                      |         |
Packaging Requirements

Summary

• **Start with Models**
  – You already have them from your analysis
  – They express requirements concisely and clearly without ambiguity

• **Add detail as necessary**
  – Stories/Scenarios/Use Cases
  – Technical Directions and Requirements
  – Objective evaluation techniques (Checkbox Requirements)
A Case Study

Calvert County, Maryland
Development Permit Project
1998

We will look at:
• Project background
• Each type of model – and key observations
• Some themes that emerged
Project Background

• Calvert County, Maryland
  – Small, historically rural county
  – Now being hit by sprawl from Washington, DC and experiencing fast growth

• The problem:
  – When a someone applies for building permit, it takes forever
  – Can be for a new house, a new shopping center, or adding a deck to an existing house
  – Applicants (citizens and developers) are complaining to the County Commissioners
Project Background

• The perceived solution:
  – Need a new computer system and better data.
    The current system is terrible.

• The project:
  – “Calvert County Development Permit Project”

• The sponsor:
  – The IT group (not much experience with projects)
Project Background

• Why look at this project?
  – It’s not too complex for a short presentation
  – A lot of “typical” things emerged
  – It touches most of the models
  – It is not confidential information

• Limitations:
  – Like most projects – there wasn’t time & resources to do everything perfect and complete
  – Some of the models have been simplified for this presentation - to make them easier to understand quickly
Project Background

• In initial conversations, these things emerged:
  – A long, Byzantine review pipeline exists
  – The current computer system does little other than log in applications at the beginning and print a permit at the end. Everything is paper documents passed along in a paper file folder
  – It is almost impossible to find out the status of a pending application (where in the pipeline?)
  – Applicants are told “Bring your checkbook and a comfortable pair of walking shoes”
  – Regular customers (developers) have learned how to work the system. They do all sorts of things to speed up the process (serve as courier between reviewers, know the reviewers, call every day, etc.)
  – Occasional customers don’t have a clue what to do except wait – for a completely unpredictable time period
Project Definition

(See the appendix for a more complete definition)

• **Project Intentions:**
  – Have the process go faster
  – Improve customer service (reduce frustration, etc.)
  – Improve predictability/rationality of the process
  – Reduce mistakes

• **Project Values:**
  – Lasting product – don’t want to see an interim product

• **Project Scope:**
  Development application/permit management
  – **From:** First applicant activity
  – **To:** Permit issued or denied

• **Project Context:**
  – **Direction:** Will purchase a COTS system with integrated data across departments
  – **Constraint:** Can’t create any new job positions
  – **Freedom:** We can suggest different ways of doing business
Business Object (Data) Model (partial)
Business Object (Data) Model

• Problem: Historical confusion over types of land locations
  – Blocks, sections, parcels, subdivisions, lots, etc.

• Solution:
  – Terms were defined
  – The ERD helped show the similarities and differences
Business Process Model

• Problem: It was a long serial process
  – Years ago there were only a couple of reviews
  – Additional reviews were added one at a time.
    Made sense to pass along the folder.
  – Eventually a reasonable process became insane

• Solution:
  – BPM showed only one real dependency
  – Restructured to have a concurrent review process
Business Process Model

• Problem: Applicant had to make several applications and fee payments at the beginning of the process
  – Different agencies were mandated to collect fees
  – The process evolved to serve the agencies, not the customer

• Solution:
  – Restructured the process to begin with a single application and fee payment, which will get spread to the various agencies
Business Process Model

• **Problem:** Even small applications were taking forever
  – Why? FIFO was the policy
  – Fact: Not all applications require the same level of review
  – So, a deck permit might wait 2 months until a subdivision permit was processed

• **Solution**
  – Set up categories of review needed and established an initial triage process
    • Simple applications – evaluated immediately
    • Routine applications – eligible for “scheduled time” process (where, once a week, reviewers are all in the same place at the same time)
    • Complex applications – must follow standard process, where reviewers each work at their own pace
Business Process Model

• Problem: Many people applied for permits that were never used
  – Why? “Just in case”
  – Also – to “get a jump” on the long permitting process

• Solution
  – Set up an initial “permit application fee” so applicant would only submit if serious
  – Previously, there were other small applications fees up front (EH, W&S) but not a permit application fee.
Business Process Model (proposed)
Business Event Model

- **Problem:** It was almost impossible to tell an applicant the status of their pending application. All I&P knew was which “black box” it was in.

- **Solution**
  - A decision was made to automatically track each review that was completed.
  - Then, by making the reviews parallel rather than sequential, the time in the “under review” status was reduced substantially.
Business Event Model

• Problem: It was almost impossible to tell an applicant the status of their pending application. All I&P knew was which “black box” it was in.

• Solution
  – A decision was made to identify and explicitly track each relevant status – at a finer degree of granularity.
Business Event Model

• Problem: Some of the activities that were needed didn’t get triggered until a long time after the initial activities.

• Solution
  – By making the reviews parallel rather than sequential, many activities could be triggered earlier in the process (see “under review”)
  – The time of the overall process was reduced substantially.
Business Event Model

INITIALLY SUBMITTED DEV APPL

Agent submits a package.

"Simple" Application and Coordinator approval

UNDER REVIEW DEV APPL

Bldg. Appl. open for review

Review for completeness
Determine if "simple" or "standard" application
If "simple" application, review application and make decision
If "standard" application, set as open for review

Final review completed (no problems)

Critical problem or Final review completed (with problems)

PENDING PAYMENT DEV APPL

Notify applicant
Receive payment

ISSUED DEV PERMIT

2 years pass

EXPIRED DEV PERMIT

DEAD DEV APPL

Notify applicant

Fees paid

Issue dev permit
Business Socio-Political Model

• Problem:
  – There was a huge number of parties involved
  – The affiliations between county (and state) organizations was fuzzy to many people

• Solution:
  – Not much could be done about this
  – The model diagram served as a quick overview of who was involved and how they were affiliated. This was useful to the staff and in bringing potential solution vendors up to speed.
Business Socio-Political Model

• Problem:
  – The poor applicant had to deal with up to 17 different providers

• Solution:
  – The role of “Permit Coordinator” was created
  – The applicant only deals with the coordinator (at least for government contacts)
  – The coordinator deals with the other government providers
  – Note: there was a constraint in the project definition that no new job positions could be created. The models made it clear that this was the best option and not just more excess.
## Role Profile Matrix (page 1/2)

<table>
<thead>
<tr>
<th>Role Description</th>
<th>Permit Coordinator</th>
<th>Permit Administrator</th>
<th>Permit Supervisor</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Description</strong></td>
<td>Well-versed on all of the aspects of the building permit process.</td>
<td>Clerical staff who administer the permitting records</td>
<td>Responsible for the entire permitting process.</td>
<td>Technically skilled in areas of review, including environmental impact and zoning regulations.</td>
</tr>
<tr>
<td><strong>Explicit Authorities</strong></td>
<td>Able to classify applications and make quick approval decisions on simple permits.</td>
<td>(none)</td>
<td>Can overrule anyone in the process.</td>
<td>Can deny a permit due to problems within their area of review.</td>
</tr>
<tr>
<td><strong>Other Responsibilities</strong></td>
<td>Single point of contact for Applicants.</td>
<td>Look up all historical permit information. Record and preserve all new permit information.</td>
<td>Reporting to various agencies.</td>
<td>(none)</td>
</tr>
<tr>
<td><strong>Credentials</strong></td>
<td>Ideally an experienced P&amp;Z Reviewer or Engineering Reviewer. Must have excellent people skills.</td>
<td>(none)</td>
<td>(none)</td>
<td>Educational credentials in field of review.</td>
</tr>
</tbody>
</table>

## Population

<table>
<thead>
<tr>
<th>Size</th>
<th>1</th>
<th>5</th>
<th>1</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy - Subject Area</td>
<td>Medium-high</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Literacy - Technical</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Cultural Considerations</td>
<td>Not averse to change, but need clear guidelines on procedures to follow.</td>
<td>Current supervisor is not keen on using technology. Prefers old paper-based system. Will be retiring within 2 years.</td>
<td>Have deep appreciation for their area, but not much appreciation for other factors.</td>
<td></td>
</tr>
<tr>
<td>Language(s) Assumed</td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>English</td>
</tr>
<tr>
<td>Tenure in Role</td>
<td>Brand new</td>
<td>10 + years, on average</td>
<td>25 years</td>
<td>5 years, on average</td>
</tr>
<tr>
<td>Work Period</td>
<td>TBD</td>
<td>M-F, 8:30 - 5:00</td>
<td>M-F, 8:30 - 5:00</td>
<td>M-F, 8:30 - 5:00</td>
</tr>
<tr>
<td>Salary Grade</td>
<td>TBD</td>
<td>low</td>
<td>medium</td>
<td>medium</td>
</tr>
</tbody>
</table>
## Role Profile Matrix (page 1/2)

<table>
<thead>
<tr>
<th>Special Accommodation Needs</th>
<th>Permit Coordinator</th>
<th>Permit Administrator</th>
<th>Permit Supervisor</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision - color blindness</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Vision impairment</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Hearing impairment</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Speech Impairment</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Mobility impairment</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Dexterity impairment</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### System Usage

<table>
<thead>
<tr>
<th>Type of Use</th>
<th>Permit Coordinator</th>
<th>Permit Administrator</th>
<th>Permit Supervisor</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation</td>
<td></td>
<td></td>
<td>Navigation</td>
<td></td>
</tr>
<tr>
<td>Inquiry (checking, verifying)</td>
<td></td>
<td></td>
<td>Inquiry (checking, verifying)</td>
<td></td>
</tr>
<tr>
<td>Data entry</td>
<td></td>
<td></td>
<td>Approvals</td>
<td></td>
</tr>
<tr>
<td>Updates</td>
<td></td>
<td></td>
<td>Reports</td>
<td></td>
</tr>
<tr>
<td>Approvals</td>
<td></td>
<td></td>
<td>Reports</td>
<td></td>
</tr>
<tr>
<td>Reports</td>
<td></td>
<td></td>
<td>Reports (ad-hoc)</td>
<td></td>
</tr>
<tr>
<td>Reports (ad-hoc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Frequency of Use      | Constantly          | Daily                | Daily             | Daily    |

<table>
<thead>
<tr>
<th>Stand to Gain</th>
<th>Automation of tedious functions</th>
<th>Automation of tedious functions</th>
<th>Better access to information</th>
<th>Better access to information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Better access to information</td>
<td>Better access to information</td>
<td>Tighter monetary control</td>
<td>Tighter monetary control</td>
</tr>
<tr>
<td></td>
<td>Better tools</td>
<td>Better tools</td>
<td>Standardized information</td>
<td>Standardized information</td>
</tr>
<tr>
<td></td>
<td>Increased efficiency</td>
<td>Increased efficiency</td>
<td>Audit trails</td>
<td>Audit trails</td>
</tr>
<tr>
<td></td>
<td>Job security</td>
<td>Job security</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stand to Lose</th>
<th>Must go thru learning curve</th>
<th>Control of some functions</th>
<th>Control of some functions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Flexibility</td>
<td>Flexibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Must go thru learning curve</td>
<td>Must go thru learning curve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expertise</td>
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<tr>
<td></td>
<td></td>
<td>Job</td>
<td>Job</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Machine making decisions they distrust</td>
<td>Machine making decisions they distrust</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Any System Performance Requirements?</th>
<th>Need fast performance if applicant is there waiting for information.</th>
<th>Ease of doing repetitive tasks.</th>
<th>(none)</th>
<th>In-field support</th>
</tr>
</thead>
</table>
Business Location Model

• **Problem:** Applicant had to go to many locations
  – To fill out applications & pay fees
  – Sometimes, as own courier
  – Over time, government got larger and spread to different locations

• **Solution:**
  – Added a new location “Building Permit Office”. All basic customer contact activities (including applications and payments) were consolidated in the Permit Coordinator role and placed in a single location.
  – By improving the process, the applicants won’t have to transport their application folder
Business Location Model

• Problem: Application folder has to go to many locations
  – Forces serial process
  – Often a time lag in transit
  – Makes prior work vulnerable (loss, etc.)

• Solution:
  – The channel was changed from material to data
    (information still went to all locations, but not material)
Some Themes

• Not all things can be easily seen on a single model.
• Each kind of model illustrates certain problems
  – By allowing discovery (by SMEs – even they were surprised)
  – By allowing communication (to each other & to commissioners)
• Each kind of model illustrates certain solutions
  – By allowing assessment
    • Where the problems exist
    • The nature of the problems
    • What solutions are feasible
  – By allowing specification
  – By allowing communication
    • To commissioners (management) – for approval
    • To vendors – in RFP
• Models allow you to do this fast
Some Themes

• Each business need is like a puzzle
  – Puzzles have keys
  – Some puzzles have more than one key. But most often one is the most elegant.
  – Each type of model may be the key to the puzzle
  – Sometimes you have an idea going in about which one is the key. However you may be wrong!
  – If you do each kind, at least to some degree, you have a better chance of uncovering the real key

• We would like the most elegant solution
  – Solves the real problem
  – Makes it crystal clear
  – Has a common sense appeal
  – Hard to argue with
  – Economical
  – Solves incidental problems as well
Assessments/Checklists/Walkthroughs

We will discuss:

– Requirements Checklists – Why they haven’t worked for me
– Assessments
  • Where to spend limited resources
  • How do I know when the requirements are done
– Walkthroughs and why you hold them
Checklists

A quick scan of the environment (my library, the web, other consultants in the industry, etc) for Requirements Checklist showed:

• They were conceptually all about the same
• They varied greatly in amount of detail (6 - 131 items in the checklist)
• Many were about “sign-off” and checking the box that a checklist had been used to check on quality and checked-off by the appropriate checker (Project Manager driven rather than Business Analyst Driven)
Checklists
Limitations

The checklists in the survey seemed to be about 3 things:

• Did I get it done (analysis and requirements)
• Did I get right? Does each and every requirement meet the Gold Standard?
• And can I prove it objectively?

Note: See NASA’s checklists available on the web for extreme examples
Problems with the Checklists
Conflicting Project Values

QUALITY
(Get it Right)

TIME
(Get it Done - Breadth)

COST
(Get it Cheap)
Problems with the Checklists

When is Analysis (and therefore Requirements) complete?

Also, at each stage “discoveries” are made:
1. Change has occurred
2. Scope shifts
3. Complexities arise (or go away)

“Sufficient to move on ...”

Approximate completion at each stage:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
<th>Build System</th>
<th>Implement System</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>60%</td>
<td>90%</td>
<td>95%</td>
<td>99%</td>
</tr>
<tr>
<td>Busn. Req.</td>
<td>5%</td>
<td>80%</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Sys. Design</td>
<td>0%</td>
<td>5%</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>System</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>90%</td>
</tr>
</tbody>
</table>
The BIG Question: How much Right and Done can we afford for any given Cell?

Requirements will continually expand until the project’s economic limits have been reached.

- Watts Humphrey

<table>
<thead>
<tr>
<th>Strategy Model (Scope)</th>
<th>Object/Data</th>
<th>Process</th>
<th>Event</th>
<th>Location</th>
<th>Socio-Political</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planner's View</td>
<td>PROJECT DEFINITION</td>
<td>Intentions, Values, Focus, Context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Model</td>
<td>Object/Data Requirements</td>
<td>Process Requirements</td>
<td>Event Requirements</td>
<td>Location Requirements</td>
<td>Socio-Political Requirements</td>
</tr>
<tr>
<td>Owner's View</td>
<td>Object/Data Design</td>
<td>Process Design</td>
<td>Event Design</td>
<td>Location Design</td>
<td>Socio-Political Design</td>
</tr>
<tr>
<td>Designer's View</td>
<td>Object/Data Design</td>
<td>Process Design</td>
<td>Event Design</td>
<td>Location Design</td>
<td>Socio-Political Design</td>
</tr>
<tr>
<td>Technology Model</td>
<td>Object/Data Design</td>
<td>Process Design</td>
<td>Event Design</td>
<td>Location Design</td>
<td>Socio-Political Design</td>
</tr>
<tr>
<td>Builder's View</td>
<td>Object/Data Design</td>
<td>Process Design</td>
<td>Event Design</td>
<td>Location Design</td>
<td>Socio-Political Design</td>
</tr>
<tr>
<td>Functioning Organization and Systems</td>
<td>Object/Data Design</td>
<td>Process Design</td>
<td>Event Design</td>
<td>Location Design</td>
<td>Socio-Political Design</td>
</tr>
</tbody>
</table>
Building Assessment into the Process

• If we only have enough time for:
  – Just enough quality
  – Just enough detail

• How can we justify spending a lot of time on a checklist?

• Build Assessment into the Process!!
Assessment – Need for Requirements

• Not all requirements are created equal
• They vary in importance from project to project
• Data/Object Requirements are the most important on a project to create a new database – Not so for an organizational redesign project
Triage the Analysis Cell

• For each Cell in the Framework ask:
  – What problems are we trying to solve? (project goals)
  – What problems and symptoms do I see? (symptoms of trouble)
  – How important is it to get it right for this cell?
  – Allocate a percentage of your budget

• Validate across cells that you have reasonable allocations.

Note: The trick here is to allocate the precious and rare resources you have to the most critical parts of the project
Business Object (Data) Model

Likely Project Goals

• Better customer service
  – Better information leads to better service

• Easier on staff
  – Improved business communication
  – Better information
    • More accurate
    • Easier to access
    • Able to support unanticipated information needs
    • Etc.

• Less expensive
  – Lower data maintenance costs

• Maintain/improve competitiveness
  – Perception as the best source for information
  – Data structured to allow quick adjustment as needed
Business Object (Data) Model

Symptoms of Trouble

• Confusion over terminology
• Unable to get needed information
• Unable to get accurate information
• Don’t know if information is current/trustworthy
• Staff is working to hard to get simple information
• Same data is available from several places (and may or may not be exactly the same)
Business Object (Data) Model

Ways to Improve

• Eliminate multiple meanings for a single term
• Eliminate multiple terms for a single meaning (unless managed carefully)
• Clarify typing structures (eliminate apples & oranges)
• Identify redundant data – for reduction and/or better management
Business Process Model

Likely Project Goals

- **Better customer service**
  - Work designed to serve customers
  - Fewer errors
  - Faster resolution of issues
  - Faster, beginning to end

- **Better for staff**
  - Fewer redundant activities
  - Fewer low-value administrative activities
  - Less management oversight (reliability build in the processes not requiring checks)

- **Less expensive**
  - Less re-work
  - Fewer hours per activity
  - Fewer redundant activities
  - Less wait time between processes (better management of the white space in an organization)

- **Maintain/improve competitiveness**
  - Better able to develop JIT delivery of product
  - Product pricing reflect cost savings
  - Processes structured to allow quick adjustment as needed
Business Process Model
Symptoms of Trouble

- Customer complaints
- Not sure who the customer is
- Work seems to take longer than it should
- Work seems harder than it should
- Poor results - lots of errors
- Doing redundant work
- Often forget to do things
- Not clear who should do some things
- Need too much approval for minor things
- Too much (or not enough) inventory on-hand
- Processes designed around technology (often on outdated technology)
- The time it takes varies on the location or staff performing the process
Business Process Model

Ways to Improve

• Eliminate activities that don’t add value (especially bureaucracy: reviews, approvals, etc.)
• Convert serial activities to parallel activities (if no real dependencies)
• Reduce number of participants (especially number of handoffs)
• Reduce time between activities
• Capture data more effectively (all at the beginning of the process vs. as needed during the process)
• Design processes around business activities and then find the appropriate technology to enable process
• Consolidate similar processes
• Sometimes – just training is needed
Business Event Model

Likely Project Goals

• Better customer service
  – Better response to customer initiated events
  – Better able to track relevant statuses and manage appropriately

• Better for staff
  – When something happens, clear on what-to-do

• Less expensive
  – Fewer redundant responses to the same thing
  – Fewer missed responses
  – Increased efficiency

• Maintain/improve competitiveness
  – Better prioritization of event responses, immediately and in the future as needed
Business Event Model
Symptoms of Trouble

• **When something significant happens:**
  – We don’t know how to respond
  – We respond inconsistently
  – We respond ineffectively
  – We fail to respond
  – We don’t even know it happened

• **We are confused about the status of things**
  – For some items, we often aren’t sure what their status is
  – We aren’t clear on why something would be of one status or another (i.e. fuzzy rules)
Business Event Model

Ways to Improve

• Understand how each event is initiated and detected
• Make sure there is a clear response strategy for each key business event
• Identify each “creating” event and each “terminating” event for each key business object
• Make sure a single “status” is not really a combination of several things
• Add states if existing status is not descriptive enough
• Remove states if existing status is too cumbersome
Business Location Model

Likely Project Goals

• Better customer service
  – Easier for customer to interact
  – Better resolution of issues

• Better for staff
  – Efficient internal interfaces
  – Less travel

• Less expensive
  – Lower facility costs
  – Lower transportation costs
  – Lower labor costs

• Maintain/improve competitiveness
  – Facilities structured to allow quick adjustment as needed
Business Location Model
Symptoms of Trouble

• Customers don’t know where to go
• Specific sites are doing too much or not enough
• We are making too many trips (“I spend most of my time going somewhere”)
• Whenever we need someone or something, it’s somewhere else
• Things take too long to get here
• We feel like we are “out of touch” with them-over-there
• We are “too far away” from: our customers, our workforce, our vendors, our partners, etc.
• Communication of information relies on physical movement on media (e.g. paper, forms, recorded media, etc.)
Business Location Model

Ways to Improve

• Reduce number of locations if redundancy exists
• Increase number of locations or change locations to be closer to customers, vendors, and/or staff pool
• Shift things from one location to another: event detection, activities, roles, and/or materials
• Improve facilities
  – Expand/reduce facility size
  – Modernize facilities: rebuild, move, remodel, re-equip, re-configure, etc.
• Improve channels
  – Replace participant channels with data channels (or vice versa)
  – Upgrade channel technology and/or vendors
  – Promote telecommuting and collaboration technologies where appropriate
• Tune processes to locations considering channels and location based time delays
Business Socio-Political Model

Likely Project Goals

• Better customer service
  – Organized for maximum effectiveness
  – Enhance customer-centric culture

• Better for staff
  – Resilient organization, able to weather change
  – Less organizational bureaucracy
  – Staff feel listened to
  – High morale among staff
  – Staff feel aligned with organizational mission
  – Staff have career mobility, professional development

• Less expensive
  – Fewer unplanned redundancies
  – Increased efficiency

• Maintain/improve competitiveness
  – Organization structured and culture established to allow quick adjustment as needed
  – More effective recruitment/ retention
  – Improved partnerships
Business Socio-Political Model

Symptoms of Trouble

- Low morale
- Pervasive conflict, “us-them” mentality
- Employees don’t understand how their work supports the mission of the organization
- Employees and managers see the mission statement as “just a piece of paper”
- Constant miscommunication
- Lack of communication (“no one ever tells us anything”)
- Frequent changes in direction without apparent rationale
- High turnover rate
- Nothing ever happens
- Managers are overworked
- We manage by “fad of the month”
- We acquire the latest technology whether it meets our needs or not
- We always lag behind the latest technology
- We bought new technology and the work is taking even longer than before
- We are going to install an ERP application (or some other big technology change)
Business Socio-Political Model

Ways to Improve

• Establish a clear mission, vision and organizational strategy model
• Align the organizational structure with the organizational mission and values
• Align incentive systems with the mission and values
• Reduce or expand managerial span of control to an optimal size
• Share support across functional areas
• Rethink roles - based on qualifications, process, relationships, and offerings
• Shift roles from one org unit to another
• Clarify responsibilities in organizational relationships
Assessing Quality

• Once you know how much effort (quantity) you intend to put into each cell of the framework, the next questions are about Quality
Assessing Quality

Project Vision

The following assessments can now be made for each requirement against the intentions of the cells of the framework (and therefore against the Project Definition (Charter, Vision, whatever you call it)).

- All items needed to specify the solution to the problem have been included
- Each item is pertinent to the problem and its solution
- Each item can be traced to its origin in the problem environment.
- The requirements specifications are a statement of the requirements that must be satisfied by the problem solution, and they are not obscured by proposed solutions to the problem

Assessing Quality

Models

The following assessments are then made by reconciling the models against each other:

• Each item is free from error
• Each item is exact, there is a single interpretation, the meaning of each item is understood, and the specification is easy to read.
• No item conflicts with another item in the specification

Assessing Quality
Fit with the Project

Finally, the following assessments should be made against the Project Plan

• During program development and acceptance testing, it will be possible to determine whether the item has been satisfied.
• Each item can be implemented with the available techniques, tools, resources, and personnel and within the specified cost and schedule constraints. (This is checked against the Conceptual Architecture)
• The requirements specifications are expressed in such a way that each item can be changed without excessive impact on other items
• Changes to the completed requirements specifications can be controlled, each proposed change can be traced to an existing requirement, and the impact of the proposed change can be assessed.

How to use walkthroughs

• Walkthroughs are often used to check quality
• Bad story about a telecom company I once worked for:
  – The analysts worked for 8 weeks (our budget) on the requirements
  – Called the user in (the first time they had seen anything) for a requirements walkthrough
  – Asked for their input
  – They gave us tons (including that we needed to start over)
  – Since the analysis budget was spent we started design the next day trying to incorporate the user feedback the best that we could.
Lessons Learned:

- Get Users and other stakeholders involved in creating the Requirements
- Ask the users questions about quality as you go (they will know if the requirements will meet the stated business needs).
- Walkthroughs are important for a project but not to validate the requirements.
- Build quality in, don’t check for it at the end.
Wrap

We will discuss:
- Review our goal
- How to follow up
Practical …

Intentions

– Understand what business requirements are
– Understand how a full-spectrum of requirements fit together
– Pick up some tips that might be useful on your projects

• Remembering: There are LOTS of ways to approach this work.
Practical ...

Just one general suggestion about your approach:

Know your **business requirement goals**
- Communication among business people
- Able to pass requirements into design
- Etc.

... and remember them when you develop your business requirements approach
How to Follow Up

• Immediately
  – Other Symposium presentations
  – Advanced Strategies Symposium Booth

• On your upcoming projects
  – Put something new into your project plan
  – Even if not part of your plan – sketch all model types, to begin to develop skills and to test whether it is helpful or not

• Your individual study
  – Practice in your everyday life
  – As you go about, observe your surroundings and think about what would go into various models. What are entities? processes? locations? events? parties, roles?, Etc.
  – Occasionally – sketch diagrams of things that interest you

• Reading
Visio Stencils

- For a set of Visio stencils that support the notation used in this presentation, text templates, requirements template, and many more wonderful things, visit:  
  - www.advancedstrategies.com

- All of the above mentioned are free.
- We do ask for you name, etc. to get an idea about who is interested in this stuff. *We don’t add you to a mailing list.*
Reference Materials

• For good overview of analysis:
  – Visit www.yourdon.com/strucanalysis/index.html

• For object modeling perspective and to compare Business Object Modeling, Process Modeling and Event Modeling:

• For a discussion on the study of real-world objects:

• For a discussion on common model patterns:

• For more on checklists:
Good Luck!
Appendix

Includes additional material in the areas we covered:

- Foundation Concepts
- The Case Study
Foundation Concepts
Frameworks

Functioning Enterprise

Mapping – Current State (Prior to project)

Enterprise Architecture Framework (e.g. Zachman)
Perspectives vs. Things viewed

Enterprise expertise

Project

Project Plan

New or modified: Business processes, Computer systems, Facilities, Org structure, Etc.

Mapping – Future State (After project)

Enterprise Architecture Framework (e.g. Zachman)
Perspectives vs. Things viewed

Methodology

Project Process Framework (e.g. Advanced Strategies)
Disciplines vs. Threads
Models
Nodes & Links

• Links
  – The two main linking structures are:
    • Network
    • Hierarchy (which is a type of network)
  – Most views are one or the other, but they are often combined in the same diagram
Business Models

Purpose

• To understand & document business facts
  – Why? Business requirements
  – Why? Business improvement
  – Why? Meet business strategic goals

• To facilitate better business communication
  – Audience? Business people
    • Help them see & articulate what they are doing
    • Help them determine opportunities to improve their business
  – Audience: Technical people
    • Help them to clearly understand the business requirements that need to be supported by technical systems

• To lead to a later actualization of a business solution
  – As a specification for an improved business
    • To transform business requirements into system designs
  – As a vehicle to test the business quality of what resulted. I.e. test criteria for:
    • The system designs (verification)
    • Whatever is built/bought (validation)
Business Models

Can show different kinds of business facts:

• Essential
  – The “core” of the business
  – If this changes, you are doing different business

• Logical
  – The “policies” of the business
  – If this changes, you are doing the same business differently

Technical models show:

• Physical
  – The mechanisms used to implement the business
Business Modeling – Basic Approach

- Project Definition
- Subject Matter Experts (SME)
- Isolate a Fact
- Represent the Fact
- Business Model Fragment

Focus statement → Observation → Fact statement → Verified fact statement → Business model fragment → Instruments & tools → PROJECT TOOL BOX
Case Study
Project Definition

• You shouldn’t start a project without some guidance
• You can’t create models without some guidance
  – What part of the business are you studying?
  – Whose perspectives do you care about?
  – To what end are the models directed?
Project Definition

• **Stakeholders** (partial list):
  – The Public
  – Landowners
  – Developers
  – County officials State officials, Federal officials, Municipalities
  – Private Communities / Home Owners Associations
  – Utilities
Project Definition

• **Project Intentions** (partial list):
  – Have the process go faster
  – Improve customer service (reduce frustration, etc.)
  – Improve predictability/rationality of the process
  – Increase the ability to track the status of the current permits/applications
  – Improve fee collection and tracking (there are various fees)
  – Make county staff more productive and efficient
  – Reduce mistakes
  – Improve enforcement of regulations
Project Definition

- **Project Values** (partial list):
  - Courtesy in the applications/permitting process needs to be maintained
  - Lasting product – the commissioners want to see a product that will be around for a while – money well spent – don’t want to see an interim product
  - Quality with no frills
Project Definition

• **Project Scope:**
  Development application/permit management
  – **From:** First applicant activity (may be prior to the application itself)
  – **To:** Forever - based upon regulations and policy
  – **Including, but not limited to:**
    • Applying for a permit
    • Application reviews (many kinds)
    • Development permit issued or denied
    • Inspections (during development)
    • Close out (after development is complete)
    • Collection of fees
    • Appeals
Project Definition

- **Project Context** (partial list):
  - **Direction:** Will purchase a COTS system with integrated data across departments
  - **Constraint:** Money – not a bottomless money pit
  - **Constraint:** Must meet regulatory requirements / Can’t scrap a particular inspection or review, must meet review deadlines
  - **Constraint:** Can’t create any new job positions
  - **Freedom:** We can suggest different ways of doing business
  - **Risk:** Support may not come from above
  - **Opportunity:** Increased revenue - No missed / overlooked revenue