

Let Me Be Perfectly Clear

Clear Communication
using Rich Definitions

David Gelperin
ClearSpecs Enterprises
david@clearspecs.com

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We are **analog beings** trapped in a **digital world**
[and we did it to ourselves]. We have constructed a set of
artificial devices that are very much **NOT in our own image**
-- Don Norman



Needs, Desires,
& Preferences



Implemented
Systems



Ambiguous
Inconsistent
Incomplete

Precise
Consistent
Complete

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Intentional Imprecision is Smart

Intentional Imprecision –

Reqs provider states high-level needs and then expects supplier to:

- (1) **lead** the discovery of details
- (2) **request** opinions on choices (with costs)

Example: Product manager writes – Our next generation chromatograph must have a faster <TIOK> cycle time than our fastest current model

Intentional imprecision is appropriate when:

- (1) supplier knows as many or more details than provider
- (2) neither supplier nor provider know details

Intentional imprecision, both **permanent** and **temporary**, should be **marked**. Consider **IOK** and **TIOK** as markers

Just Enough Precision

Reqs are part of **interactive communication** between reqs providers and solution suppliers



Understanding Should Determine Details

Shallow PU	5 %	Agile	Research NOT Dev
	5 - 15 %	30 - 35 %	Agile
Moderate PU	5 - 25 %	45 - 55 %	70 - 85 %
	5 - 25 %	45 - 55 %	70 - 85 %
Deep PU	5 - 25 %	45 - 55 %	70 - 85 %
	Deep SU	Moderate SU	Shallow SU

Provider Understanding (PU) of problem domain and specific needs, wants, and preferences

Supplier Understanding (SU) of solution domain and relevant solutions

requirements content: % of necessary details

Secondary Drivers

As well as supporting supplier understanding, **details may be needed** for:

- ◆ customer consensus
- ◆ third-party testers
- ◆ government regulations
- ◆ legal considerations

Sooner or Later

Precision is painful for many,
but **always** appears in systems development

The issue is not **if** it will appear,
but **who** provides it and **when**

Fixing Vague Terms

When accidental imprecision is detected

- ◆ **Delete**
- ◆ **Replace**
- ◆ **Enhance**
- ◆ **Illustrate**
- ◆ **Define**
 - **plain**
 - **rich**

Plain Definitions are Imprecise

Risk: a **potential** source of **significant** harm or loss

Plain definitions define words using **phrases and sentences**.

Most plain definitions **do not enable precise calculations or decisions**.

Plain definitions **are sufficient** for some words.

Plain Definitions are Not Enough

**Accurately identify potential customers
for our new order entry system**

Dictionary definitions (standard context-free meanings)

e.g. **potential** – expected to become or be

vs.

Contextual (but still plain) **definitions** (meaning as a function of associated words)

e.g. **potential customer** – a person or organization, who is not a customer now, but may become one

e.g. **potential increase** – an increase (in the price of gas) that may occur

Precise Contextual Definitions

Accurately identify potential customers
for our new order entry system

Need **precise** contextual definitions for:

- potential customers
- identify potential customers
- accurately identify potential customers

Need Rich Definitions

Patterns	Objects	Examples
Entity profile	Nouns, unmodified	customer
	Nouns, modified	VAR controller
Derived value	Nouns, modified	employee bonus
Derived condition	Nouns, modified	potential customer
	Verbs, premodified	rarely fail
Quality profile	Nouns, modified	satisfied customer
	Verbs, premodified	accurately identify
Action contract	Verbs, postmodified	display complaints
	Verbs, premodified	tentatively identify
Derived tasks	Verbs, postmodified	plan vacation
Event profile	Events	accurately identify potential customers for our new system

Derived Conditions (modified nouns and verbs)

Derived conditions name groups of one or more logical expressions (joined by *ANDs* and *Ors*)

potential customer =

bought-many-services or
bought-services-A-and-B or
bought-a-lot-of-service-C

bought-many-services =

total-invoiced-service-types > 5

bought-services-A-and-B =

invoiced-for-service-A and *invoiced-for-service-B*

bought-a-lot-of-service-C =

invoiced-amount-for-service-C > \$500,000.00

Defining Simple Conditions

Derived conditions can define:

- account is *delinquent*
- account is *overdrawn*
- book is *overdue*
- item is *backordered*
- food is *outdated*
- *customer is a senior*

Defining Triggers

Derived conditions can define action triggers:

water too high =
level above 100 meters for 4 seconds

platform failure =
power failure
or *hardware failure*
or *communication failure*
or *system software failure*

Derived Condition Table

Input is a "reservation locator"

1	res confirm #			
2	Flight date	departure airport	flight #	freq. flyer #
3	Flight date	departure airport	flight #	passenger name
4	Flight date	departure airport	destination airport	freq. flyer #
5	Flight date	departure airport	destination airport	passenger name

Another Derived Condition Table

Primary operator is in class #

<i>subject</i>	<i>predicate set</i>	1	2	3	4
PO age	integer ranges	≥ 25	< 25 ≥ 21	24 or 23	< 24
PO sex	[M, F]	-	M	M	F
PO marital status	[M, S]	-	M	S	-
Annual business distance	integer ranges	> 4800 km	-	-	-
Operator class		07	09	13	13

PO = primary operator of a vehicle

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Quality Profiles (modified nouns and verbs)

Identify

1. a **subjective quality attribute**
2. a **measure** of that attribute
3. an associated **process** for measurement
4. a **method** for interpreting the results such as division of results into ranges to define satisfactory and unsatisfactory outcomes.

Example of Quality Profile

ID	QS-1.1
ATTRIBUTE	System Learnability – ease of learning to use the system effectively
MEASURE	Time (in minutes) required by novice subjects (with no prior exposure to our website and less than 6 months experience with web applications) to successfully complete a 1-item order (assisted only by the online help system)
METHOD	Time at least 100 novice subjects during user interface testing
MINIMUM	Less than 10 minutes for at least 80% of the novice subjects
GOAL	Less than 7 minutes for at least 80% of the novice subjects
Stretch	Less than 5 minutes for at least 80% of the novice subjects
Past [current system]	11 minutes for 80% of all users ← recent site statistics

The Hard Part

Identifying measures for highly subjective concepts,
for example:

"The system should be fronted by an efficiently navigable,
imaginatively designed, attractively laid out and secure web
site that ..."

1. Answer the question: How will we know when we succeed?
2. Collect examples and counterexamples and find patterns
3. Consider prototyping
4. Consider deletion

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Action Contracts (verbs)

The **meaning** of a function can be defined by the consequences of both valid and invalid *requests for service*.

What conditions are TRUE after the request that were not TRUE before? What conditions characterize the request?

Action contracts define the meaning (i.e., consequences) of a function or process using **post, pre, during, and constant conditions**

Process Conditions

- ◆ **Constant condition**
A condition that is TRUE at the beginning, during, and after a correct process i.e. its truth value does not change
- ◆ **Pre-condition**
A condition that must or may be TRUE at the beginning of the process, but may become FALSE during the process
- ◆ **Post-condition**
A condition that is TRUE after a correct process, but is FALSE or undefined at the beginning of the process
- ◆ **During condition**
A condition that becomes TRUE during the process, but is FALSE or undefined at the beginning of the process. The condition may have any truth value after the process. [A during condition that is TRUE after the process is a post-condition.]

Action Contract -- Example

pre & post conditions for a set of actions

Process order

Order Quantity	On Hand Quantity	On Hand vs. Order	Post-Conditions
Invalid	---		Invalid quantity reported
Valid	Out	[Short]	Backorder created
Valid	In	Short	Backorder created & Partial order ticket created
Valid	In	Enough	Full order ticket created

Action Contract - Example

Get Seat on Reserved Flight

Global Constant Conditions

For res system, status is active

For passenger, system access status is signed on

Rule #	Res locator info	Res found	Seat assignment	Main Result	Thanked	Advised
1	valid	found	already assigned	seat assigned	yes	
2	valid	found	assignable	seat assigned	yes	
3	valid	found	not assignable	request queued	yes	yes
4	valid	not found			yes	yes
5	valid					yes

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Entities

Define nouns using their attributes, data types, and relationships to other nouns

- ◆ Internal entities
 - ◆ **domain**
e.g. **order, VAR controller**
 - ◆ **system**
e.g. **user**
- ◆ Input entities
e.g. **reservation locator**
- ◆ Output entities
e.g. **logs, messages, reports**

Copy of a Book Entity Profile

Attribute Name	Data Type	Occurrences
Copy Id	Identifier	
Book Id	Identifier	
Supplier Id	Identifier	
Acquisition Date	Date	
Checkout Period	Number	
Loaned Count	Number	
Availability Status	Code	
Availability Start Date	Date	
Borrower Ids	Identifier	Multiple (10)
Relationship Type	Entity	
M:1	Book	
M:1	Library	
M:1	Supplier	
M:N	Patron	

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Derived Values (modified nouns)

Define noun phrases using a cascade of algebraic formulas

Weekly income =
yearly income / 52

Days after sale =
current date - sale date

**Total of orders for
salesperson-id in *year-id*** =
SUM OF values FROM orders
WHERE
(sales contact = *salesperson-id*)
AND (year = *year-id*)

Derived-Value Table

state	city	tax-rate
AZ		.025
MN	Edina	.038

**Sales-tax-rate for
city-id in *state-id*** = tax-rate
FROM sales-tax-rate-table
WHERE
(*state* = *state-id*)
AND (city = *city-id* OR blank)

Mixed Cascades



- Each derived (condition, value, and task) definition uses a cascade of patterns
- Cascades contain one or more patterns
- Multipattern cascades can be *pure* (i.e., all the same patterns) or *mixed*

A mixed cascade:

```

employee bonus = If is-executive, executive bonus
                  Elseif is-manager, manager bonus
                  Else staff bonus Endif
is-executive = (job-title = CEO or CFO or CTO or ...)
    
```

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Derived Tasks (post-modified verbs)

Defines verb phrases using a cascade of "work breakdown" definitions

Two forms:

1. Set of component tasks

e.g., **arrange trip**

arrange transportation

arrange housing

2. Component tasks with control flow

e.g., If destination airport is not known

determine destination airport

Endif

arrange flight

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Event Profile Questions

What?

- event summary

When?

- preconditions
- constant conditions
- triggers
- frequency

Who, Whose or Which?

- interactors or system

How many, how much, or how long?

- types, quantities, or duration

With what?

- instrument of action

From and To whom or where?

- origin and destination

Why?

- goal or rationale
- post-conditions

How?

- action steps or substeps
- variants

Example of Event Profile – Part 1

Identify potential customers

Question	Answer
What? -event summary	Accurately identify potential customers for the new umbrella coverage policy
Who, Whose or Which? -interactors or system -entities	System analyzes current and former AI customer databases
With what? -instrument of action	Data mining program
Why? -goal or rationale -post-conditions -next events	The resulting potentials file will contain access keys for each current and former customer that satisfies the selection criteria. Potentials will be notified about the new policy by e-mail, snail mail, and phone.

Example of Event Profile – Part 2

Identify potential customers

Question	Answer
When? –preconditions –constant conditions –triggers –frequency	Program will run several times as the user is expected to adjust the selection criteria.
How many, how much, or how long? –types, quantities, or duration	Marketing manager estimates about 15% of customers are eligible (750K of 5M).
From and To whom or where? –origin and destination	Marketing manager will provide the disposition of the potentials file by 6/1
How? –action steps or subtasks –variants	

Value of Rich Definitions

- ◆ Rich definitions
catalyze crucial conversations
- ◆ Their value is directly related to the challenge of their creation
i.e. easy = low value
hard = high value

Recommendations

Be Smart

Use rich definitions of key phrases
to introduce precision early

Use and **mark**
intentional imprecision

Resources

Slides – [Just Enough Precision](#)
Slides – [Let Me Be Perfectly Clear](#)
Paper – [Using Rich Definitions to Improve Customer
Communication](#)
Word Template – [Rich Glossary Template](#)

Video – [StyleWriter and TEKchecker Movie \(fun\)](#)
User Guide – [TEKchecker User Guide](#)

Resources freely available at
www.clearspecs.com