Commonality Analysis for Sandwich Manufacture

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INTRODUCTION

The basic functionality of sandwich manufacture has remained constant for over 2 centuries. In order to reduce costs and improve reliability, we offer here an analysis of the common and variable parts of the process. It is hoped that the common operations may be automated in the future.

OVERVIEW

Sandwich manufacture can be separated into at least three subdomains: bread preparation, content filling, and slicing. We will discuss each of these subdomains in this document. This commonality analysis will address the following related issues:

• What are bread types?
• What are valid fillings for sandwiches?

DEFINITIONS

In this section and in the following sections the terms defined will be italicized.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread</td>
<td>A staple food made from flour or meal mixed with a liquid, usually combined with a leavening agent, and kneaded, shaped into loaves, and baked.</td>
</tr>
<tr>
<td>Filling</td>
<td>A food item that may legally be included within a sandwich.</td>
</tr>
<tr>
<td>Sandwich</td>
<td>Two or more slices of bread with a filling placed between them.</td>
</tr>
<tr>
<td>Sandwich Manufacture</td>
<td>The process of creating a sandwich.</td>
</tr>
</tbody>
</table>

COMMONALITIES

The following statements are basic assumptions about the domain of sandwich manufacture.

C1. All sandwiches have at least 2 slices of bread of the same type.
C2. All breads used in sandwiches are sliced to thicknesses between 0.5 and 1.5 inches.
C3. Every bread slice used in a sandwich has an outside and an inside.
C4. Fillings for sandwiches may be divided into 2 categories: meats and cheeses
VARIABILITIES

The following statements describe how sandwich manufacture may vary.

V1. A sandwich may have 2 or 3 slices of bread.

V2. The type of bread used in a sandwich may vary according to type:
   - white
   - rye
   - pumpernickel

V2. The type of meat used in a sandwich may be any of the following:
   - ham
   - roast beef
   - pastrami

V2. The type of cheese used in a sandwich may be any of the following:
   - American
   - Swiss
   - provolone

PARAMETERS OF VARIATION

The following parameters characterize the variabilities allowed in the domain of sandwich manufacture.

<table>
<thead>
<tr>
<th>#</th>
<th>Parameter &amp; Variability</th>
<th>Meaning</th>
<th>Domain</th>
<th>Decision Time</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1.</td>
<td>slice count, V1.</td>
<td>number of slices of bread in the sandwich</td>
<td>{2, 3}</td>
<td>specification</td>
<td>2</td>
</tr>
<tr>
<td>P2.</td>
<td>bread type, V2.</td>
<td>type of bread in the sandwich</td>
<td>{white, rye, pumpernickel}</td>
<td>specification</td>
<td>white</td>
</tr>
<tr>
<td>P3.</td>
<td>meat type, V3.</td>
<td>type of meat in the sandwich</td>
<td>{ham, roast beef, pastrami}</td>
<td>specification</td>
<td>ham</td>
</tr>
<tr>
<td>P4.</td>
<td>meat amount</td>
<td>amount of meat in the sandwich, measured in ounces</td>
<td>Positive Real Number</td>
<td>compile</td>
<td>2</td>
</tr>
<tr>
<td>P5.</td>
<td>cheese type, V4.</td>
<td>type of cheese in the sandwich</td>
<td>{American, Swiss, provolone}</td>
<td>specification</td>
<td>Swiss</td>
</tr>
<tr>
<td>P6.</td>
<td>cheese amount</td>
<td>amount of cheese in the sandwich, measured in ounces</td>
<td>Positive Real Number</td>
<td>compile</td>
<td>0</td>
</tr>
</tbody>
</table>
ISSUES
The following are key issues considered during the commonality analysis.

Issue 1: Is a sub a sandwich?
Resolution: No.

Issue 2: Can the slices of bread used in a sandwich be of different types?
    A1. Yes---there is no reason to constrain the types of bread.
    A2. No---mixed bread types leads to insanity.
    D1. This might be necessary if there are insufficient quantities of one type of bread.
    D2. Mom said that you should not do this.
Resolution: No, by vote.

Issue 3: Can more than one type of meat or cheese be included in a sandwich?
    D1. Harpo will research this issue and report back.

TO DO
1. Add more bread types, such as whole wheat. [Harpo]
2. Add variability for amounts of fillings [Chico]
3. Revisit the different bread type issue, ask more moms. [Groucho]

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