Design Arguments

Stakeholders + Domain Person **P** [in setting **S**]
Core tension wants to achieve goal **G** but obstacles $\mathbf{O_{1\text{-}N}}$ get in the way.

Need

Any solution also has to:
satisfy constraints $\mathbf{X_{1\text{-}N}}$,
minimize costs $\mathbf{Y_{1\text{-}N}}$,
and avoid obstacles $\mathbf{Z_{1\text{-}N}}$.

Axioms As designers, we bring the following
principles and constraints $\mathbf{A_{1\text{-}N}}$.

Our approach, _____,
has characteristics $\mathbf{C_{1\text{-}N}}$
that help stakeholders achieve their
goal **G** while avoiding obstacles $\mathbf{O_{1\text{-}N}}$.

Design Argument #1

Evidence

How do you know?

Need

Need Thesis

Stakeholders + Domain Person **P** [in setting **S**]

Core tension wants to achieve goal **G** but obstacles $\mathbf{O_{1\text{-}N}}$ get in the way.

Evidence

How do existing approaches fail?

Any solution also has to:
satisfy constraints $\mathbf{X_{1\text{-}N}}$,
minimize costs $\mathbf{Y_{1\text{-}N}}$,
and avoid obstacles $\mathbf{Z_{1\text{-}N}}$.

Axioms As designers, we bring the following principles and constraints $\mathbf{A_{1\text{-}N}}$.

Evidence

What characteristics have you borrowed from solutions that succeeded in analogous settings?

Approach Thesis

Our approach, _____,
has characteristics $\mathbf{C_{1\text{-}N}}$
that help stakeholders achieve their goal **G** while avoiding obstacles $\mathbf{O_{1\text{-}N}}$

What differentiates your approach from previous solutions that failed?

How have stakeholders responded to/been able to use your approach?

Design Argument #2

Evidence

How do you know?

Need

Need Thesis

Stakeholders + Domain Person **P** [in setting **S**]

Core tension could achieve goal **G** if obstacles $\mathbf{O_{1\text{-}N}}$ were removed.

Evidence

How do existing approaches fail?

Any solution also has to:
satisfy constraints $\mathbf{X_{1\text{-}N}}$,
minimize costs $\mathbf{Y_{1\text{-}N}}$,
and avoid obstacles $\mathbf{Z_{1\text{-}N}}$.

Axioms As designers, we bring the following principles and constraints $\mathbf{A_{1\text{-}N}}$.

Approach Thesis

Our approach, _____,
has characteristics $\mathbf{C_{1\text{-}N}}$
removes obstacles $\mathbf{O_{1\text{-}N}}$ so that
stakeholders can achieve goal **G**.

Evidence

What characteristics have you borrowed from solutions that succeeded in analogous settings?

What differentiates your approach from previous solutions that failed?

How have stakeholders responded to/been able to use your approach?

Visualizing API Usage Examples at Scale

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Figure 1. EXAMPLORE **takes a focal API call that a programmer is interested in, locates uses of that API call in a large corpus of mined code examples, and then produces an interactive visualization that lets programmers explore common usage patterns of that API across the corpus.**

ABSTRACT

Using existing APIs properly is a key challenge in programming, given that libraries and APIs are increasing in number and complexity. Programmers often search for online code examples in Q&A forums and read tutorials and blog posts to learn how to use a given API. However, there are often a massive number of related code examples and it is difficult for a user to understand the commonalities and variances among them, while being able to drill down to concrete details. We introduce an interactive visualization for exploring a large collection of code examples mined from open-source repositories at scale. This visualization summarizes hundreds of code examples in one synthetic code skeleton with statistical distributions for canonicalized statements and structures enclosing an API call. We implemented this interactive visualization for a set of Java APIs and found that, in a lab study, it helped users (1) answer significantly more API usage questions correctly and comprehensively and (2) explore how other programmers have used an unfamiliar API.

INTRODUCTION

Learning how to correctly and effectively use existing APIs is a common task — and a core challenge — in software development. It spans all expertise levels from novices to professional software engineers, and all project types from prototypes to production code. The landscape of publicly available APIs is massive and constantly changing, as new APIs are created in response to shifting programmer needs. Within companies, the same is true, perhaps even more so: joining a company can require learning a whole new set of proprietary APIs before a developer becomes an effective contributor to the company codebase. Developers often are stymied by various learning barriers, including overly specific or overly general explanations of API usage, lack of understanding about the interaction between multiple APIs, lack of alternative uses, and difficulty identifying program statements and structures related to an API [11, 19, 5].

One study found that the greatest obstacle to learning an API is "*insufficient or inadequate examples*." [19] Official documenta-