Feature Transition Charts for Visualization of Cross-Project Scope Evolution in Large-Scale Requirements Engineering for Product Lines

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What is the problem we are working on.

- Providing a comprehensive overview of the complexity and dynamics of scoping decisions in large-scale multi-project environment.
- This paper presents a visualization technique called Feature Transition Charts (FTC) that gives an overview of scoping decisions involving changes across multiple projects. The work is based on previous work on within-project visualization of feature survival (Feature Survival Charts).

Case Study Motivation

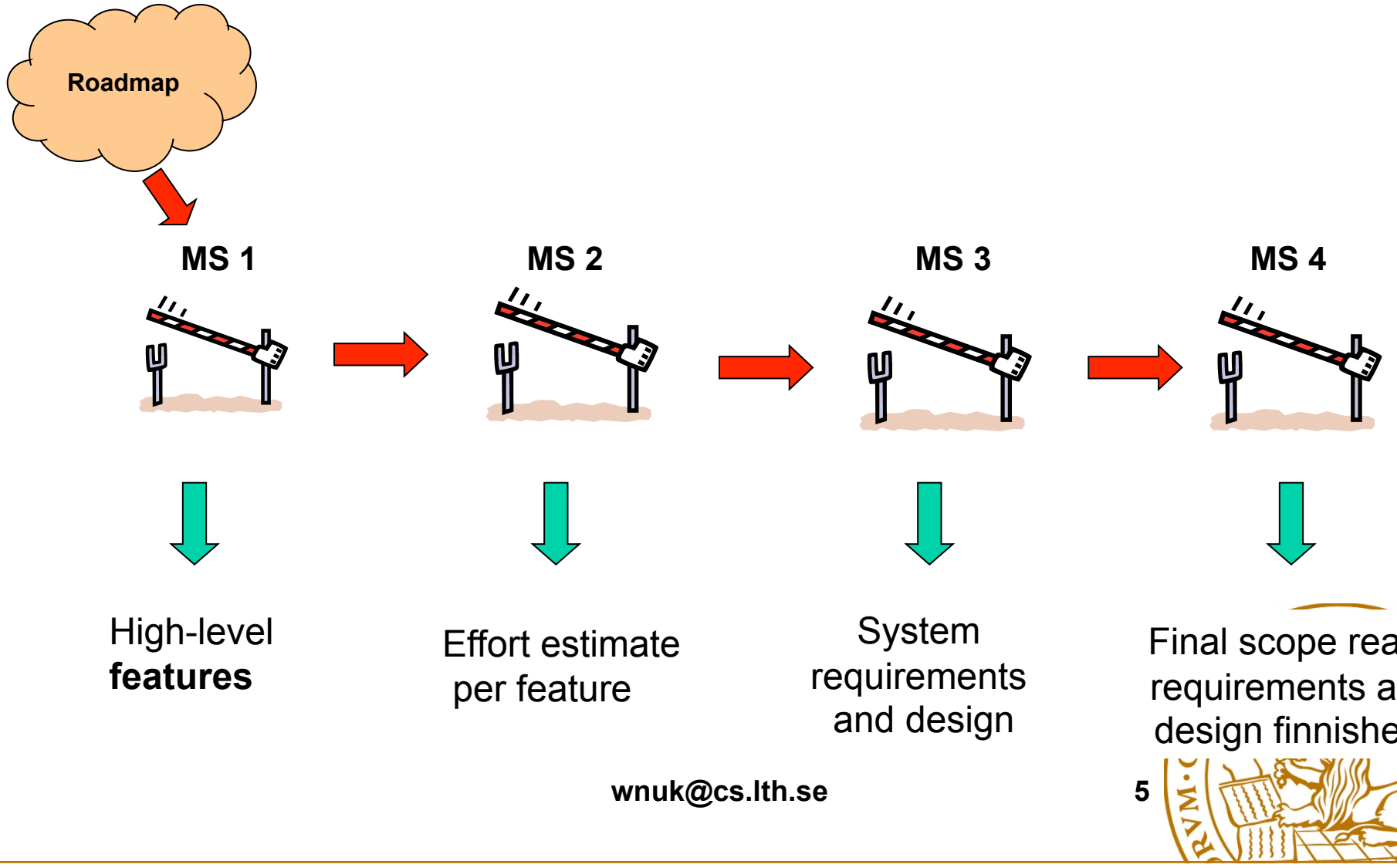
- Feature Survival Charts can only show a single project during analysis.
- Previous results indicate that many features were de-scoped from the analyzed projects.
- Find ways of visualizing across projects scope changes.
- Find ways of visualizing timing and magnitude of across-projects transitions.

Case Study Introduction

- Empirical data from two industrial projects at a large company using a product line approach
- Has approximetely 5000 employees
- Develops embedded systems for a global market
- The company uses a stage-gate model for requirements projects

Requirements Management Process

– **Requirements Teams *(RTs)* and Design Teams *(DTs)***



Methodology

STEP 1: Research questions definition

STEP 2: Features transition types definition

- Three types of transitions considered to be the most important.

STEP 3: Empirical investigation of previously derived assumptions in the given company context

- Selecting projects for the analysis
- Finding transitions
- Creating Feature Transition Charts for the selected projects

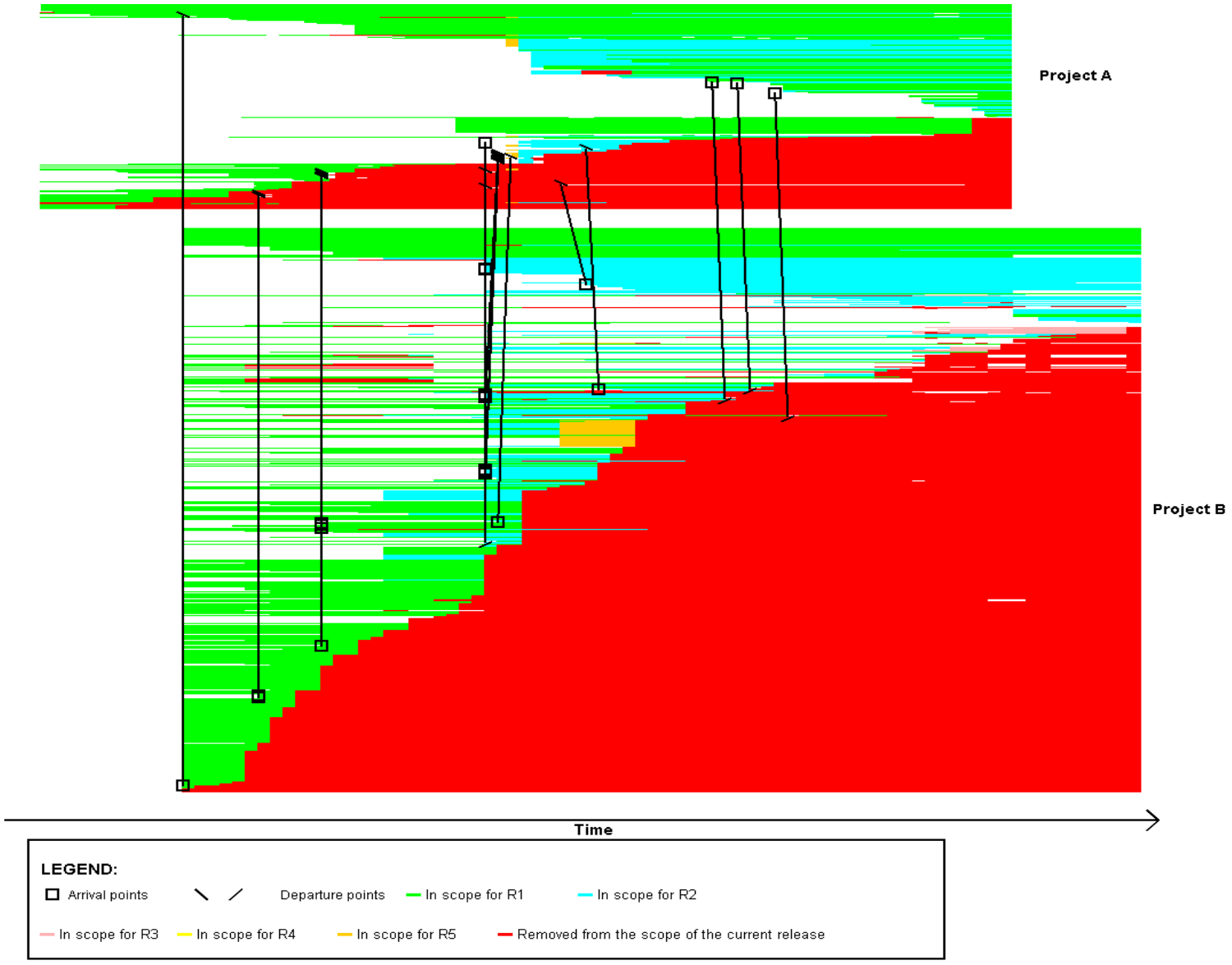
STEP 4: Initial validation with practitioners

- Discussing the phenomenon
- Analyzing the results
- Collecting opinions and critique

Feature Transitions Types

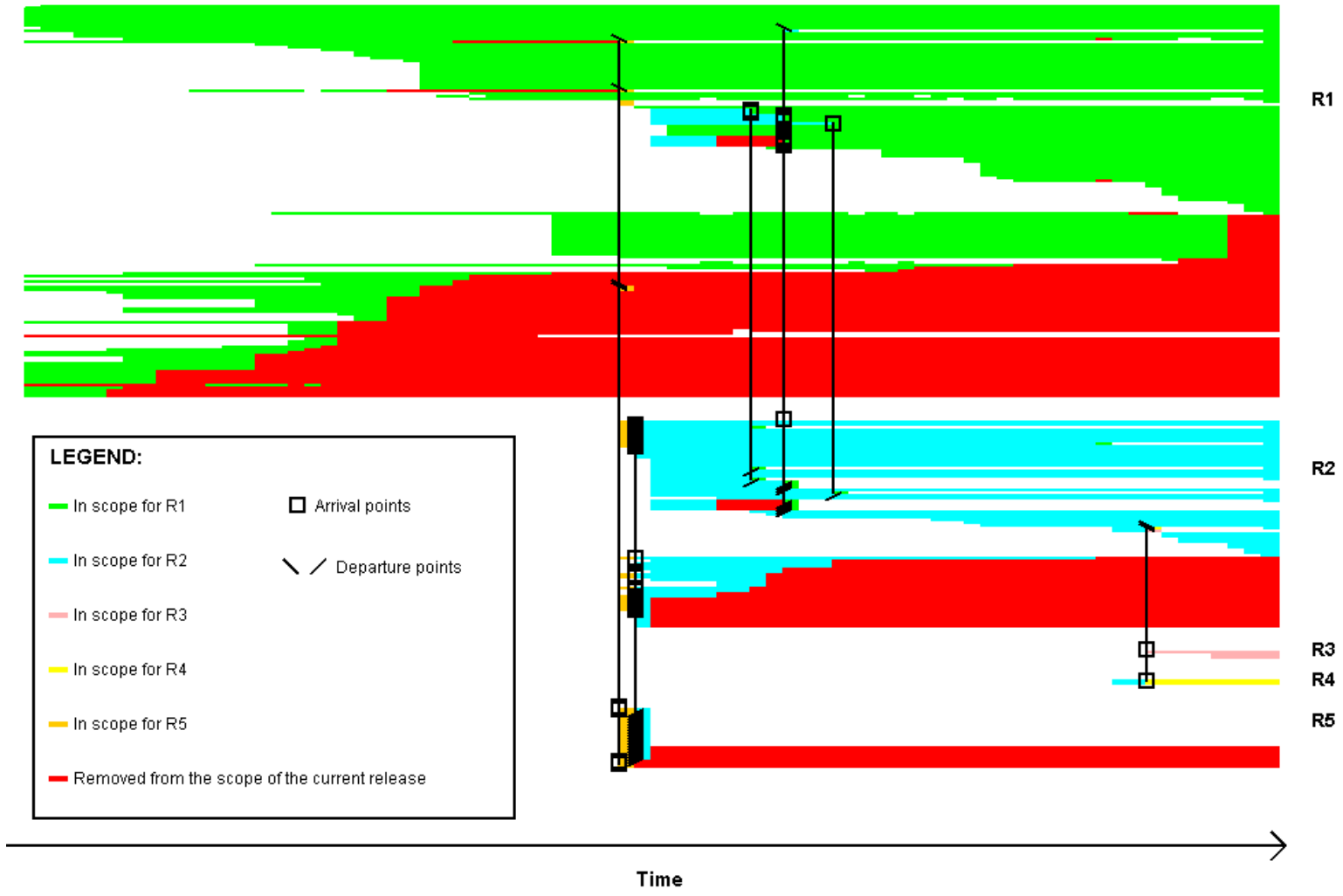
- Cross-project Feature Transitions
- Within-project Feature Transitions
- Multi-step Feature Transitions

Cross-project transitons on the Industrial Example



4 backward and 21 forward transitions

Within-project transitons on the Industrial Example



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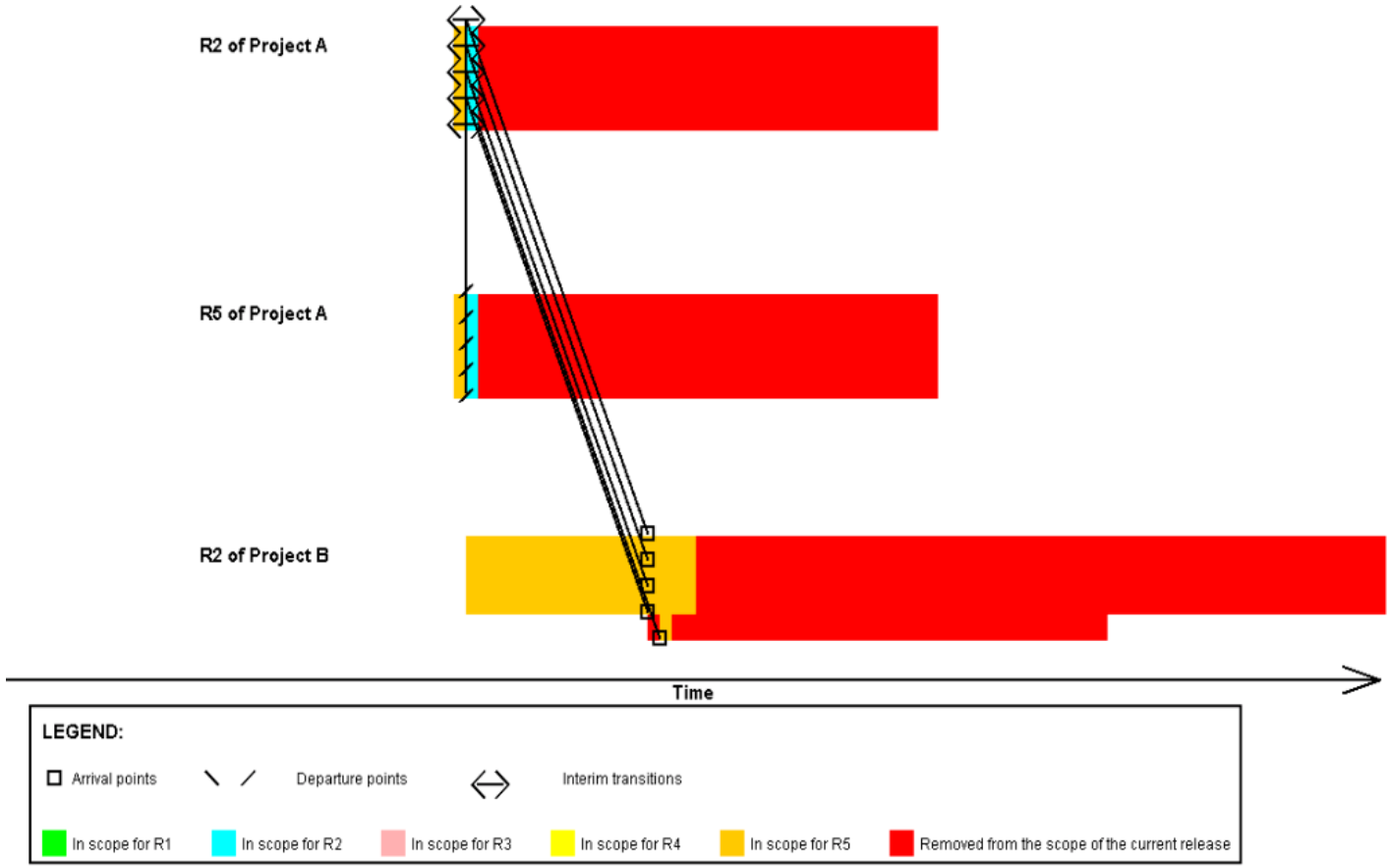
Multiple transitions on the Industrial Example



Initial Validation

- Practitioners expressed their interest in visualizing cross-project transitions
- Feature transitions may sometimes heavily influence the market value of affected features
- It is crucial to visualize the transitions because of so called *enablers*
- Usefulness and applicability of each type of transition
  - Cross-project visualization turned out to be ranked the most useful
- Size and magnitude symbols
  - Useful in providing an effective overview in timing and magnitude

Conclusions

- The FTC can scale to large projects
- The practitioners believe that FTC can give a comprehensive overview of scoping dynamics that have not previously been made explicit.
- FTC can be used by both requirements engineers and process managers to gain valuable information about the presence and nature of scope changes across projects or projects' releases.
- The proposed visual symbols for departure and arrivals of feature transitions can be useful in providing an effective overview of the timing and magnitude of feature transitions.

Future work

- Enhanced tool support with the possibility of zooming interactively.
- Other means of marking the departure and arrival points.
- Additional work should be performed to address the applicability of FTC in other contexts (information systems domain or single product development).

Questions?