The prevalence of code over models: turning it around with transparency

MoDRE 18

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Support from:
Goal of this Talk

Discuss the prevalence of modeling over coding
Plan Driven Software Process

• Based on the book “Engineering Software as a Service” by Armando Fox and David Peterson
• Government Contracts
• Lengthy specifications and contracts
• Acquisition Regulations
• “Contractor makes more money the longer it takes to develop the software”
Agile Way (Captured from https://www.atlassian.com/software/jira)

Go agile with ease

Whether you’re a seasoned agile expert, or just getting started, Jira Software unlocks the power of agile.

Flexible planning

Accurate estimations
Estimations help your team become more accurate and efficient. Use story points, hours, t-shirt sizes, or your own estimation technique. Jira Software supports them all.

Value-driven prioritization
Order user stories, issues, and bugs in your product backlog with simple drag and drop prioritization. Ensure stories that deliver the most customer value are always at the top.

Transparent execution
Whether your team is across the table or around the world, Jira Software brings a new level of transparency to your team’s work and keeps everyone on the same page.

Actionable results
Extensive reporting functionality gives your team critical insight into their agile process. Backed by data, retrospectives are more data-driven and actionable than ever before.

Scalable evolution
Add and change issue types, fields, and workflows as your team evolves. Jira Software is agile project management designed for teams of every shape and size.
GitHub (captured from https://github.com/)

...whether you’re making your first commit or sending a Rover to Mars, there’s room for you here, too.

GitHub’s users create and maintain influential technologies alongside the world’s largest open source community.

Developers use GitHub for personal projects, from experimenting with new programming languages to hosting their life’s work.

Businesses of all sizes use GitHub to support their development process and to securely build software.

* As of June 2018
“In short, developers will be at the center of solving the world’s most pressing challenges. However, the real power comes when every developer can create together, collaborate, share code and build on each other’s work. In all walks of life, we see the power of communities, and this is true for software development and developers.”

Satya Nadella, Microsoft Chief Executive Officer [4]
GitHub (captured from https://github.com/)

More than 1.8 million businesses and organizations use GitHub.
What is GitHub?

- [https://www.youtube.com/watch?time_continue=10&v=w3jLU7DT5E](https://www.youtube.com/watch?time_continue=10&v=w3jLU7DT5E)

“As of January 2015, this 86 terabyte repository contained a billion files, including over 9 million source code files containing a total of 2 billion lines of source code, with a history of 35 million commits and a change rate of 40 thousand commits per work day.`, and “But generally any engineer can access any piece of code, can check it out and build it, can make local modifications, can test them, and can send changes for review by the code owners, and if an owner approves, can check in (commit) those changes. Culturally, engineers are encouraged to fix anything that they see is broken and know how to fix, regardless of project boundaries.”
Henderson, Fergus. "Software engineering at Google"

- A search for the string “model” in Henderson’s paper returned no results.
“Individuals and teams at Google are required to explicitly document their goals and to assess their progress towards these goals.”
Recent research on industry adoption of MoDRE

- lack of standards on modeling languages,
- lack of training,
- alignment of managerial goals with the type of modeling to be used,
- tool support,
- traceability,
- model as the baseline, ensuring consistency across refinement levels (configuration management).
- On the other hand, reports on requirements practice in industry [13], [14], [15] show the prevalence of text and the effectiveness of collaboration.
Continuous clarification and emergent requirements flows in open-commercial software ecosystems [13]

Fig. 2 Visualization of emergent communication in the CLM ecosystem (here: from the perspective of RTC). Discussions of requirements in the RTC issue tracker receive contributions from emergent contributors, either from other product teams within IBM or from other organizations. Size of nodes depicts number of emergent contributions by this stakeholder, color of links depicts comment type (yellow requirements negotiation, green coordination, brown information) (color figure online)
The evolution of requirements practices in software startups [14]

Fig. 3: Positioning the companies along the 6 dimensions of the Theory of Requirements Practice Evolution

“Here we include a radar diagram showing the two startups that changed the least and the most in evolving their requirements practices, C06 and C03 respectively, as well as the mode for each dimension...”
Transparency

• Transparency has been evoked as a desired quality for software
• However, Transparency is not just visibility
• Transparency is a general quality. It is implemented by a set of policies, practices and procedures that allow citizens to have accessibility, usability, informativeness, understandability and auditability of information/processes held by centers of authority (society or organizations).
Social coding in GitHub: transparency and collaboration in an open software repository [8]

• “In this work we examined how individuals interpreted and made use of information about others’ actions on code in an open social software repository. We found that four key features of visible feedback drove a rich set of inferences around commitment, work quality, community significance and personal relevance. These inferences supported collaboration, learning, and reputation management in the community.”
Software Transparency (T[AIUIUA])
Transparency [AUIA]
Accessibility[PAP]

- Portability
- Availability
- Publicity

Help connections: Accessibility → Portability, Accessibility → Availability, Accessibility → Publicity.
Usability [USOPAUI]
Informativeness [CIACCCCC]
Understandability [CCDED]

- Conciseness
- Composability
- Decomposability
- Extensibility
- Dependency
Auditability [VCVTA]
SIG (Operationalization) [16]
GitHub (captured from https://github.com/)

Features

• Project management
• Code review
• Team management
• Social coding
• Documentation
• Code hosting
Project Management

• Issue
  – Tasks (list), Assignees and Mentions (Notifications), Labels, Milestones

• Link Issue : Pull request

• Project board
  – Organize by status, Add tasks, Share work, See activities
Project Management

- **Issue**
  - Tasks (list), Assignees and Mentions (Notifications), Labels, Milestones
- **(Link Issue: Pull request)**
- **Project board**
  - Organize by status, Add tasks, Share work, See activities
Code Review

- Pull request
- Change
  - Colors, Diffs, History (commits, comments, references), Blame (partial view)
- Discuss Code
  - Comments, Review Requests, Resolve Conflicts
- Merge
  - Permissions, Protected branches, Required status checks
Code Review

- Pull request
- Change
  - Colors, Diffs, History (commits, comments, references), Blame (partial view)
- (Discuss Code)
  - Comments, Review Requests, Resolve Conflicts
- Merge
  - Permissions, Protected branches, Required status checks
Team Management

- Manage
  - Permissions, Roles, Nested teams
- Focus the conversation
  - Moderation
- Set guidelines
  - Common codes
Team Management

- Manage
  - Permissions, Roles, Nested teams
- Focus the conversation
  - Moderation
- Set guidelines
  - (Common codes)

Usability

Uniformity

help

operationalization (possible implementation)
Social Coding

- Follow projects
- Explore projects
- Share achievements
Social Coding

- Follow projects
- Explore projects
- Share achievements

Accessibility

Publicity

help

operationalization (possible implementation)
Documentation

- Web Pages
- Wikis
- Extensions
Documentation

- Web Pages
- Wikis
- Extensions

Informativeness

Understandability

Current

Extensibility

operationalization (possible implementation)
Code Hosting

- Just one place
- Easy access
- Repository
Code Hosting

- Just one place
- Easy access
- Repository
GenMyModel (Captured from https://www.genmymodel.com/)
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Centralized Model Repository
Share your knowledge with versioning and access right management.

Collaboration Made Easy
Collaborate easily & simultaneously with your team on the same model.

Fast and Intuitive interface
GenMyModel combines the power of desktop modeling tools with the efficiency of a modern web solution.

Industry Standards Compliance
Finally a tool which respects 100% of the UML 2.5 standards to model your software, and BPMN 2 standards for your business process.
Future Research
“When Alice visualised the Broken Instrument Alarm task in context (Figure 4), she noted risks (red ellipses) that may impact the task (the blue ellipse). By clicking on nodes in the model, Alice obtained details of these risks, including details of potential attackers. This allowed her to review the rationale behind the models created by Bob.”
Fig. 4. Traceability graph (TG): Border colors represent the impact, fill colors corresponds to the viewpoint. (a) TG. (b) TG with hidden viewpoints (blue and cyan are missing). (c) TG with transparent pseudo nodes showing their containing families (according to the zoom level). (d) Fully expanded TG.
Evaluation of goal models in reuse hierarchies with delayed decisions [19]

Bank Concern

Comparable

Normalization of Ranges

Pruning of Goal Models

MoDRE 2017 - Lisbon, Portugal
Seamless Integration of Multirequirements in Complex Systems [20]

Figure 3. Multiviews dimension: create translation links between common tools and an interface (the RSML) with more formal language (Eiffel).
Eyeballs

- In their ICSE 11 paper Ownership, experience and defects: a fine-grained study of authorship, Foyzur Rahman, Premkumar T. Devanbu: "We found that implicated code is more strongly associated with a single developer’s contribution; our findings also indicate that an author’s specialized experience in the target file is more important than general experience." --> which stipulates that given enough eyeballs, all bugs are shallow (Linux Law by Eric Raymond)
Future?

- As such, the adoption of more abstract representations (model oriented), as the research community have been forecasting, is yet to happen.
  - Is it?

- Several environments do allow collaborative modeling.
  - For instance: The Design Sprint (https://www.gv.com/sprint/)
    “The sprint gives teams a shortcut to learning without building and launching. The sprint is a five-day process for answering critical business questions through design, prototyping, and testing ideas with customers.”
  - Our experience
3C Collaboration Strategy

"The 3C collaboration model is based on the idea that to collaborate, members of a group communicate, coordinate and cooperate. The 3C model derives from the seminal article by Ellis et al."

"Communication involves the exchange of messages and the negotiation of commitments. Coordination enables people, activities and resources to be managed so as to resolve conflicts and facilitate communication and cooperation. Cooperation is the joint production of members of a group within a shared space, generating and manipulating cooperation objects in order to complete tasks [Fuks et al. 2005]. Despite their separation for analytic purposes, communication, coordination and cooperation should not be seen in an isolated fashion; there is a constant interplay between them."

3C Collaboration Strategy

- Cooperation
- Communication
- Coordination

Presencial Meeting

Operationalization (SIG)

White Board
Pen

Senior Researcher

Sig Paper

Senior Researcher
Researchers
3C Collaboration Strategy (Actors)

Julio Cesar Sampaio do Prado Leite, Vera Werneck, Antonio de Pádua Albuquerque Oliveira, Claudia Cappelli, Ana Luiza A. Cerqueira, Herbet de Souza Cunha, Bruno González-Baixauli:
Understanding the Strategic Actor Diagram: an Exercise of Meta Modeling. WER 2007: 2-12
3C Collaboration Strategy (White Board)
However ...

- "Code is King"
- It will always prevail
- The holly grail is to make the transition from modeling to code transparent. Is it?
THANK YOU !
References


