THREAT MODELLING

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MOTIVATION

- THE GOAL IS TO CREATE AWARENESS ABOUT THE POSSIBLE THREATS
- RECENTLY MORE AND MORE DEVICES HAVE BECOME INTERCONNECTED
- SECURITY IS MAINLY AN AFTERTHOUGHT
- THERE ARE VERY FEW SECURITY EXPERTS
- GIVE SOMEONE WITH NO BACKGROUND IN SECURITY THE ABILITY TO IDENTIFY VULNERABILITIES

BACKGROUND

- THREAT MODELING IS USED TO ANALYZE, DISCOVER AND DESCRIBE VULNERABILITIES IN SYSTEMS
- THREAT MODELING DESCRIBES WHAT IS BEING MODELED IN MORE CONTEXT THAN JUST SECURITY FIRST.
- THREAT MODELING CAN BE USED FOR SECURITY SYSTEMS, AIRCRAFT, AUTOMOBILES, EMBEDDED CONTROLS, PHONES, CAMERAS, WIRELESS EQUIPMENT, AND EVEN THINGS AS SIMPLE AS PHYSICAL ROOMS.

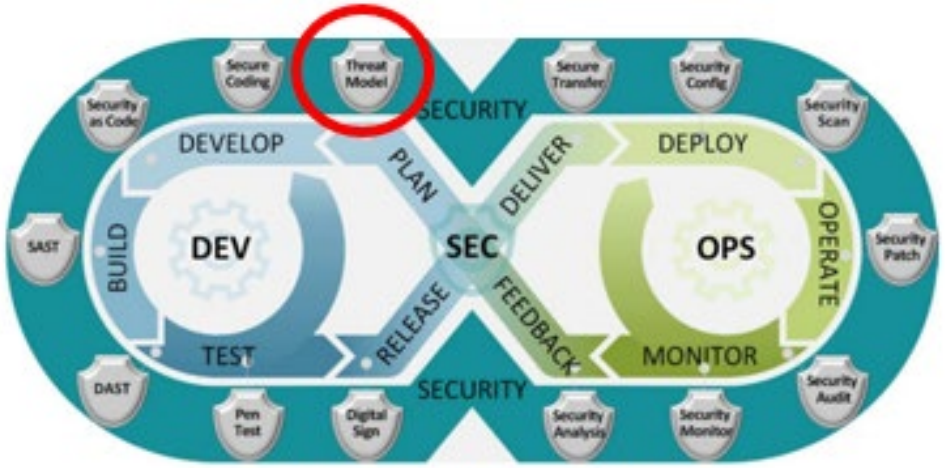
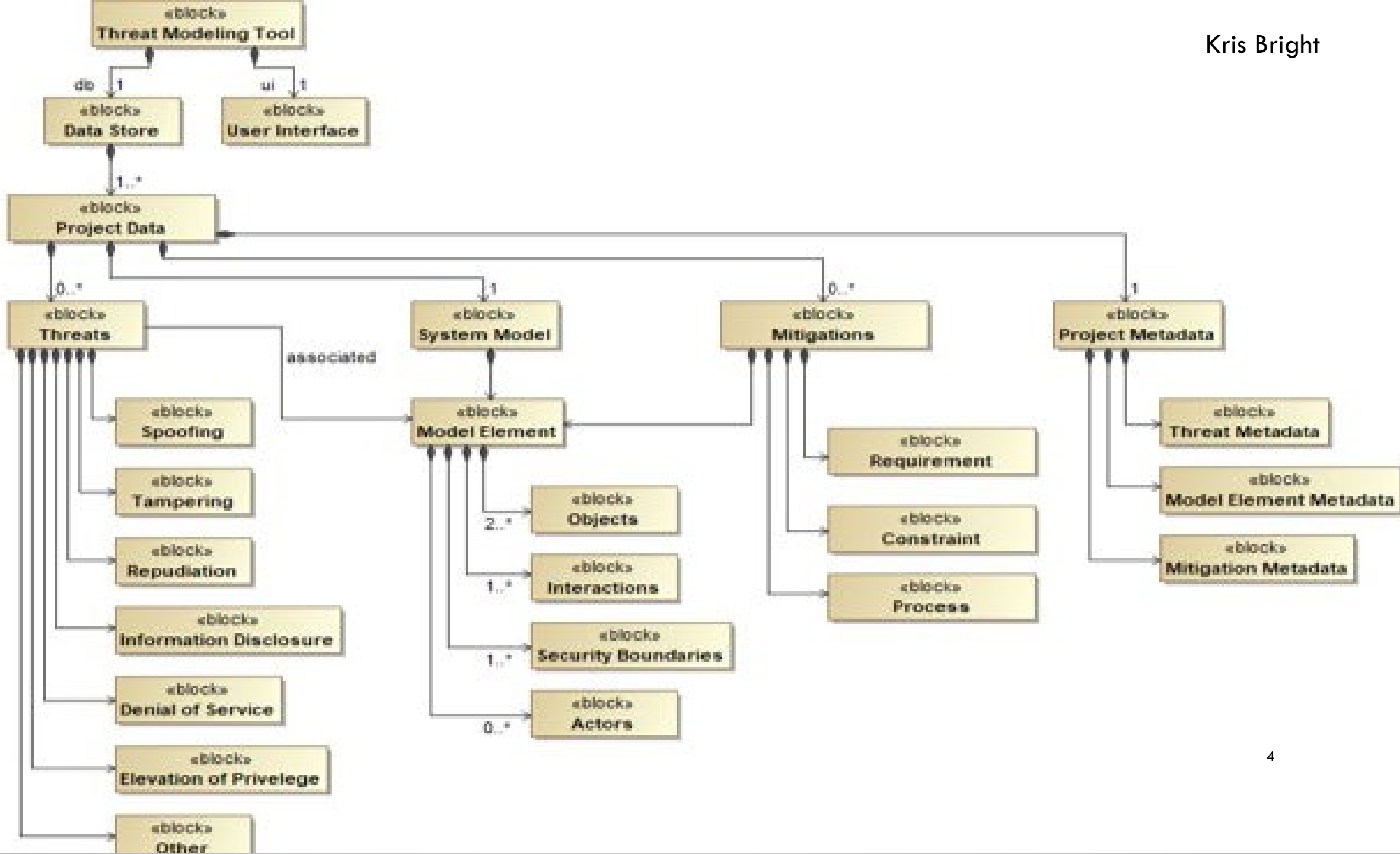


Figure 3: DevSecOps Software Lifecycle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Threat Modeling Tool
db
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ui
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Data Store
«block»
User Interface
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«block»
Project Data
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1
0..*
1
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Threats
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System Model
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Mitigations
«block»
Project Metadata
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Spoofing
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Tampering
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Repudiation
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Information Disclosure
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Denial of Service
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Elevation of Privelege
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Other
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Model Element
2..*
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Objects
1..*
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Interactions
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Security Boundaries
0..*
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Actors
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Requirement
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Constraint
«block»
Process
«block»
Threat Metadata
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Model Element Metadata
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Mitigation Metadata

PROJECT REQUIREMENTS

- TECHNICAL REQUIREMENTS
  - USER INTERFACE – EXTREMELY SIMPLE GUI (WYSIWYG)
  - ASSISTED FUNCTION – TOOLTIPS, VISUAL GUIDANCE, ON/OFF CAPABILITIES
  - IMPORT/EXPORT FUNCTIONALITY
  - SAVE AND LOAD
  - VERSION CONTROLLED – GITHUB
  - FRONTEND AND BACKEND : ANGULAR AND PYTHON
  - EXTENDABLE CODE (MINIMUM VIABLE PRODUCT)
  - MAINTAINABLE CODE

REQUIREMENTS CONTINUED

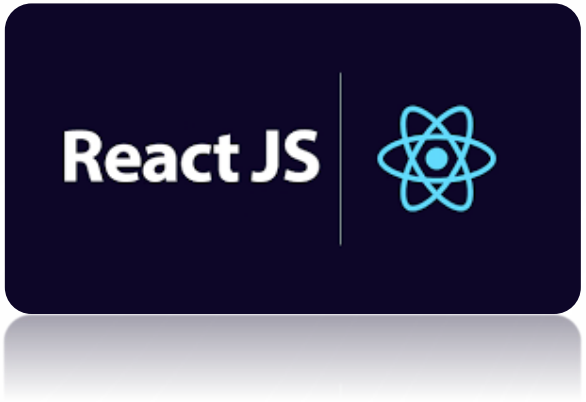
- STANDARD REQUIREMENTS
  - OPEN SOURCE
  - REGULAR CODING STANDARDS
  - PUSH/PULL REQUEST
  - USING BRANCHES ON VERSION CONTROL NOT MAIN
- CONSTRAINT REQUIREMENTS
  - NO ADMIN
  - COLORBLIND ADAPTABILITY
  - TESTABLE CODE
  - UNIX STYLE TIME RECORDING
  - CAPABILITY TO RUN ON ANY AVERAGE LAPTOP

DESIGN OPTIONS

Joe Swiney

1) FrontEnd Selection

React	
Pros:	Cons:
• Easier to learn • An abundance of online resources • Runs natively in browser	• Not a complete framework as it requires additional packages • No team member has experience



Angular	
Pros:	Cons:
• Complete framework out of the box • An abundance of online resources • Runs natively in browser • Team members have experience	• Steeper learning curve

2) BackEnd Selection

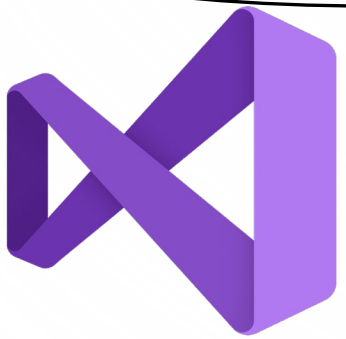
Rust	
Pros:	Cons:
• Faster execution • Similar to Java • Automatic garbage collection • Memory efficient	• No team members have used Rust • Slightly more difficult to implement • Less third-party support • Fewer online resources

Python	
Pros:	Cons:
• Three team members have used it in a professional setting • An abundance of open-source packages available • Automatic garbage collection	• Minimal learning curve for the one team member without experience • Less memory efficient • Slower execution

Joe Swiney

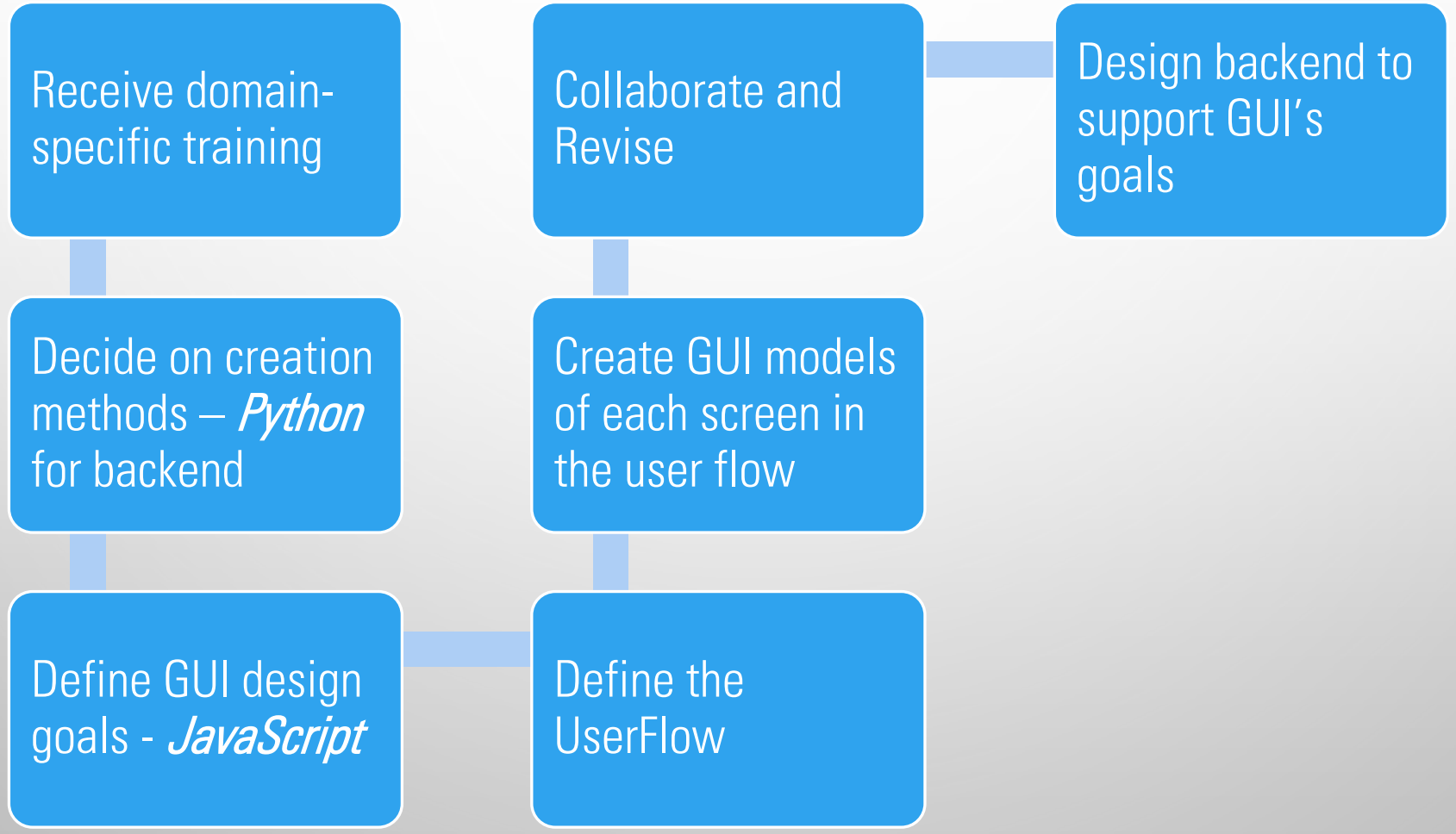
2) Integrated Development Environment Selection

JetBrains	
Pros:	Cons:
• Specialized IDEs for each language • A large variety of add-ons for code linting and syntax highlighting • Built-in, user-friendly debugger • Professional versions available free for students • Built-in GitHub integration • Optimized for Mac and PC • Recommended by CS professor for JavaScript development	• Requires a different application for each language



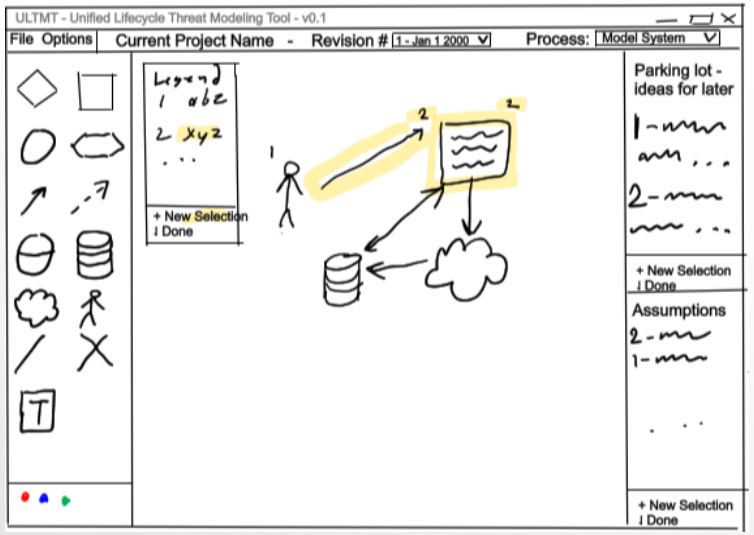
Visual Studio	
Pros:	Cons:
• Built-in, user-friendly debugger • Add-ons for all necessary languages • Both languages can be written in the same application	• Initial setup can be difficult • Not optimized for Mac • Can be slow

DESIGN TRACK

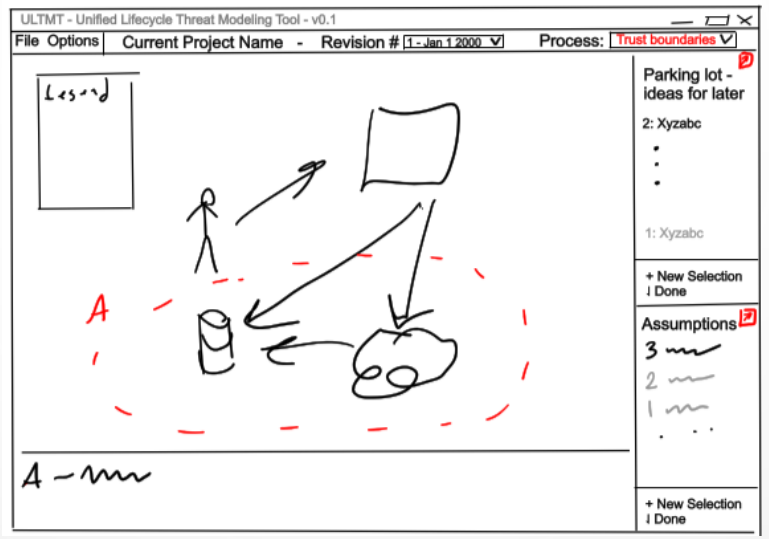


DESIGN DETAILS

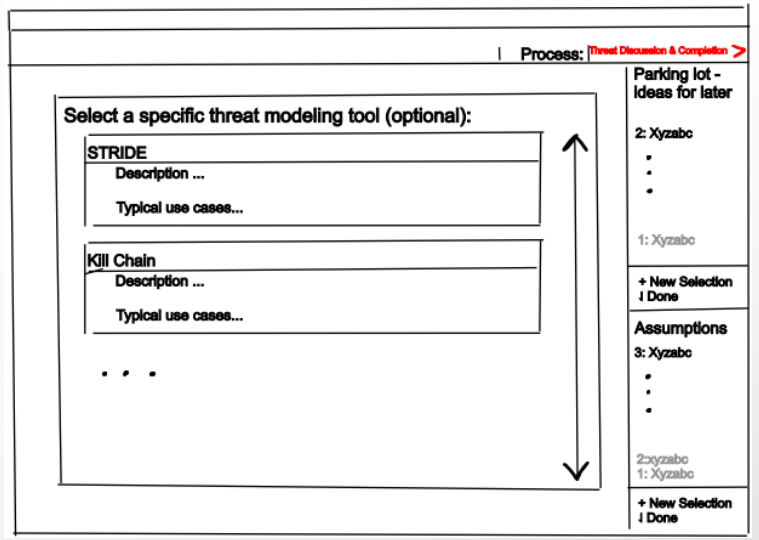
Cooper Zuranski



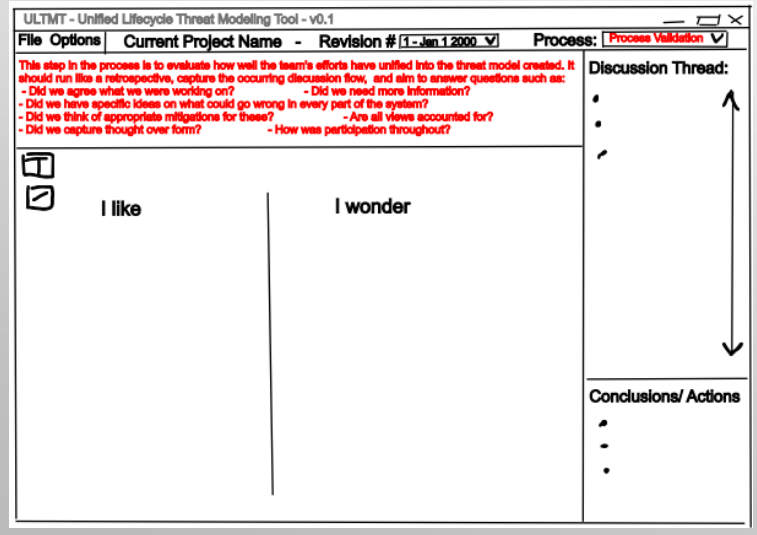
Model System



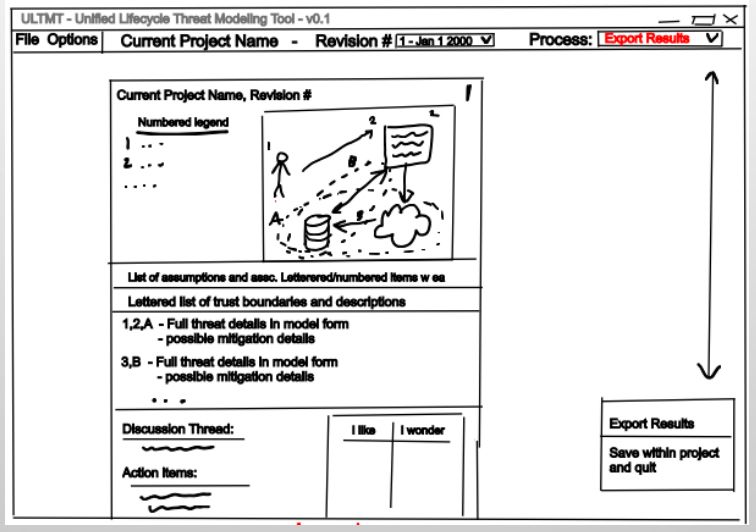
Trust Boundaries



Threat Discussion and Completion



Process Validation



Export Results

Model Confirmation

SYSTEM TEST PLAN

Kris Bright

Mocha/Chai	
Pros:	Cons:
• **Automated testing process** • **Can continuously test or perform tests on-demand** • **Can test complex functionality** • **Human-readable syntax** • **Free** • **One team member has experience, though the experience is limited**	• Complicated syntax can be confusing for newer users • Documentation isn't always clear

JEST	
Pros:	Cons:
• **Simple syntax that is human-readable** • **Good documentation available online** • **Can test complex functionality**	• No group member has experience

unittest	
Pros:	Cons:
• **Automated testing process**	• No external plug-ins

PyTest	
Pros:	Cons:
• **Automated testing process**	• Over 800 external plug-ins to speed up creation of test cases

POTENTIAL RISK AND MITIGATION

- LITTLE TO NO PHYSICAL RISK DUE AS IT'S PURELY SOFTWARE
- FAILING TO MAKE SOFTWARE EASILY EXTENDABLE
- HIDDEN SOFTWARE BUGS
- ISSUES WITH VERSION CONTROL
- FAILING TO MEET BASIC CONSTRAINTS

PROJECT PLAN

Determine Requirements	Design Initial Iteration	Threat Modeling Training	Modify Initial Iteration Design	Finalize Design	Sponsor Check In	Initial UI Implementation	UI Demonstration
Weeks 1-5							
	Weeks 5-7						
		Week 8					
			Weeks 9-11				
				Weeks 11-13			
						Weeks 13-15	
							Week 16

Fig. Semester 1 Project Plan

Integrate Backend	Write Tests	Sponsor Check In	Integration Testing	Sponsor Check In	Systems Testing	Project Refinements
Weeks 17-20						
	Weeks 20-22					
			Weeks 23-25			
					Weeks 26-29	
						Weeks 29-32

Fig. Semester 2 Project Plan

QUESTIONS?