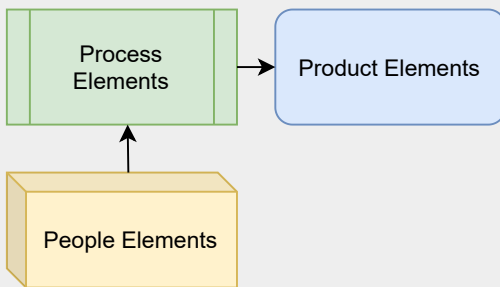
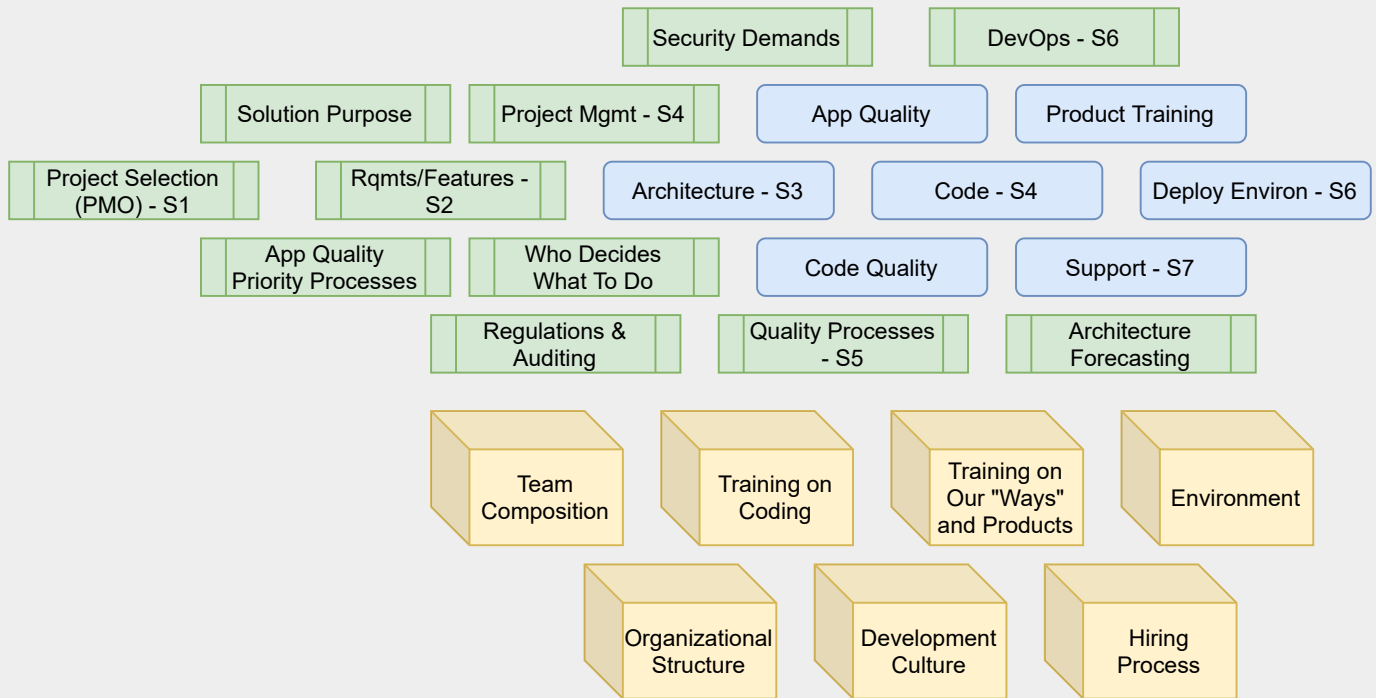


The Elements of Software Development

Things that influence how software is developed



The elements of software development are shown in three categories:

1. People elements influence the skills of the people developing the software and their attitudes and ability to do the work.
2. Process elements influence the ways ideas get transformed into products.
3. Product elements influence the experience and satisfaction of the people using the product produced by the processes.

This diagram also associates the classical steps of an SDLC with the elements

- S1 - Planning: Project Selection (PMO)
- S2 - Analysis and Requirements: Requirements/Features
- S3 - System Design: Architecture
- S4 - Development: Project Management. Also Code
- S5 - Testing: Quality Processes
- S6 - Implementation: DevOps. Also Deploy Environment
- S7 - Operations & Maintenance: Support

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The Elements of Software Development

People Elements

#	Element	Questions to identify how an element is implemented
1	Organizational Structure	<p>Do developers spend the majority of their time developing a single product?</p> <p>Do developers complete projects then do little with their solutions after the project is complete?</p> <p>Do teams have specialists that divide their time across many teams?</p> <p>Do developers work in a matrix structure?</p> <p>Are developers consultants?</p> <p>Is there a Project Management Office managing priorities?</p>
2	Development Culture	<p>Are developers excited and thrilled to be at work every day?</p> <p>Do developers enjoy providing excellent customer service?</p> <p>Do employees believe they can make a difference?</p> <p>Do employees have the freedom to fail?</p> <p>Do employees work in fear of losing their job or retribution for mistakes?</p> <p>Do people do work from intrinsic motivation or do they require carrots and sticks?</p> <p>Does everyone help everyone else?</p> <p>Is everyone honest and open?</p>
3	Hiring Process	<p>How do candidates begin the hiring process?</p> <p>Does HR filter candidates first?</p> <p>Does HR know the personality traits that will work best in the exact role you are trying to fill, or does HR generalize about the personality traits of acceptable employees?</p> <p>Can you adequately determine via your hiring process which candidates will thrive and contribute, and which are unlikely to be satisfied or succeed?</p>
4	Team composition	<p>Do your developers have a lot of experience developing software in contexts like yours?</p> <p>Do your developers have experience in other contexts that could be used to improve yours?</p> <p>Is your team comprised solely of junior developers?</p> <p>Do developers understand the business domain?</p> <p>Is the business domain simple or complex (social media domains are simple, quantum mechanics cryptography is complex).</p> <p>Are team members all located closely together geographically?</p>
5	Training on coding languages and development tools	<p>Are your coders excellent at the programming languages used or novices?</p> <p>Are your coders experts with the tools and environments in which they are coding and deploying?</p> <p>Do your developers grok Agile?</p>
6	Training on our "ways" and products	<p>Do your developers understand how things are done and how to get things done in your environment?</p> <p>Do they understand your coding guidelines, product domain, and processes for developing, testing, and deploy?</p> <p>Can your developers fix those processes and create new and better processes, or can they just use the existing processes?</p> <p>Do they know who to work with in other areas of the business to answer questions and get things done?</p>
7	Environment	<p>Do your developers have current hardware, network bandwidth, multiple monitors, and comfortable workstations free of distractions and interruptions?</p> <p>Do they have modern development tools and frameworks and processes to help them improve code quality and identify deficiencies quickly?</p>

The Elements of Software Development

Process Elements

#	Element	Questions to identify how an element is implemented
8	Project Selection	<p>How are projects selected to be worked on? Do developers have input the selection? Does a remote Project Management Office (PMO) make all the decisions? Is there visibility to the selection process? Do product owners "own" developer teams dedicated to working on their products? Do customers drive what projects are worked on next? <i>Project Selection aligns with the Planning Phase of the SDLC.</i></p>
9	Solution Purpose	<p>What is the purpose of the solution? Will it be used internally? Is it just a demo? Is it a prototype or proof of concept? Is it primarily to learn new technologies? Is it customer facing? Is it the core of the business? Is it for one customer or many? Will it only be used for a single event or activity or short duration?</p>
10	Application Architecture Priorities	<p>What is the relative importance of each of these aspects of the solution: Security, Customer Satisfaction, Up Time, Accuracy, Being First to Market, Being Feature-Rich, Ease of Use, Easy to Maintain, Speed/Performance, or some other aspect? Does everyone on the team know which of aspects are most important in the product? How do your development processes facilitate achievement of those goals? How important is application up time? How important is security?</p>
11	Security Demands	<p>How much emphasis do you need to place on application security? How likely is your application to be a target of hackers? How do the security requirements restrict your choice of architectures and frameworks? How do they affect your development processes and the auditing of such? How do they affect your deployment strategies and options?</p>
12	Requirements, Features, and Priorities	<p>How do you acquire the requirements for the product or project? How detailed are features when the developers start work on them? How easily and frequently can developers work with product owners for clarification and guidance? How are features and requirements prioritized? <i>Requirements, Features, and Priorities aligns with the Requirements Gathering Phase of the SDLC.</i></p>
13	Regulations & Auditing	<p>Do any regulations such as HIPAA, PCI, GDPR, and PCI affect how you manage data and control access to information? Do auditing compliance guidelines dictate or influence software development processes? Can you work with auditors to alter your practices to improve your efficiency while maintaining compliance? Do regulations prevent the use of some technology solutions and tools?</p>
14	Who Decides What To Do?	<p>Who decides at a daily and weekly level what to work on next? Do developers control their time and their ability to invest it in improving new processes or learning new skills? Do product owners make decisions about what each person will focus their time on each week? Does a project manager allocate a developers time across multiple products and projects? Does a technical team lead help developers allocate their time weekly and daily?</p>
15	Project Management	<p>How do you manage and track the completion of tasks and features? How are features and bugs priorities? What tools do you use and what visibility do these tools provide to management? Do you use agile approaches like Scrum or Kanban or do you a waterfall approach or even no defined process? <i>Project Management aligns with the Development Phase of the SDLC.</i></p>
16	Quality Processes	<p>How do you know your software is doing what your customers want it to do? How thoroughly are features tested? How is regression testing performed? Is there a team of Quality Assurance (QA) people playing a role? Is code reviewed by other developers? Are developers mentoring junior developers and developers new to the product? Are there automated test suites? Does static code analysis look for bugs, security flaws, outdated third party libraries and adherence to other guidelines? Do you have Pen Tests and Performance Test suites for your applications? Do you have training for programmers? <i>Quality Processes aligns with the Testing Phase of the SDLC.</i></p>

17	Architecture Forecasting	<p>Are developers and marketing aware of new technologies that may affect how you want your software solutions to evolve?</p> <p>Are developers keeping the software up to date with newer versions of frameworks and libraries to minimize the disruption that could come from large updates and to take advantage of productivity enhancements in newer software?</p> <p>Are software architects keeping the doors open for the evolution of architecture in new directions to prevent it from becoming obsolete?</p> <p>Are developers learning of new techniques and processes for the process of software development that may be used to make improvements?</p>
18	DevOps	<p>Have you automated your builds?</p> <p>Can you automatically deploy to test or production?</p> <p>Do you have test and QA environments?</p> <p>Do you have source code that automatically starts builds and runs static analysis and unit tests?</p> <p>Do developers dread when it comes time to deploy their code?</p> <p>Is deployment handled by developers or others?</p> <p>Are configurations for environments managed by automation so they can be created on the fly?</p> <p>Are the configurations for environments managed securely throughout the whole SDLC?</p> <p><i>DevOps aligns with the Deployment Phase of the SDLC.</i></p>

The Elements of Software Development

Product Elements

#	Element	Questions to identify how an element is implemented
19	Architecture	<p>Does the application have multiple layers?</p> <p>Does the application use relational databases, document databases, or other external data stores?</p> <p>How do the layers of the app communicate with other layers?</p> <p>Does the solution run on a single computer or in a web farm or in the cloud?</p> <p>Does the solution need to scale across multiple computers and devices?</p> <p>Is the application comprised of microservices?</p> <p>Is it a SPA?</p> <p>Is it a static web site?</p> <p>Is the App UI coded separately from a data store?</p> <p>Is it an app for an app store for a phone or software embedded in a chip in hardware?</p> <p>Is the app built by a single team?</p> <p>Does it need to support many front end platforms?</p> <p><i>Architecture aligns with the Design Phase of the SDLC</i></p>
20	Code	<p>What code languages do you use to produce a solution?</p> <p>How does existing code impact how you approach making changes to it for new features and fixing bugs?</p> <p>How is the code organized and managed for input from multiple developers?</p> <p><i>Code aligns with the Development Phase of the SDLC</i></p>
21	Code Quality	<p>As a result of your development processes, how good is your code quality?</p> <p>How easily can it be modified to support new features?</p> <p>How well is it protected from bugs by unit tests?</p> <p>How long can the code provide a solution until it will need to be replaced or altered?</p> <p>How many bugs are in the code?</p>
22	Resulting App Quality	<p>Are customers happy with the solution?</p> <p>Is the application scalable, performant, and resilient?</p> <p>Is the customer's data secure?</p> <p>Is the application good at defending against hacking attempts?</p>
23	Deploy Environment	<p>Do you deploy the software to desktops?</p> <p>Is it deployed to the cloud?</p> <p>Is it deployed to a JamStack hosting site?</p> <p>Is it deployed to an internal web server?</p> <p>Is it embedded onto computer chips?</p> <p>Is it deployed through an App store?</p> <p>Do multiple teams build part of the solution and do their deployments need to be coordinated?</p> <p><i>Deploy Environment with the Deploy Phase of the SDLC</i></p>
24	Product Training	<p>Do customers and users of the software have access to adequate training?</p> <p>Are they aware of all the features?</p> <p>Can they find or figure out how to accomplish their desires easily with your software and its supporting documentation?</p>
25	Support	<p>How do customers let you know they need support?</p> <p>Who contacts customers to help them resolves problems?</p> <p>Who keeps the product running in the deployed environment?</p> <p>Do developers support the software or is that handled by a separate team?</p> <p><i>Support aligns with the Support Phase of the SDLC</i></p>