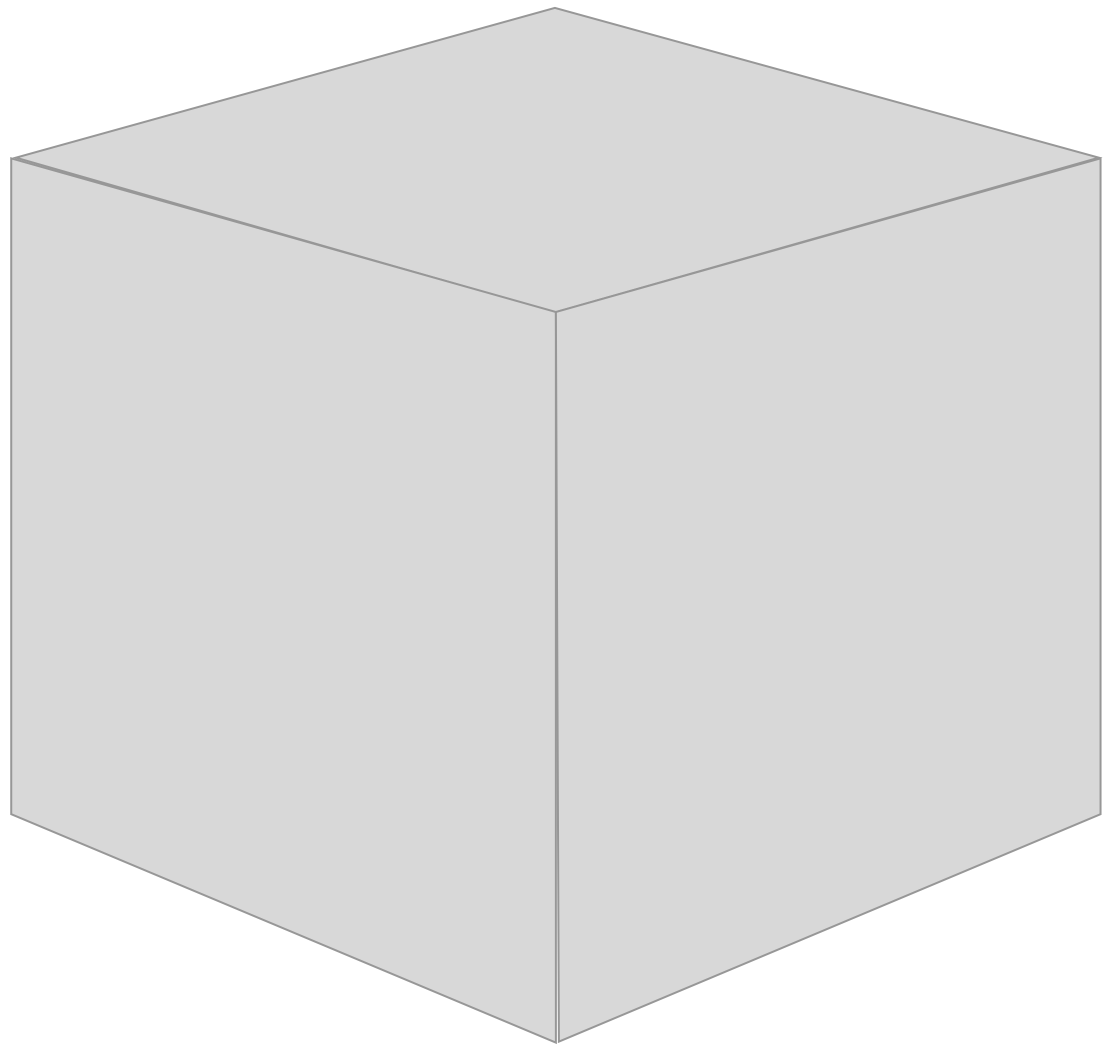
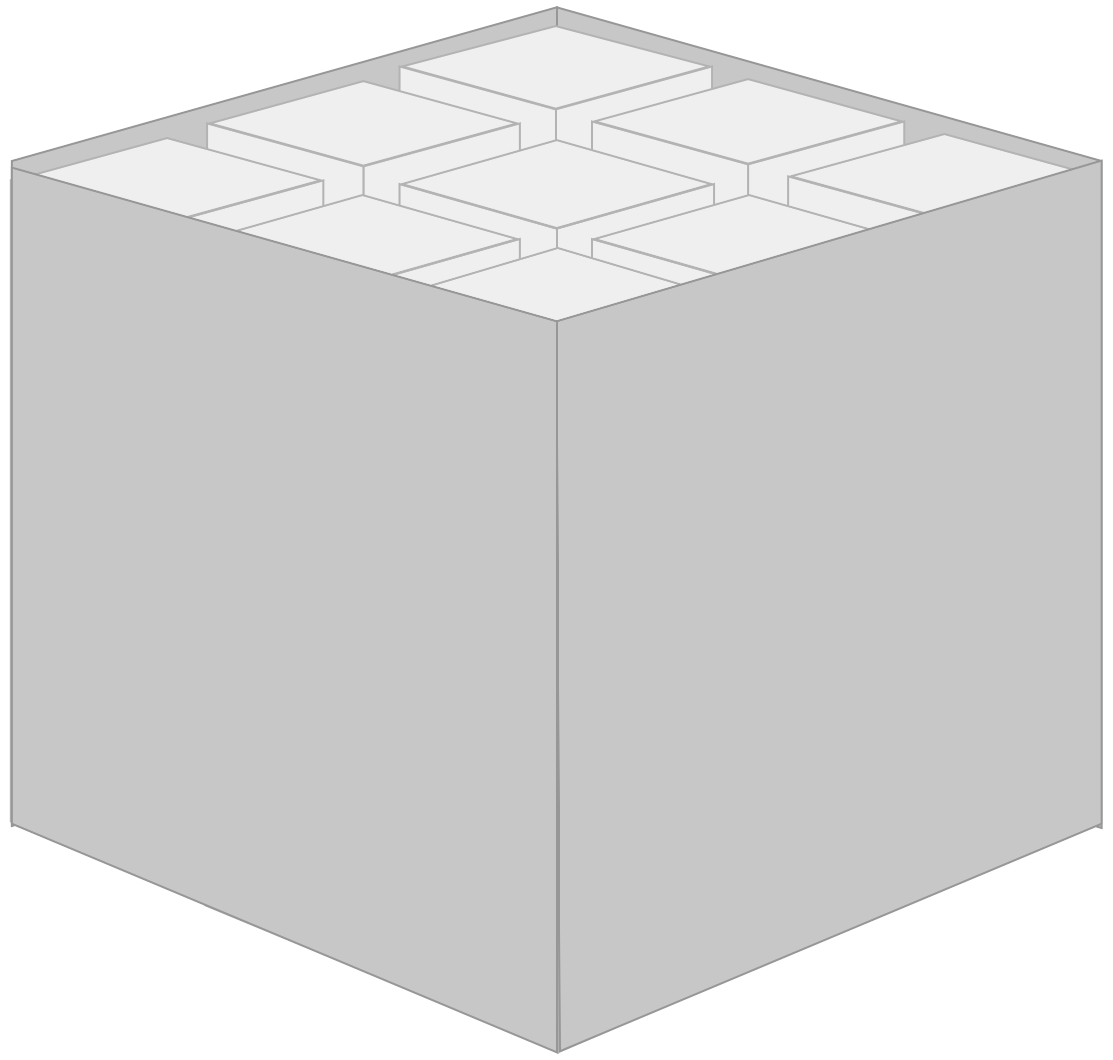
INFODECK

Self-Contained Systems

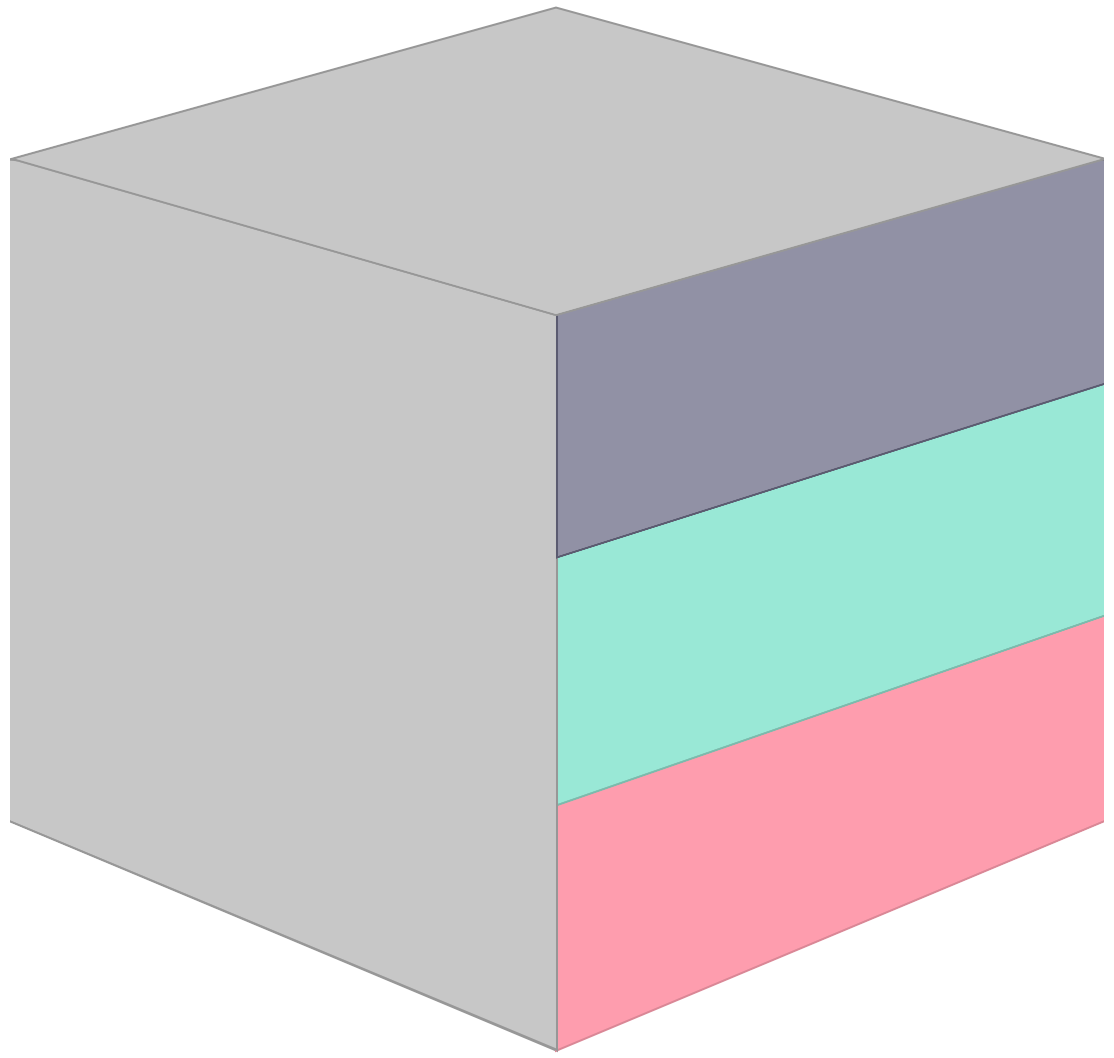
INNOQ



A monolith contains **numerous** things inside of a single system ...



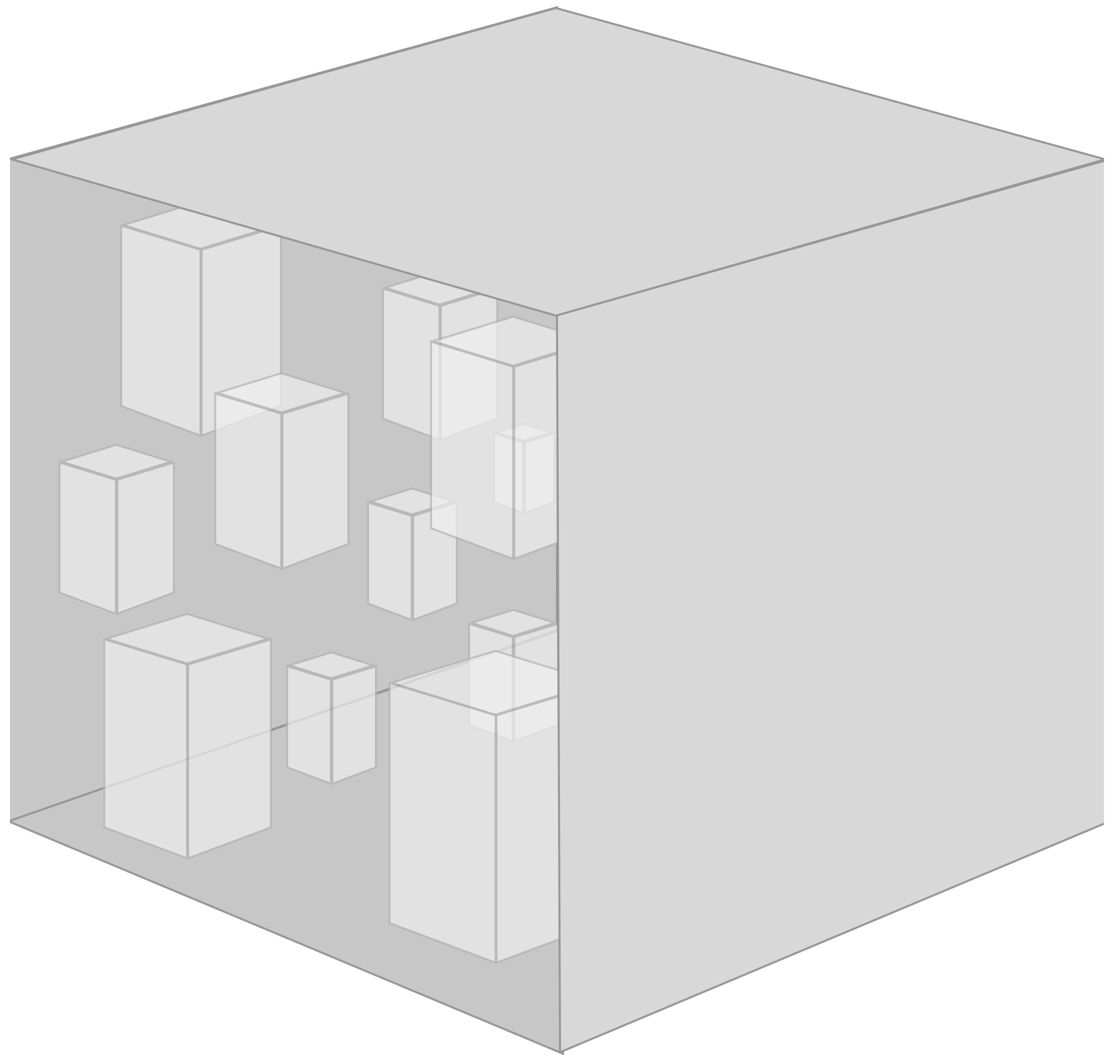
Various Domains



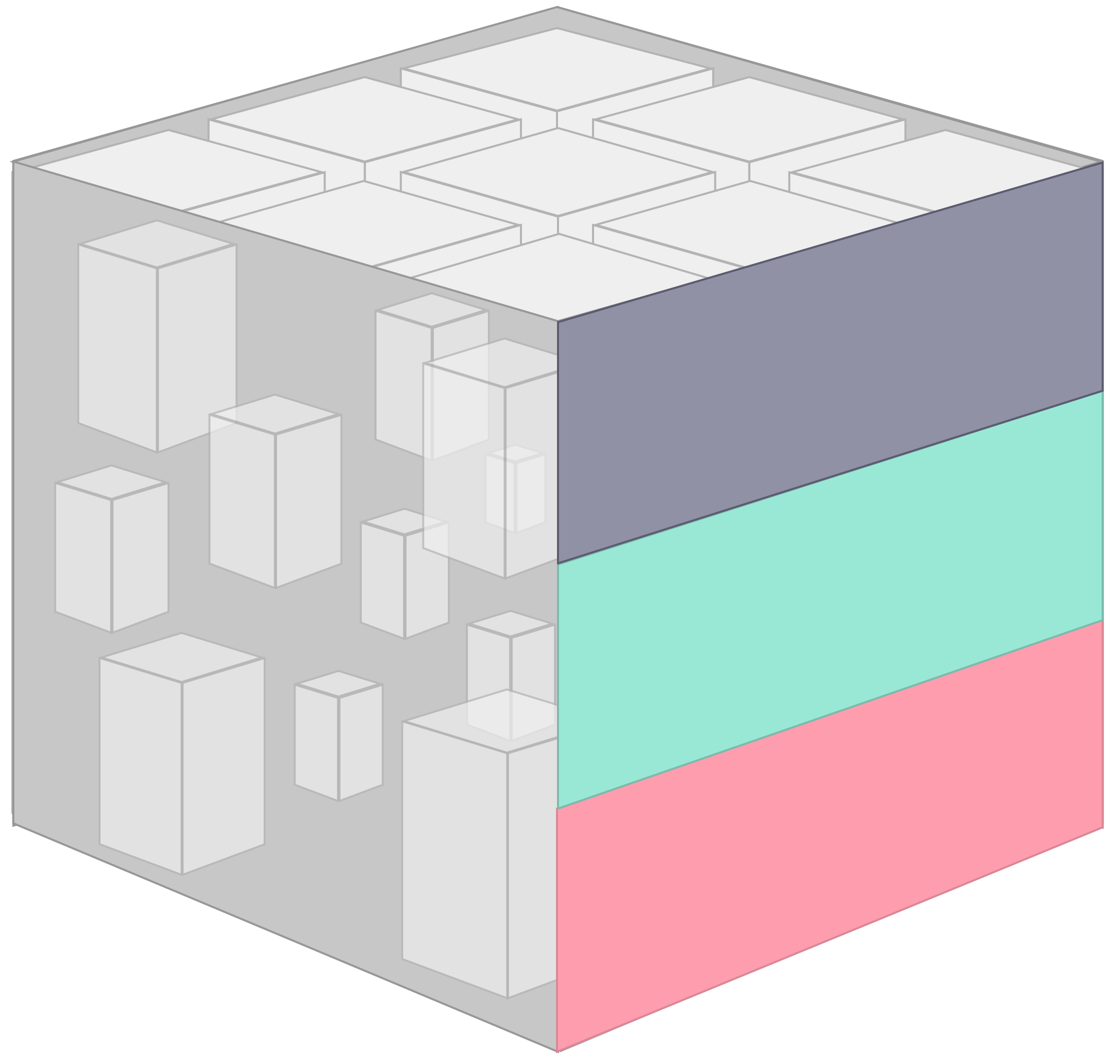
User interface

Business logic

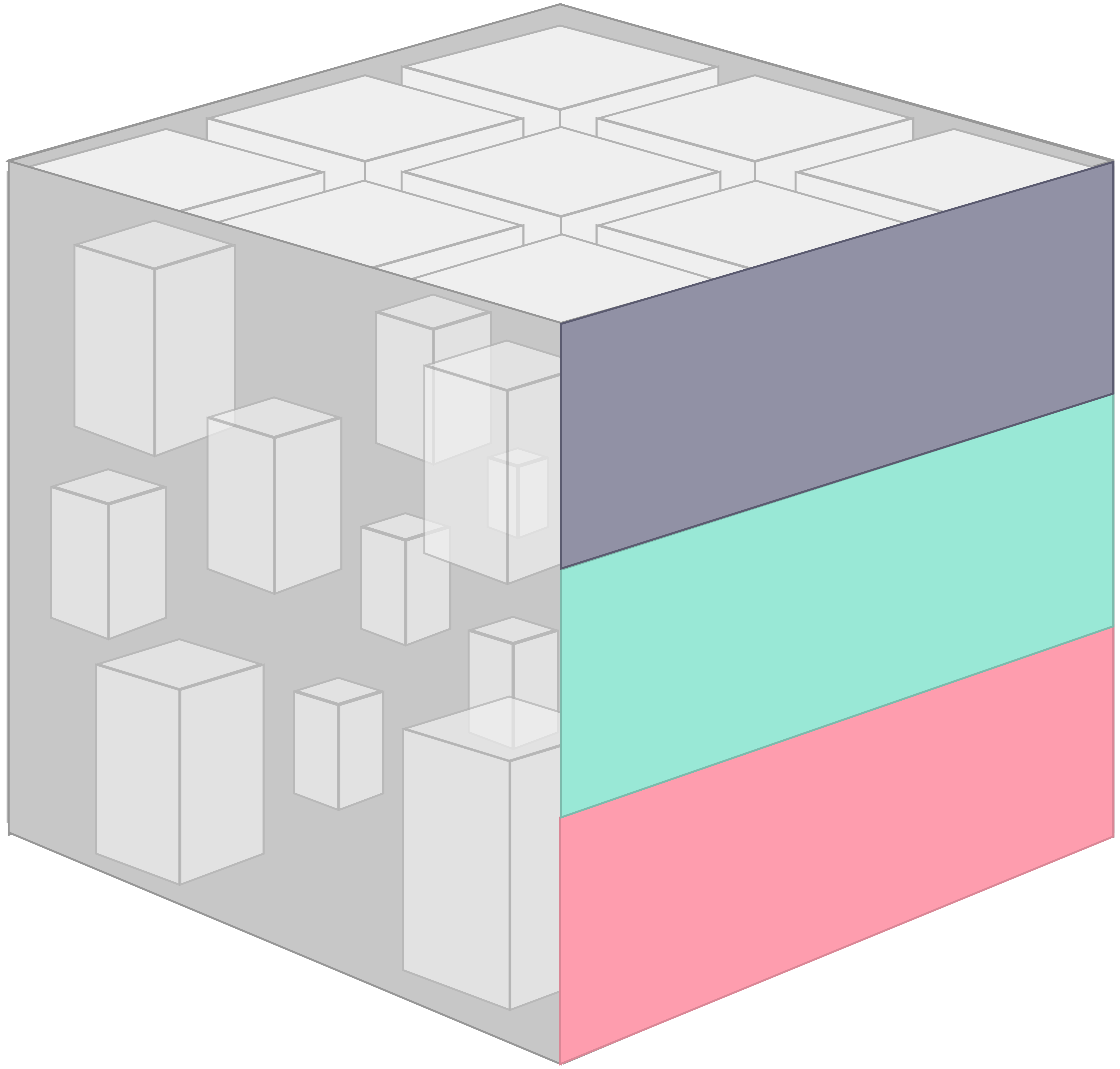
Persistence



… as well as a **lot** of modules, components, frameworks and libraries.



With all these layers in one place, a monolith tends to **grow.**



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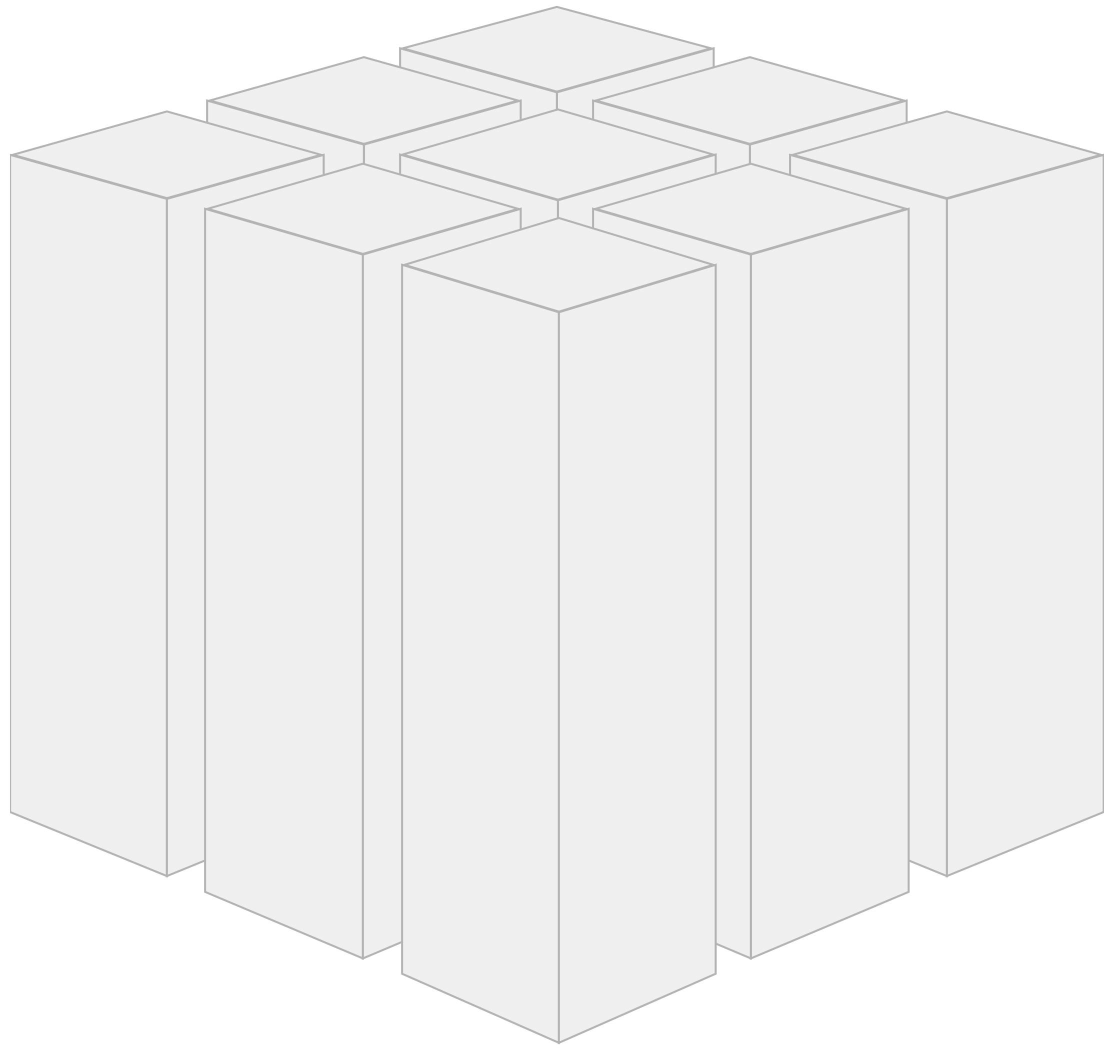
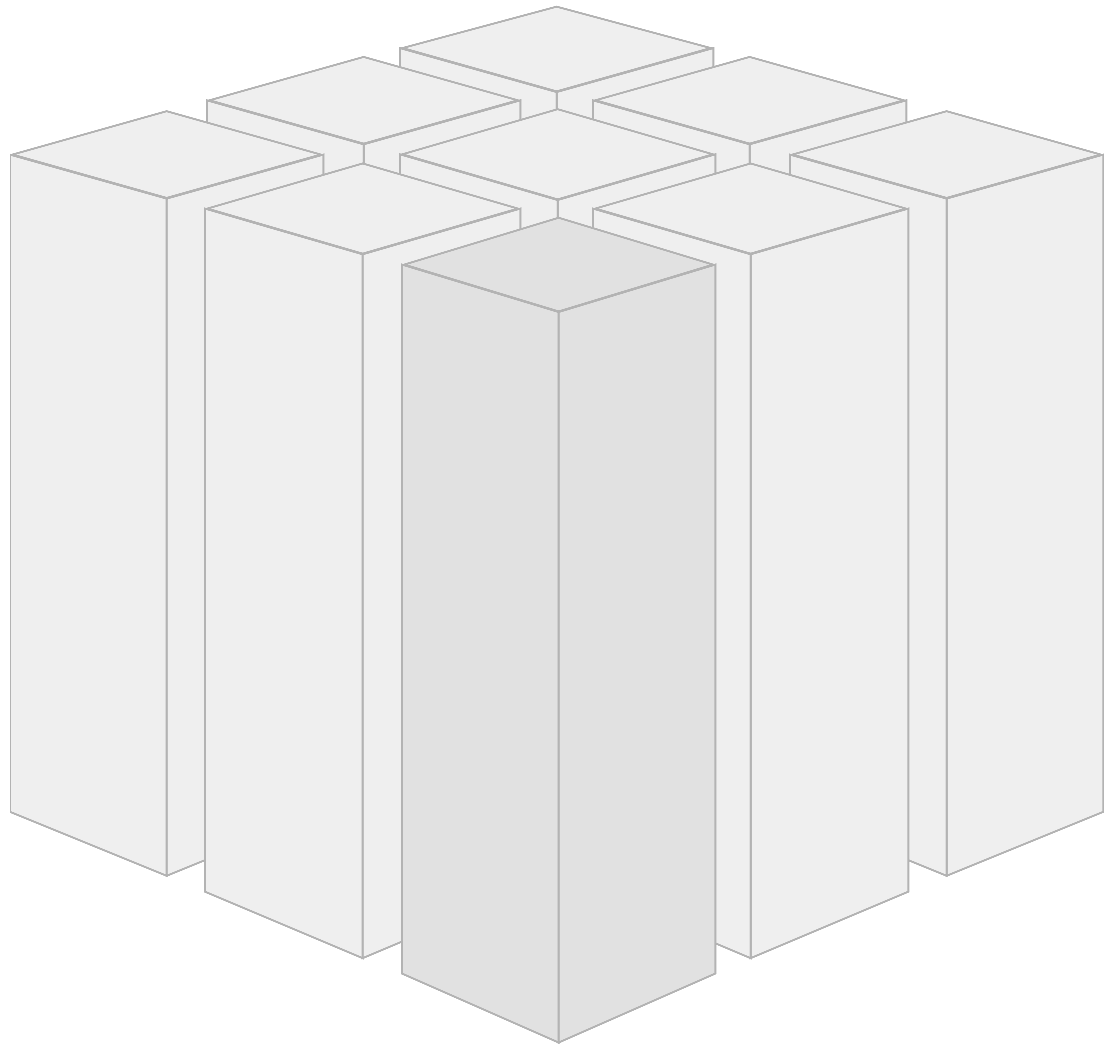
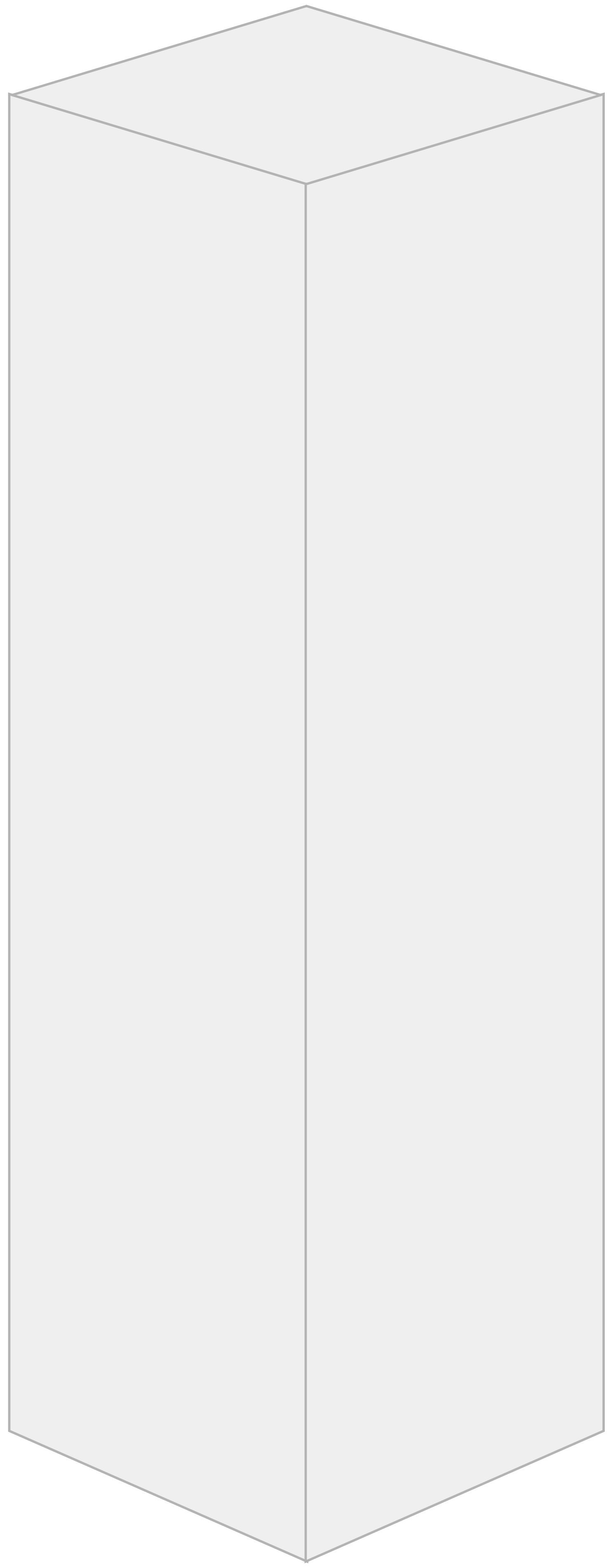


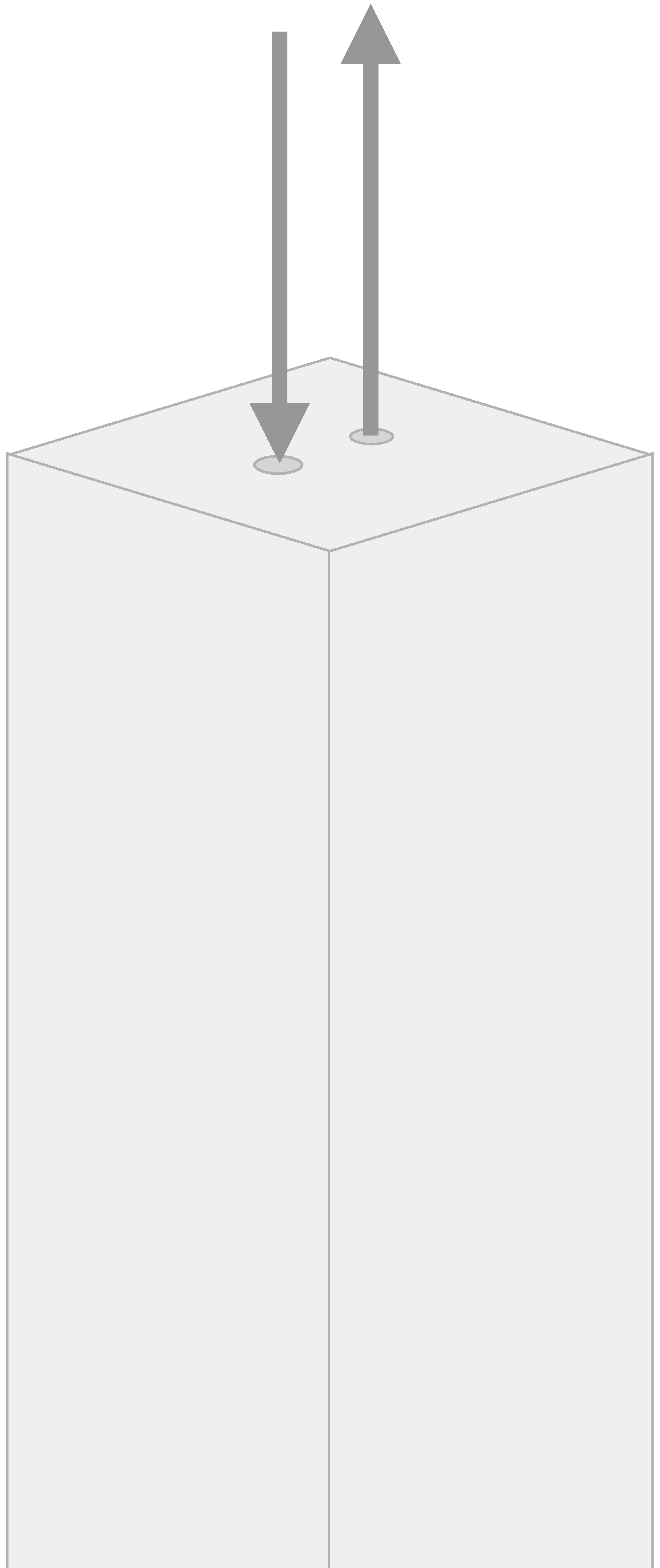
If you cut a monolithic system along its very domains …



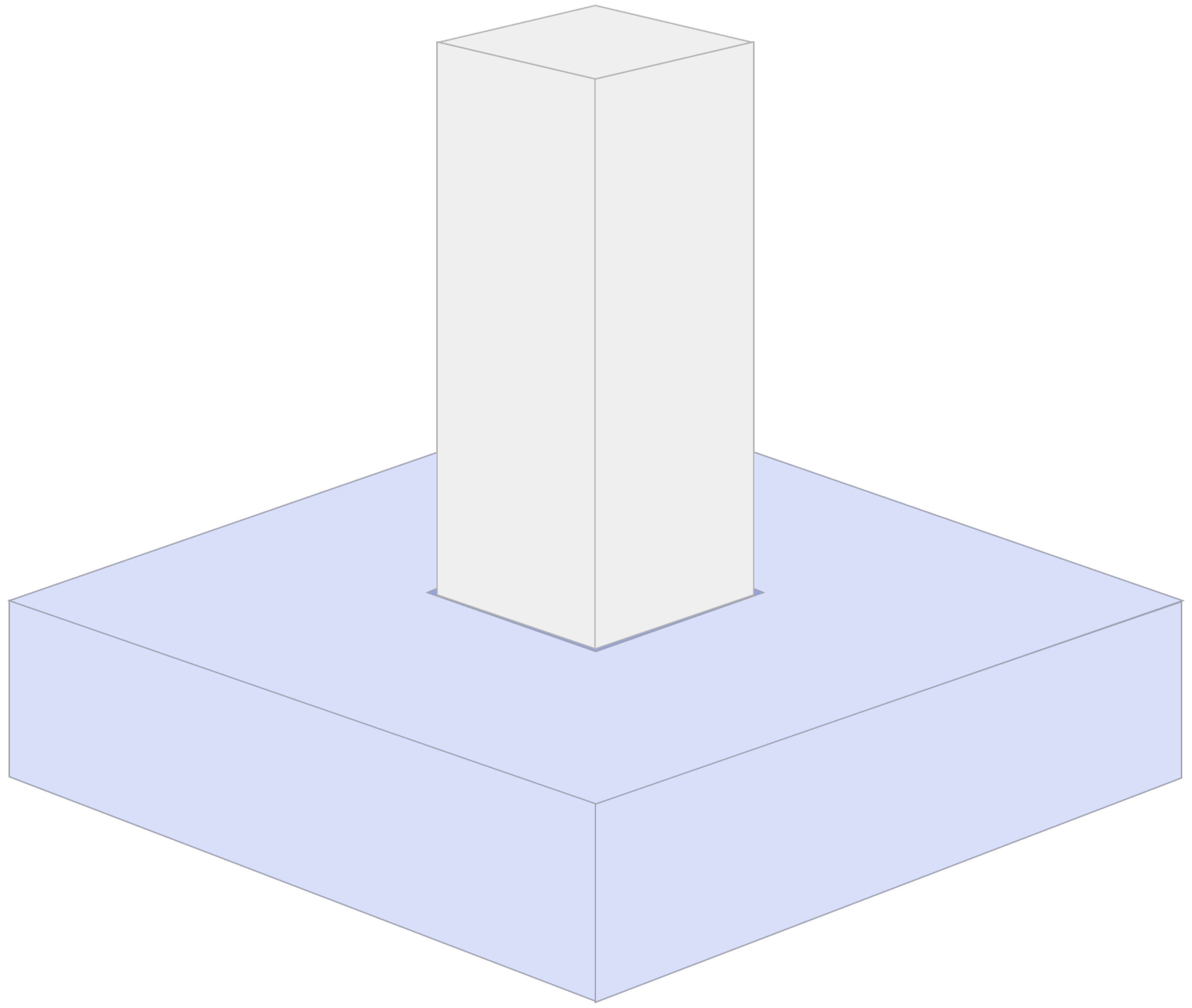
… and wrap every domain in a **separate, replaceable** web application …



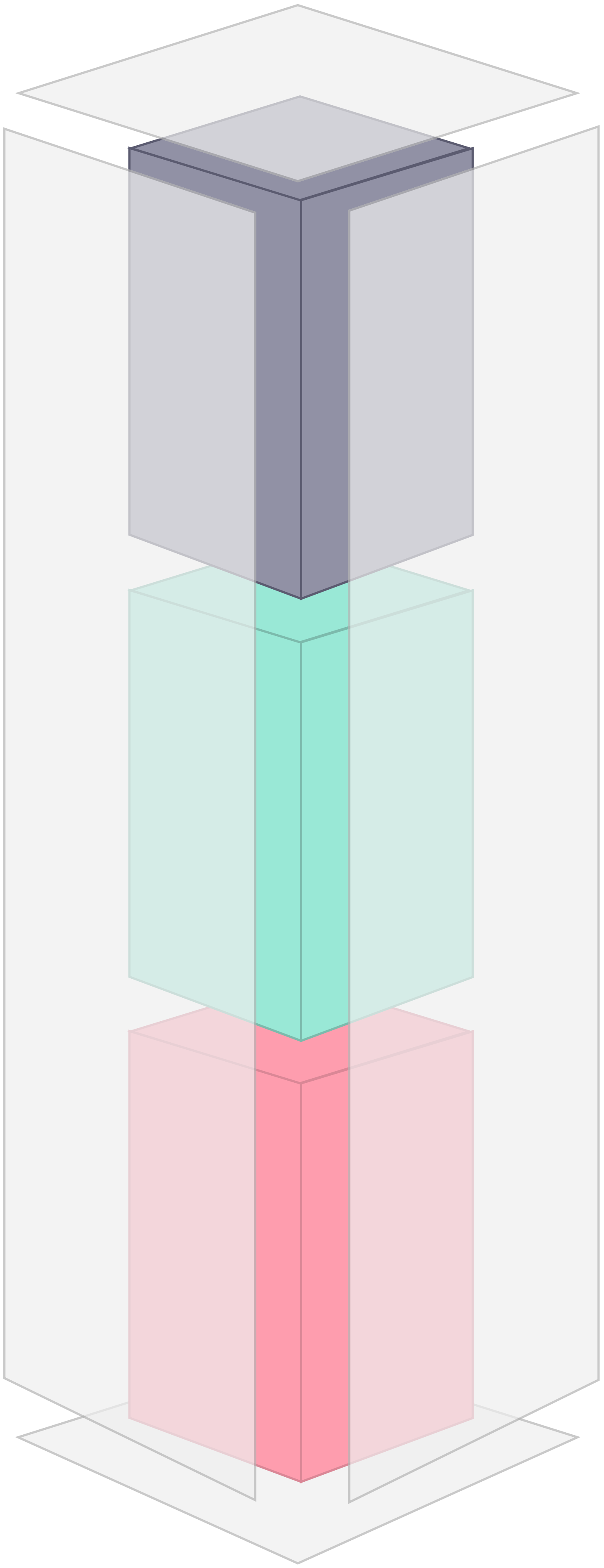
… then that application can be referred to as a **self-contained system** (SCS).



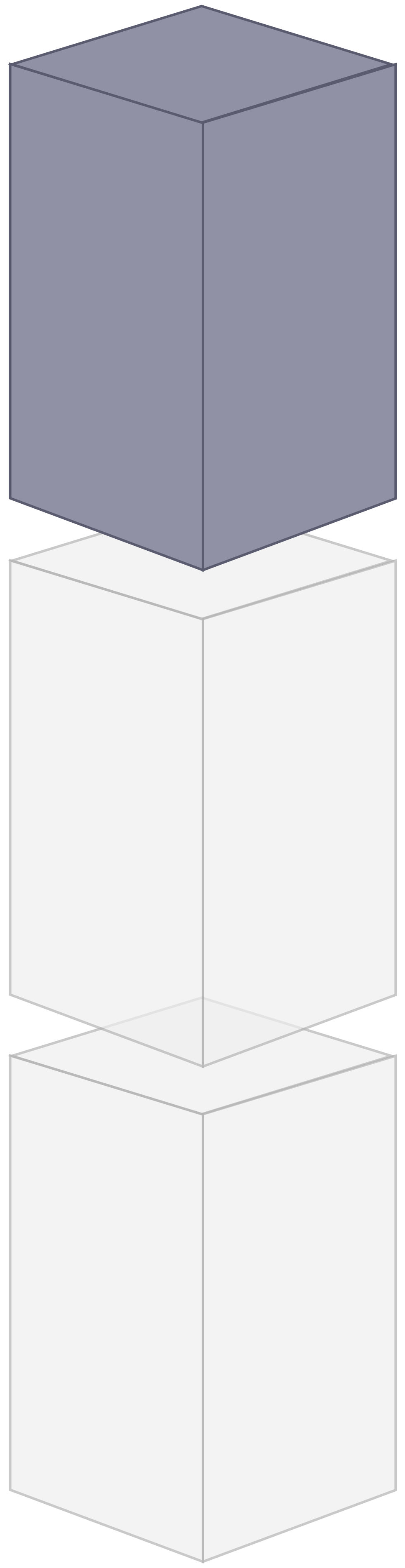
On its outside, an SCS is a decentralized unit that is communicating with other systems via **RESTful HTTP** or **lightweight messaging**.



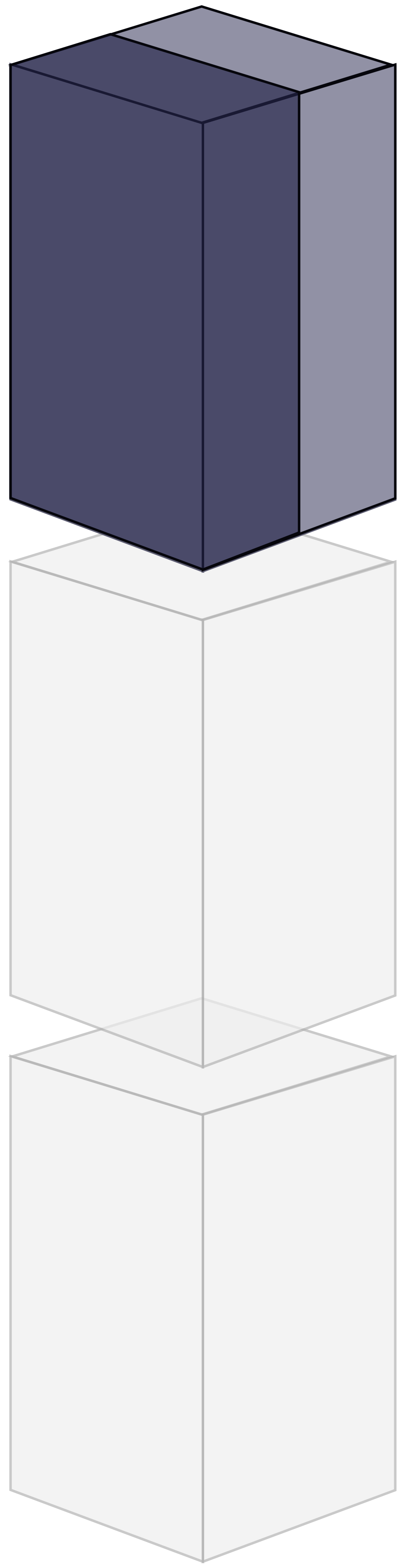
Therefore self-contained systems can be individually developed for **different platforms.**



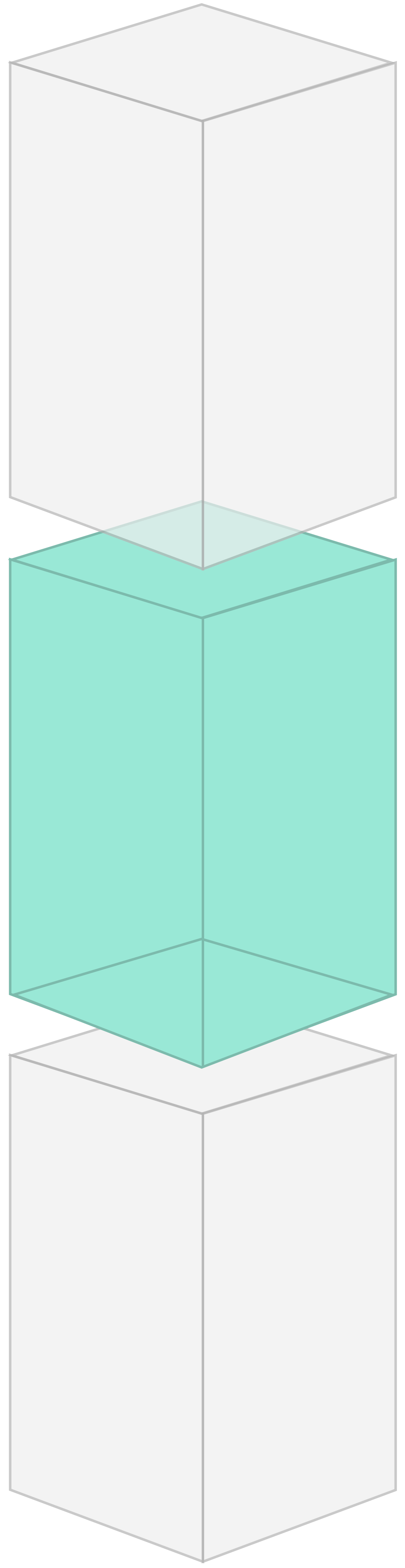
An SCS contains its own **user interface**, specific **business logic** and separate **data storage**



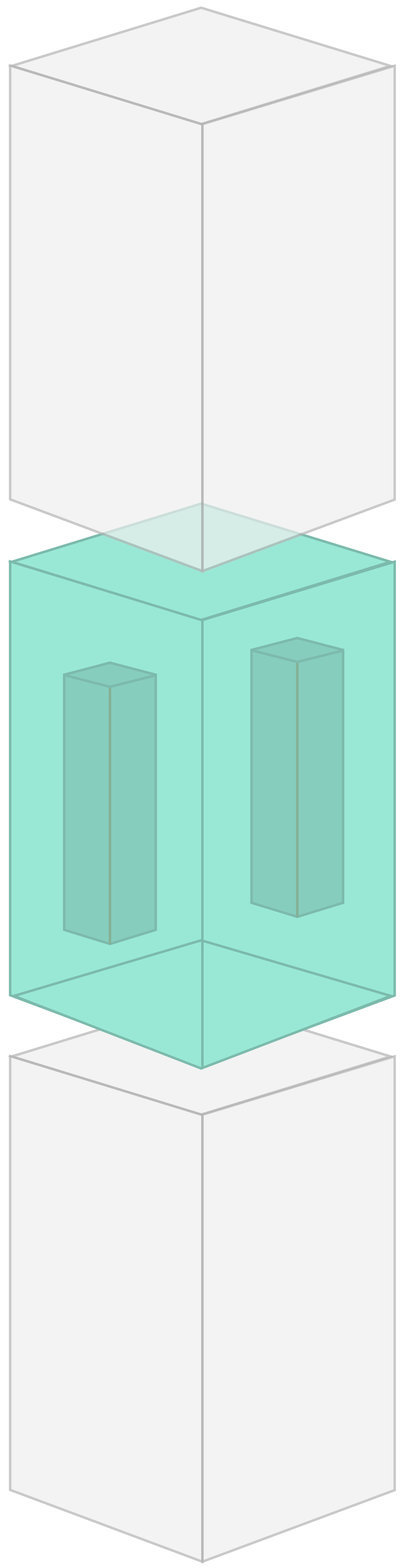
The user interface consists of web technologies that are composed according to **ROCA principles**.



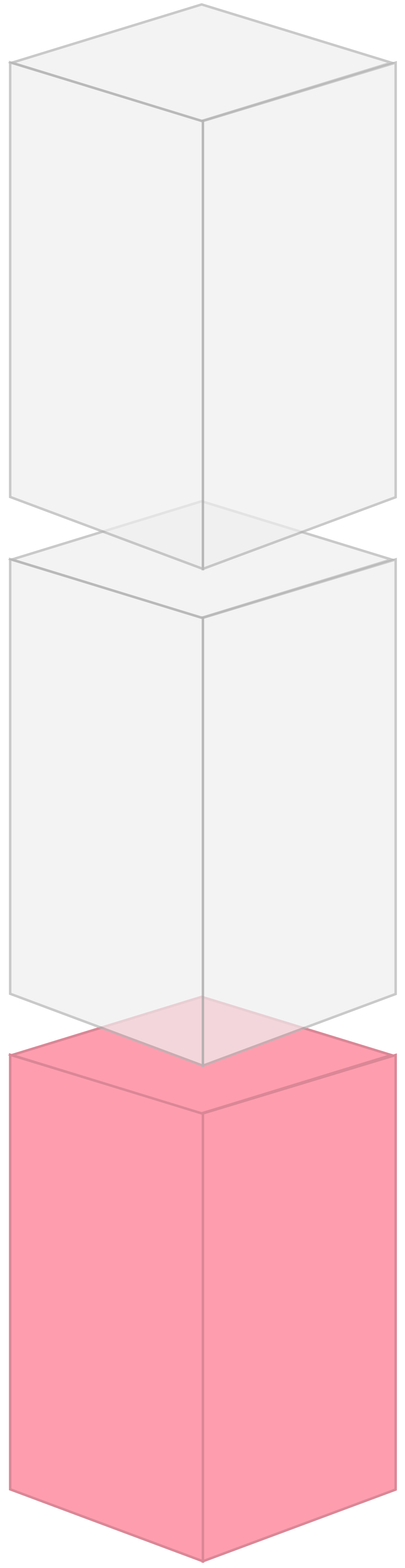
Besides a web interface a self-contained system can provide an **optional API**.



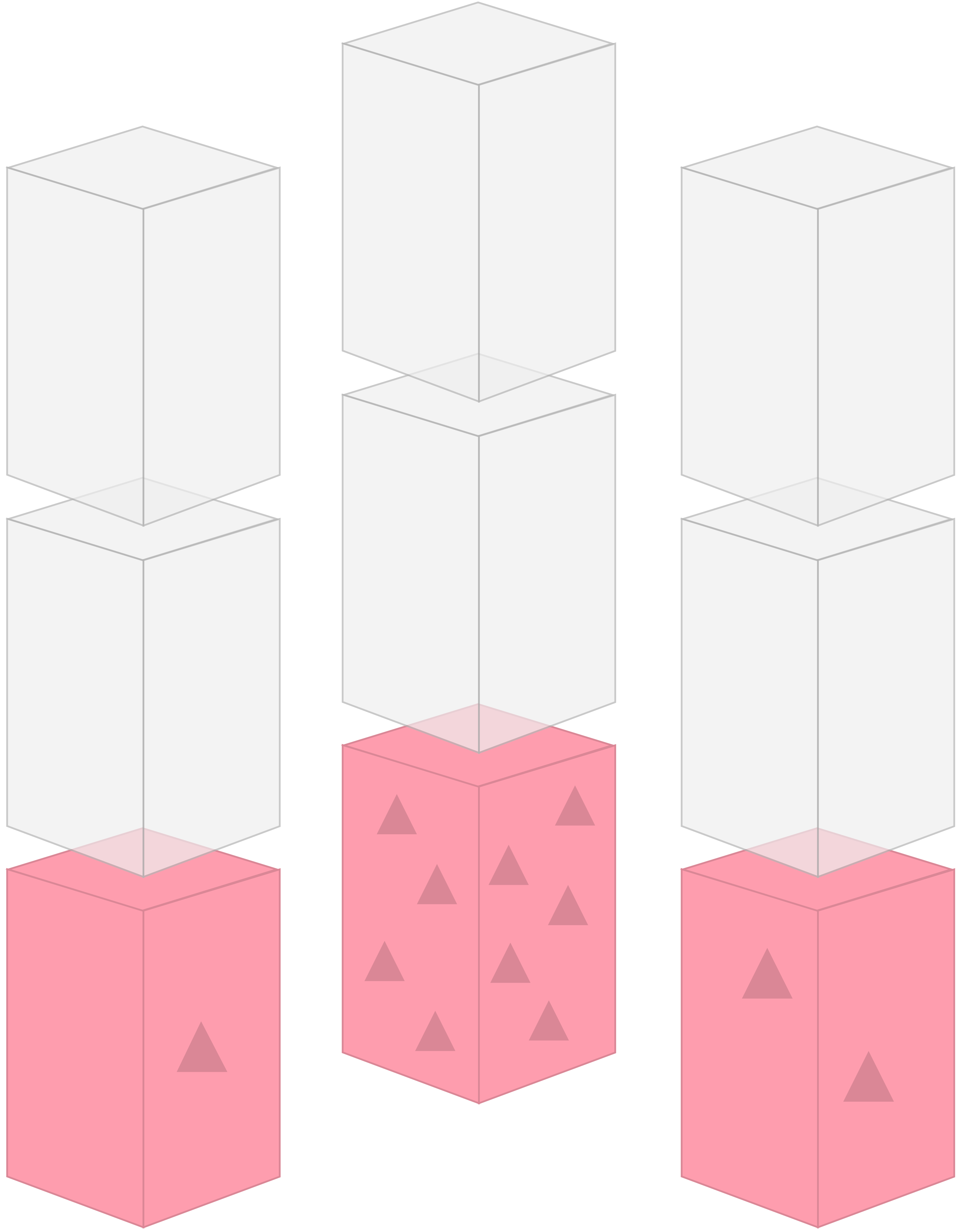
The business logic part **only** solves problems that arise in its core domain. This logic is only shared with other systems over a **well defined interface**.



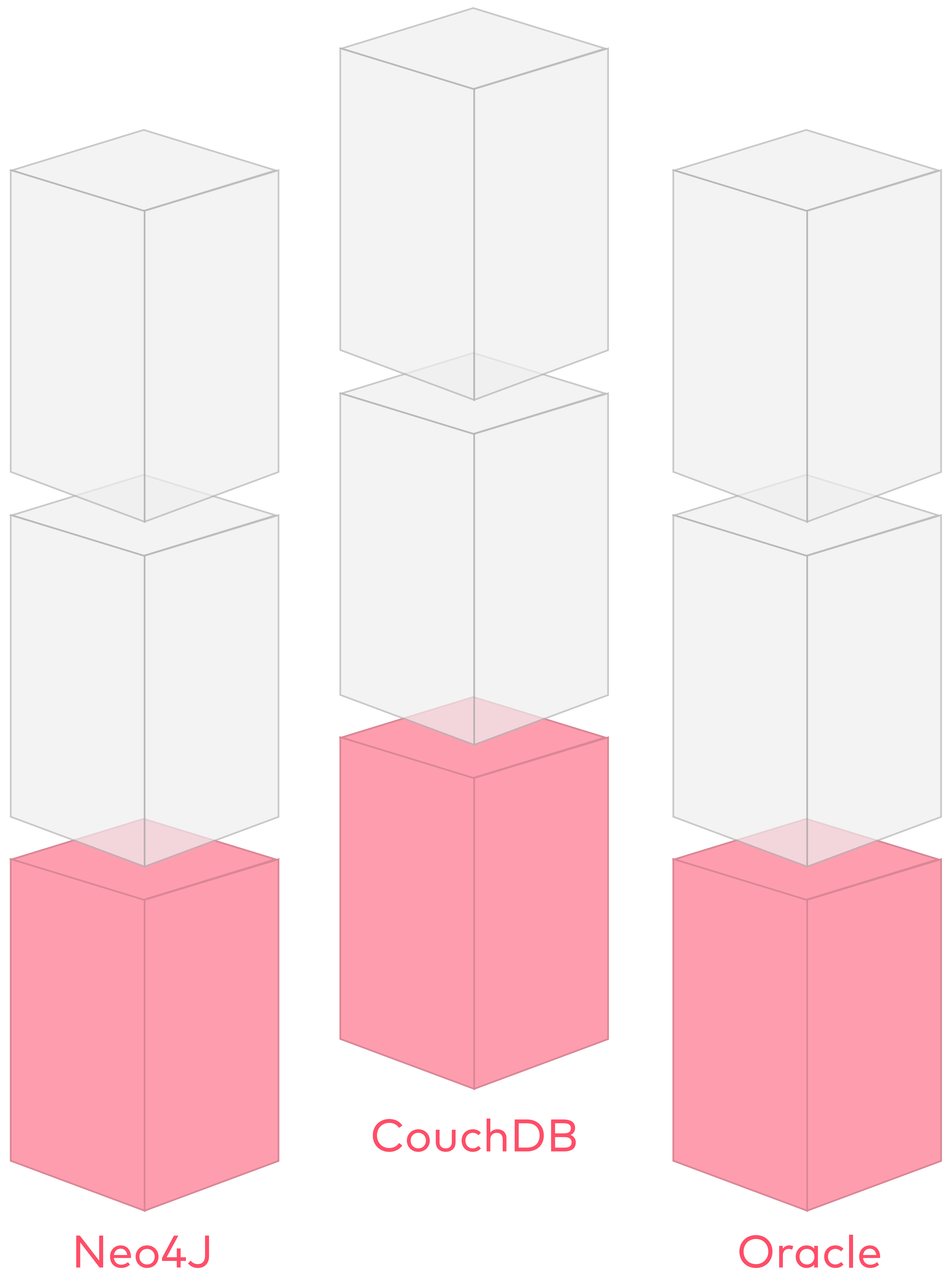
The business logic can consist of **microservices** to solve domain specific problems.



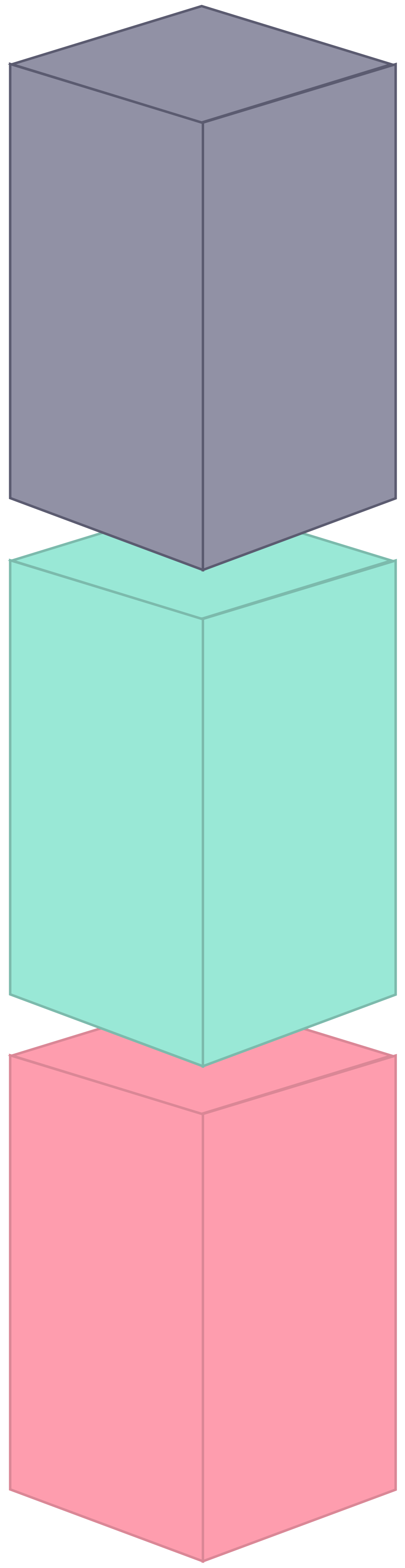
Every SCS brings its **own data storage** and with it redundant data depending on the context and domain.



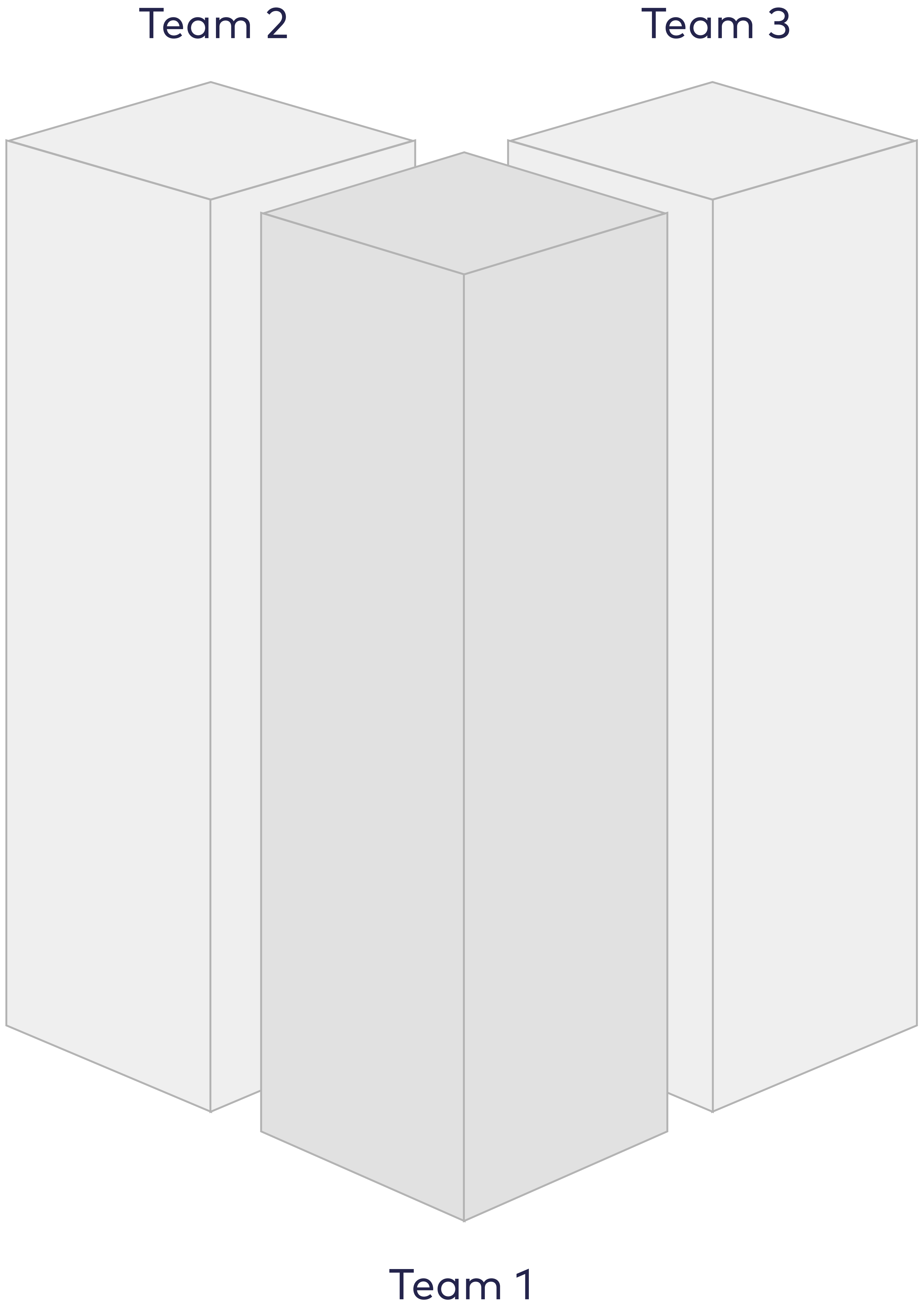
These redundancies are tolerable as long as the **sovereignty of data** by its owning system is not undermined.



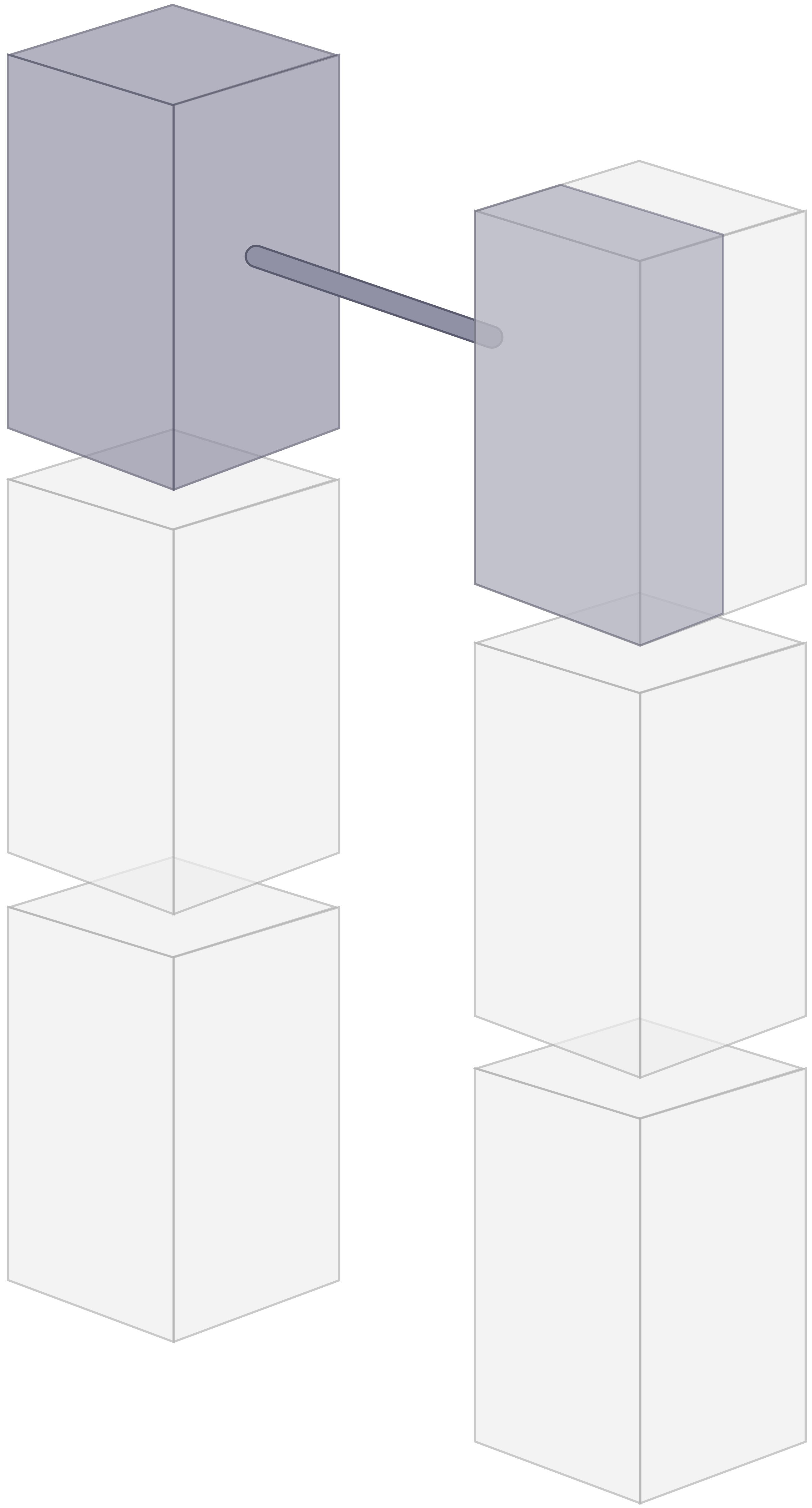
This enables **polyglot persistence**, which means a database can be chosen to solve a domain specific problem rather than to fulfill a technical urge.



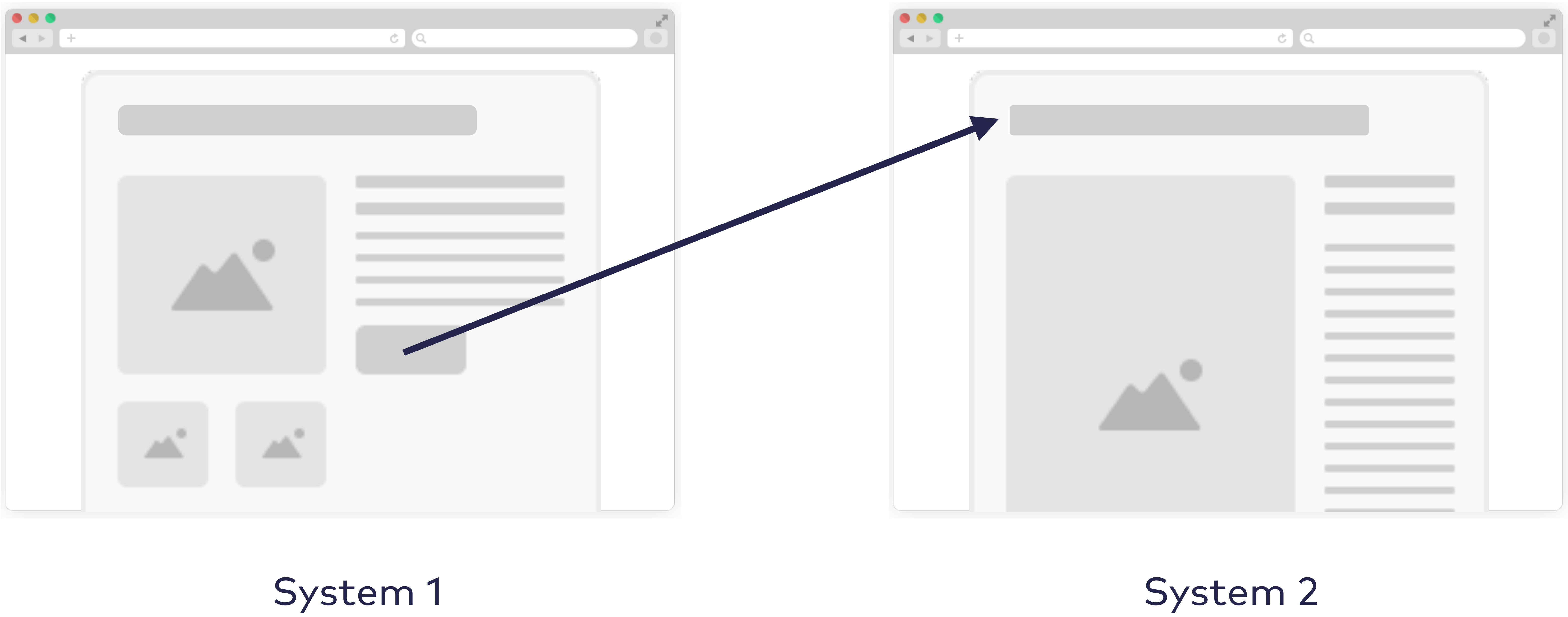
Inside of a self-contained system a bunch of **technical decisions** can be made independently from other systems, such as programming language, frameworks, tooling or workflow.



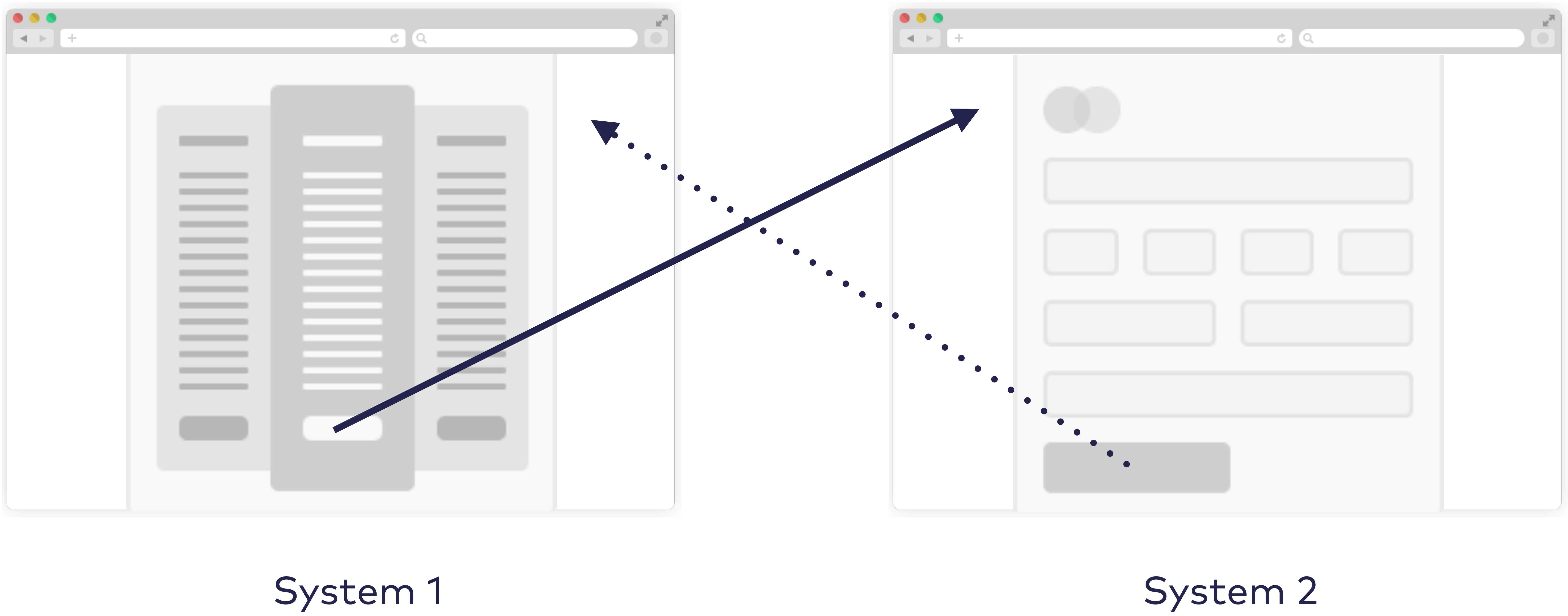
The manageable domain specific scope enables the development, operation and maintenance of an SCS by a **single team**.



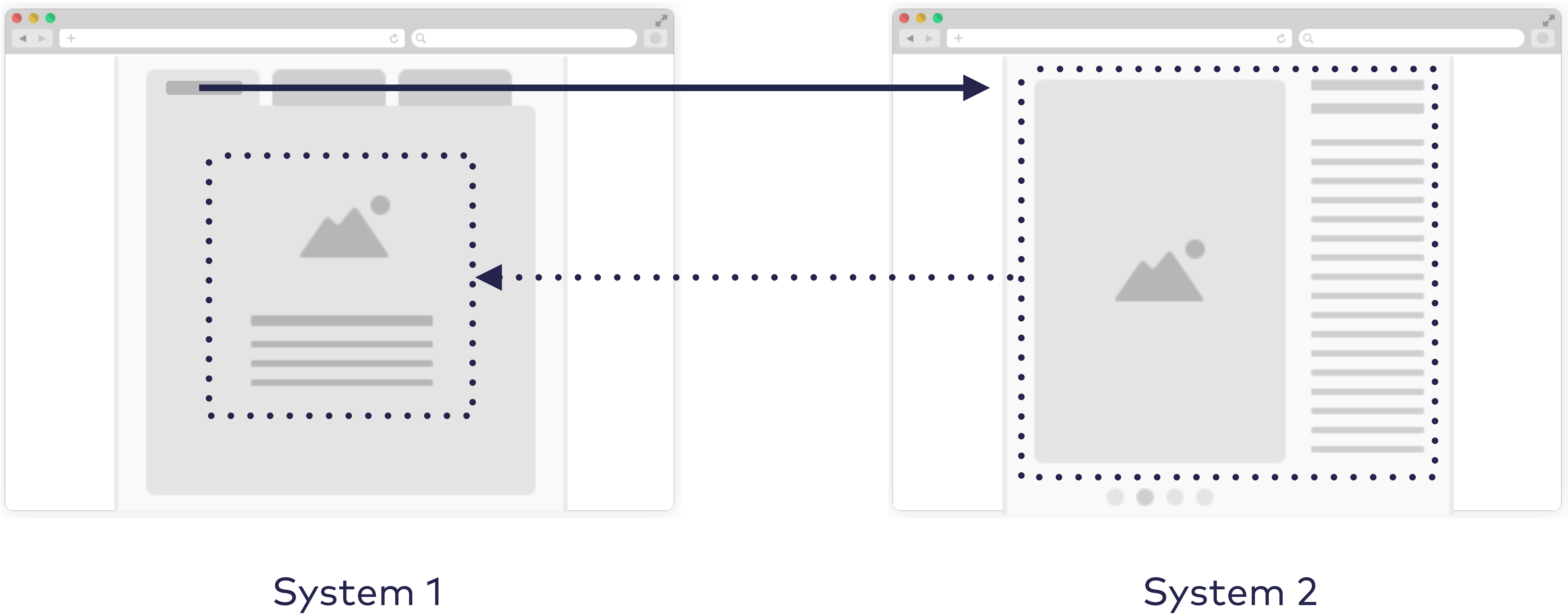
Self-contained Systems should be integrated over their **web interfaces** to minimize coupling to other systems.



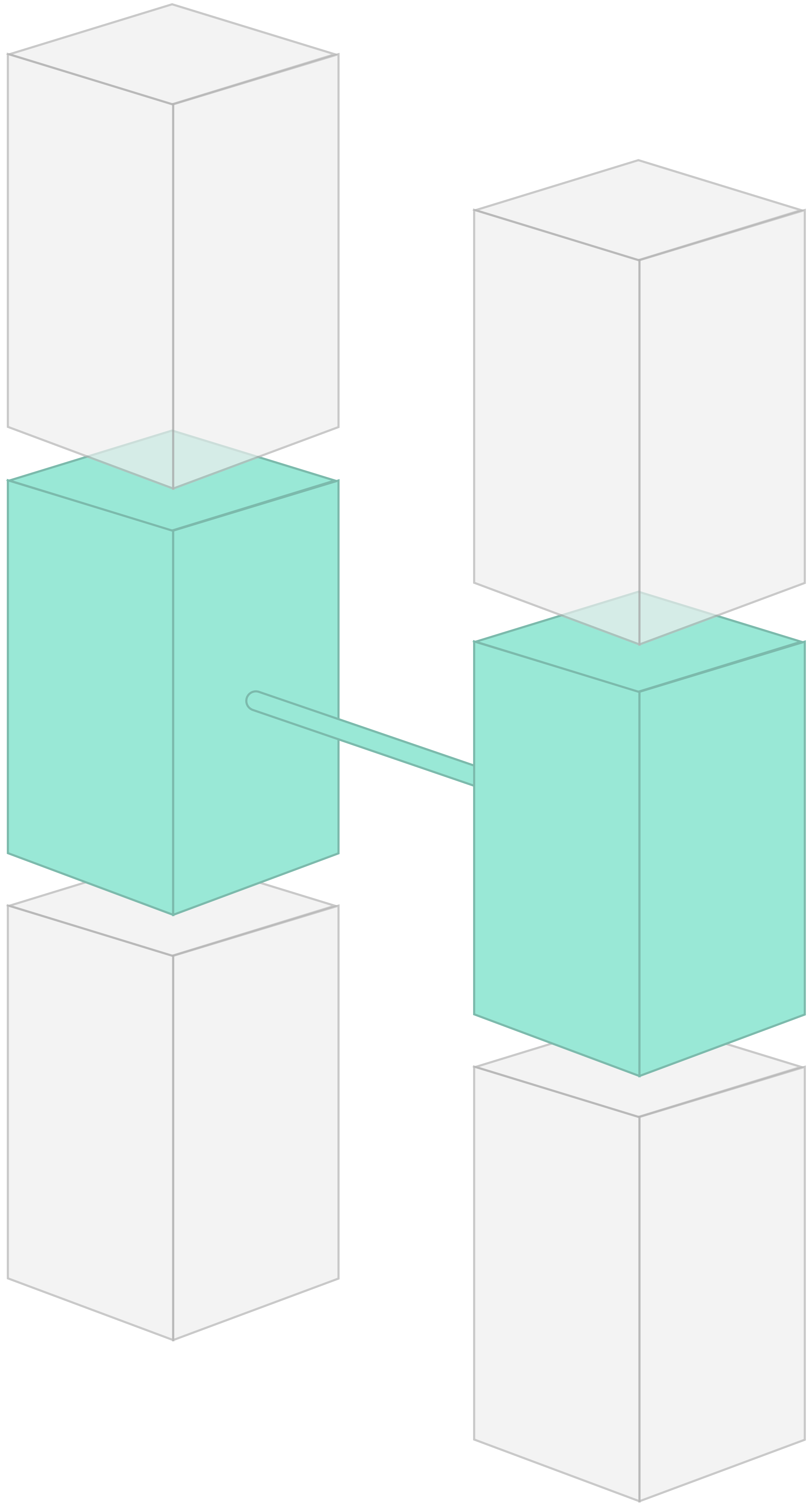
Therefore simple **hyperlinks** can be used to navigate between systems.



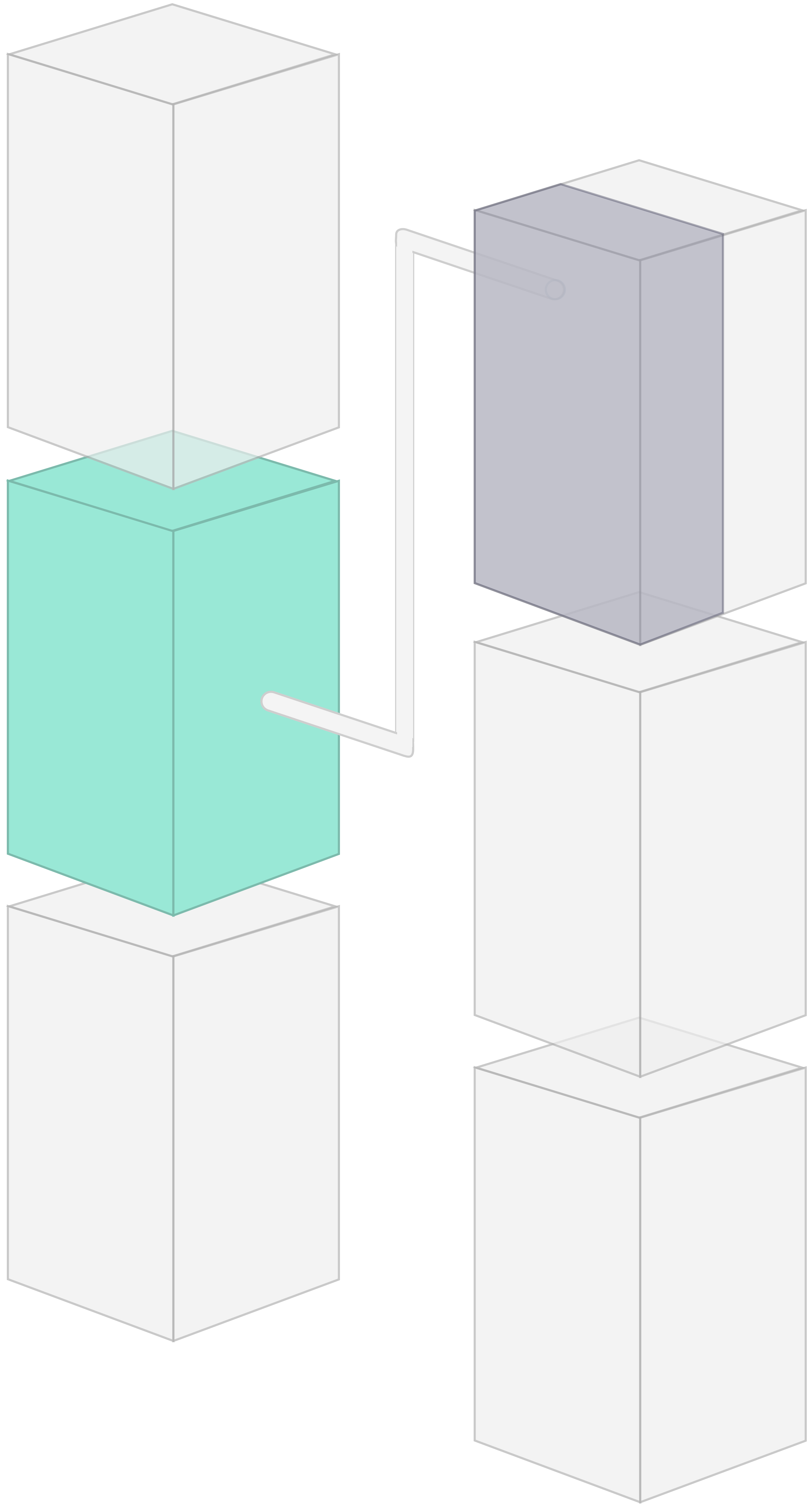
A **redirection** can be used to ensure navigation works in both directions.



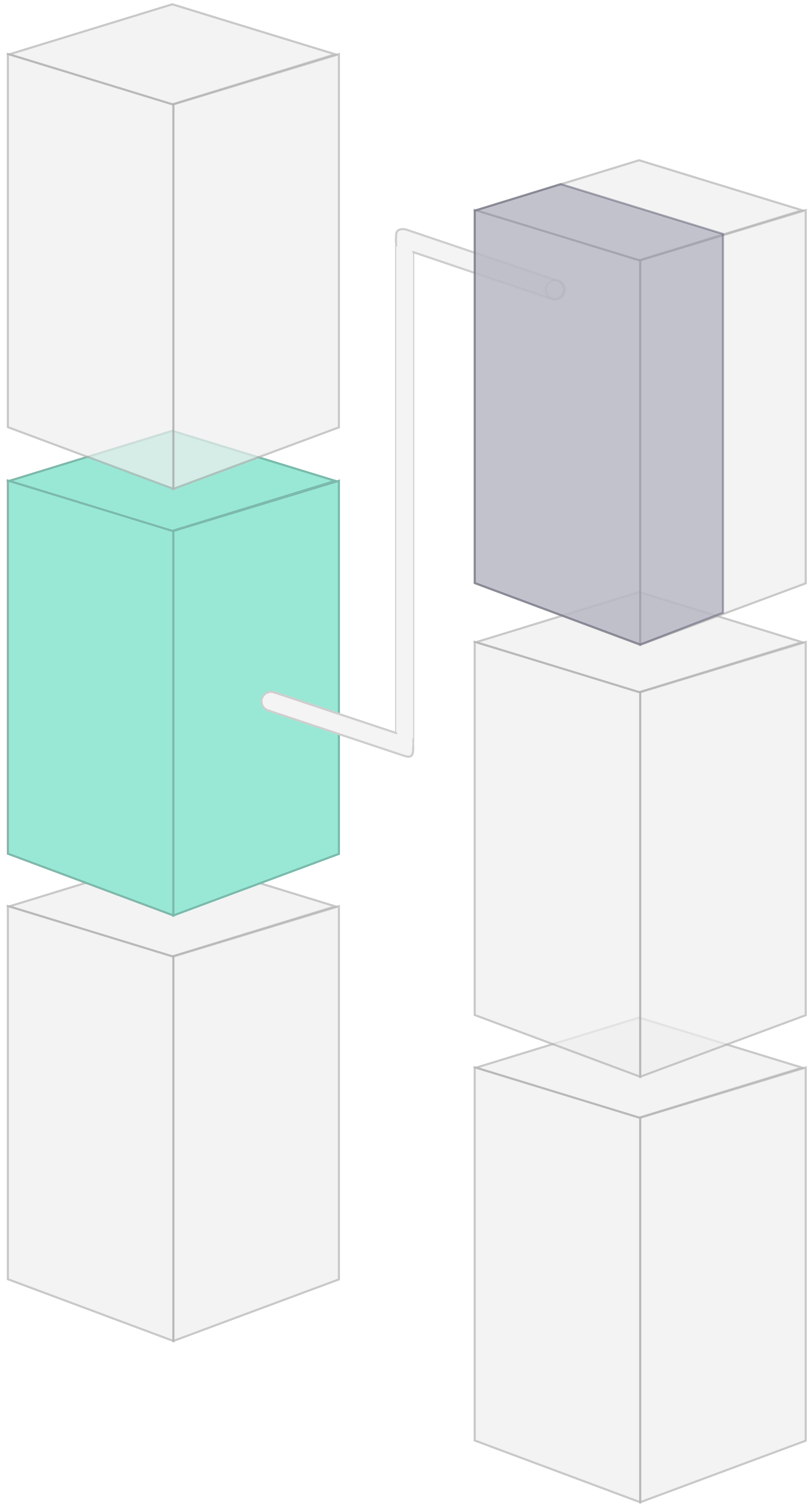
Hyperlinks can also support the **dynamic inclusion** of content that is served by another application into the web interface of a self-contained system.



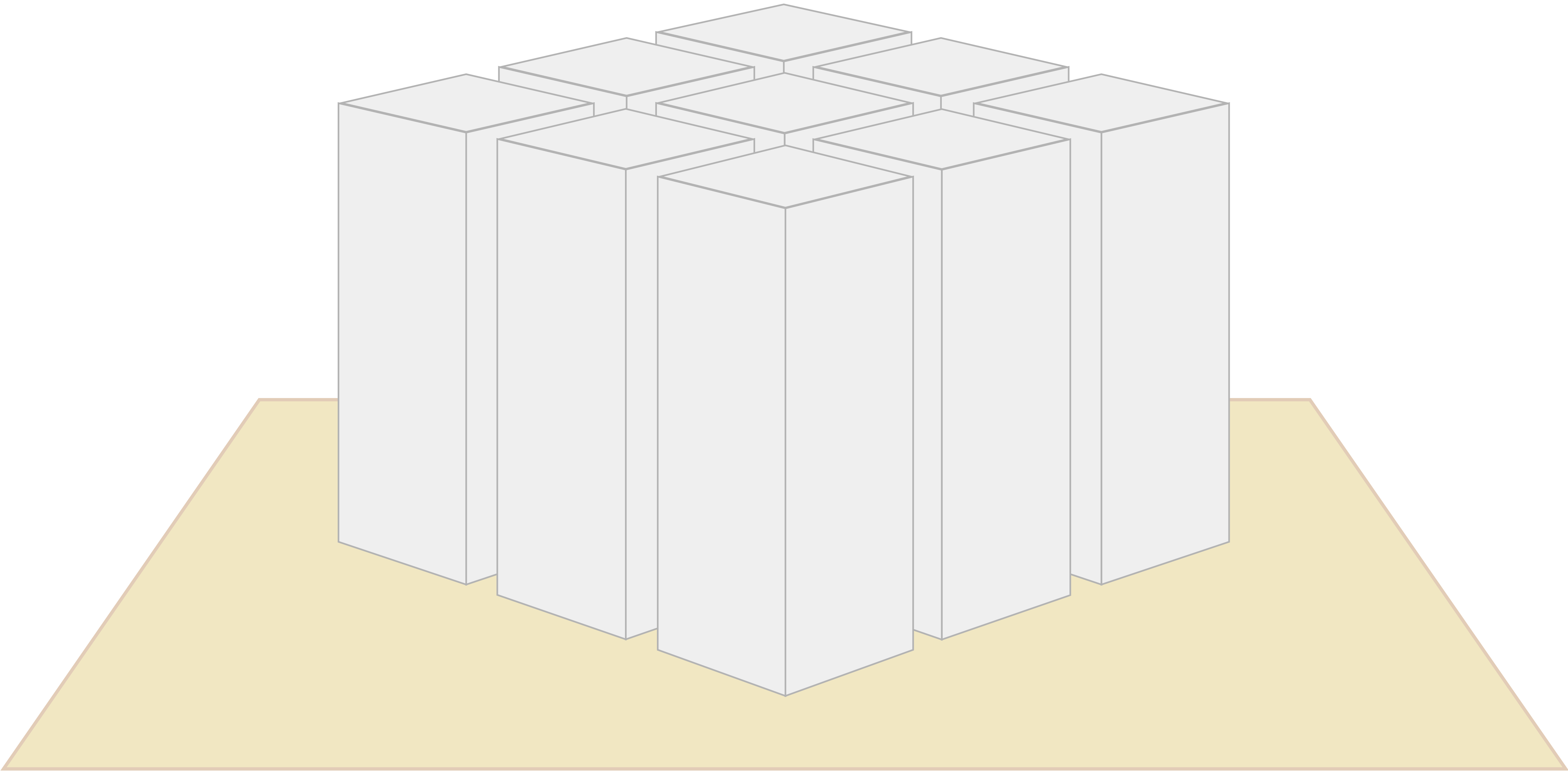
To further minimize
coupling
to other systems,
synchronous remote calls
inside the business logic
should be **avoided**.



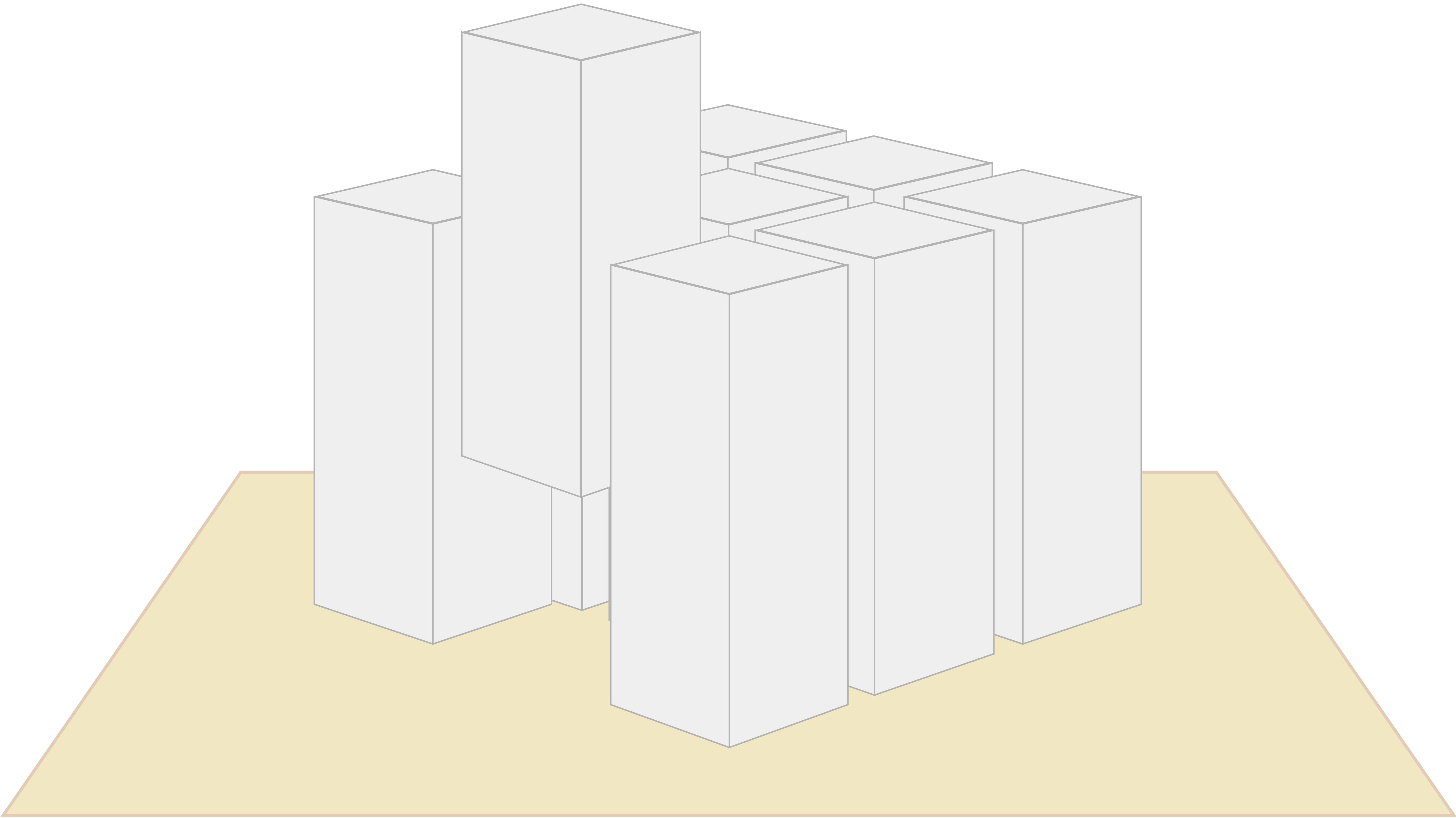
Instead remote API calls should be handled **asynchronously** to reduce dependencies and prevent error cascades.



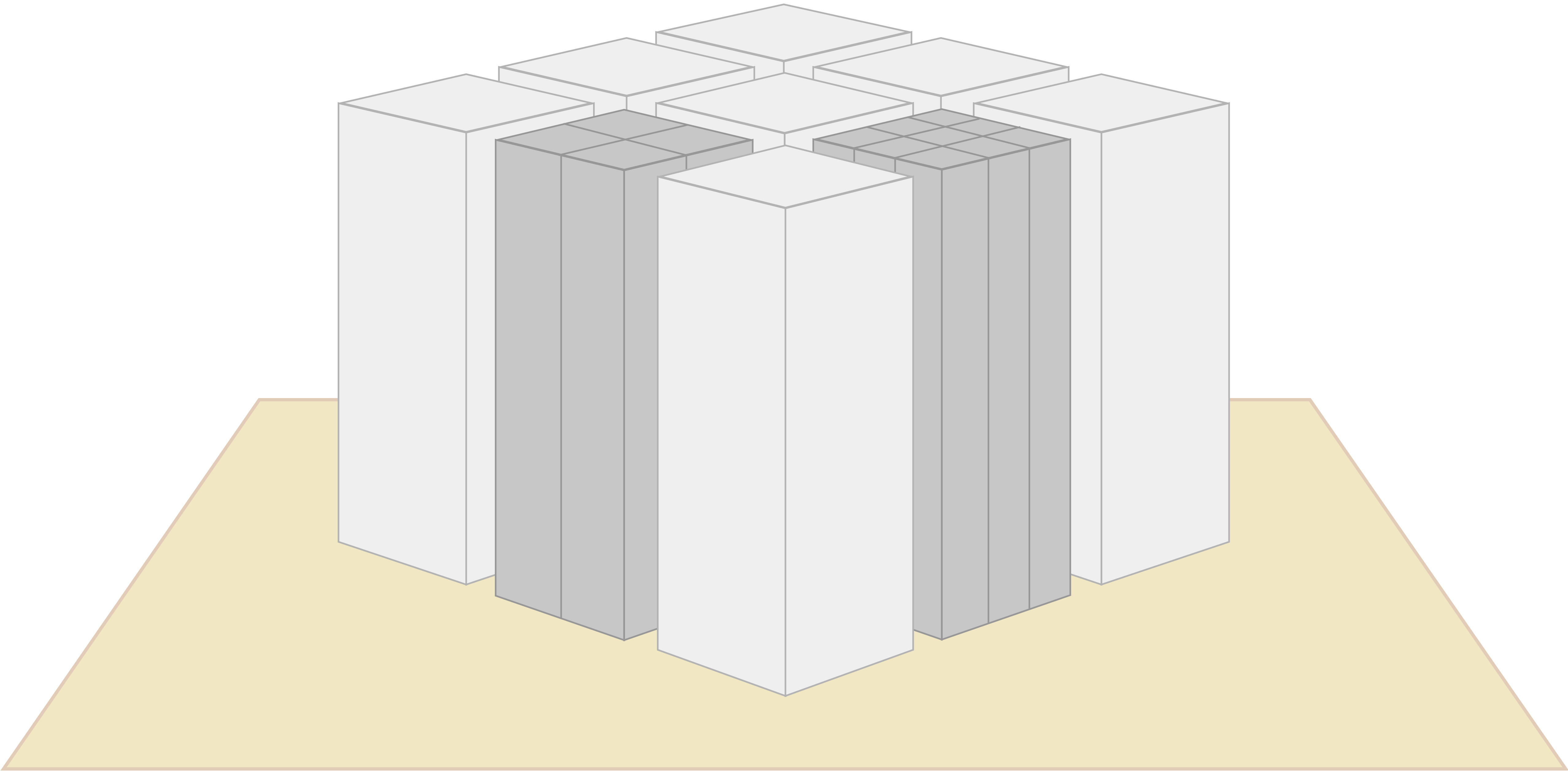
This implies that – depending on the desired rate of updates – the data model's consistency guarantees are **relaxed**.



An integrated
system of systems
like this has many benefits.

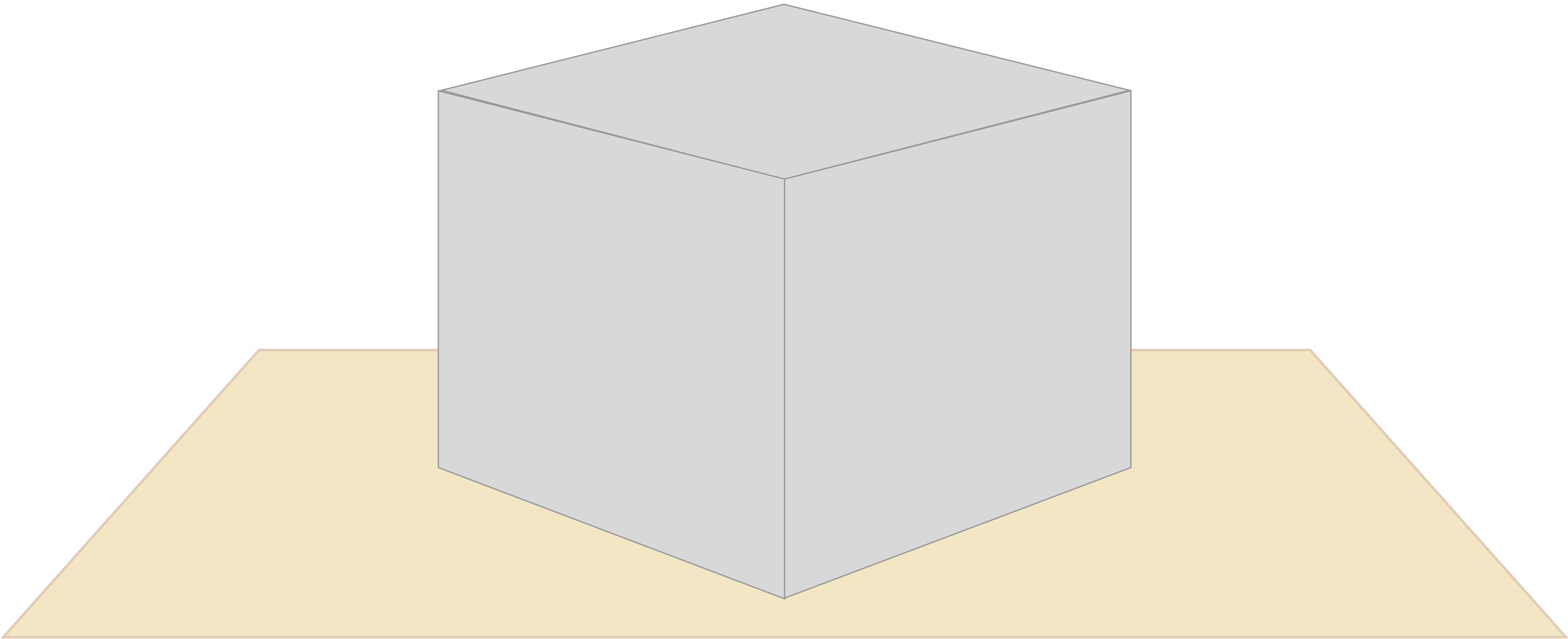


Overall **resilience** is improved through loosely coupled, replaceable systems.

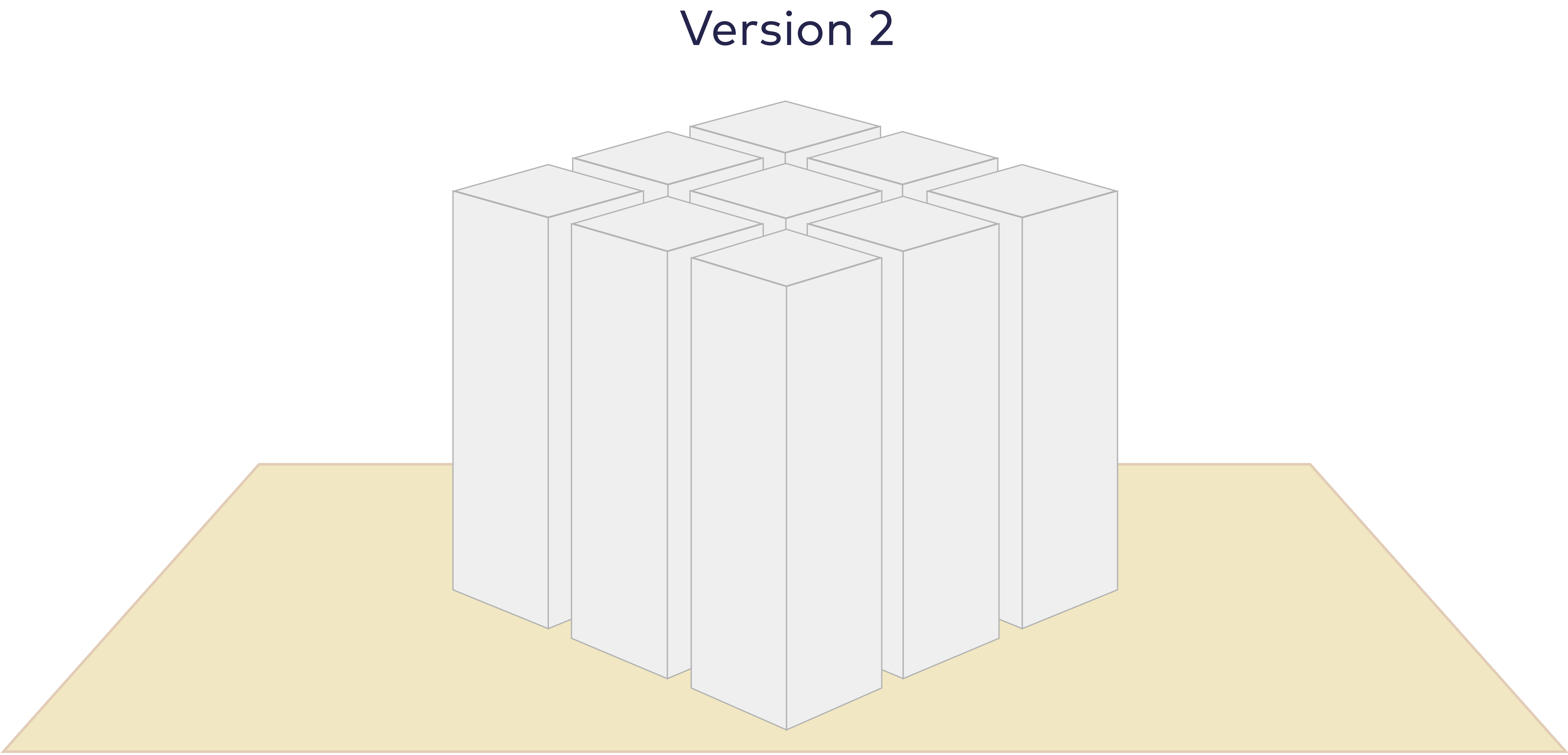


Some systems can be **individually scaled** to serve varying demands.

Version 1



It is not necessary to perform a risky **big bang release** to migrate an outdated, monolithic system into a system of systems.



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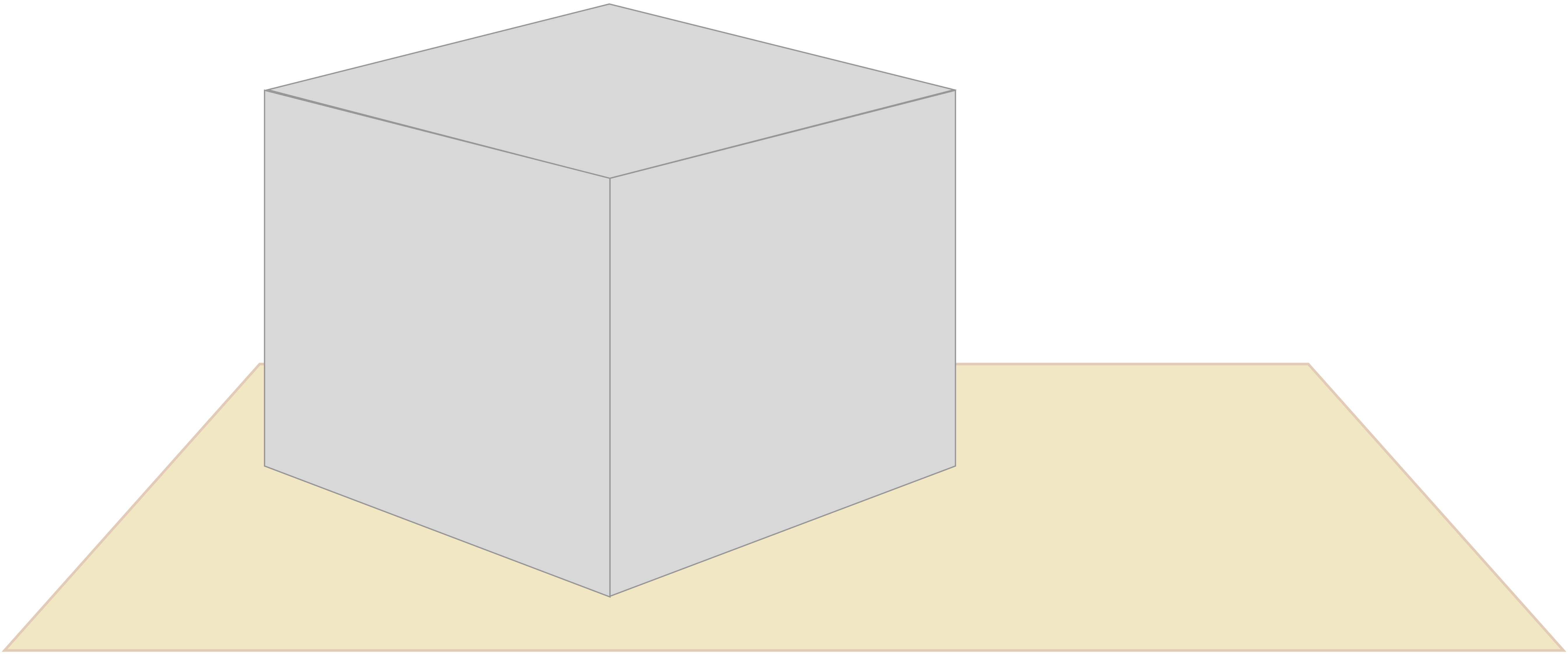
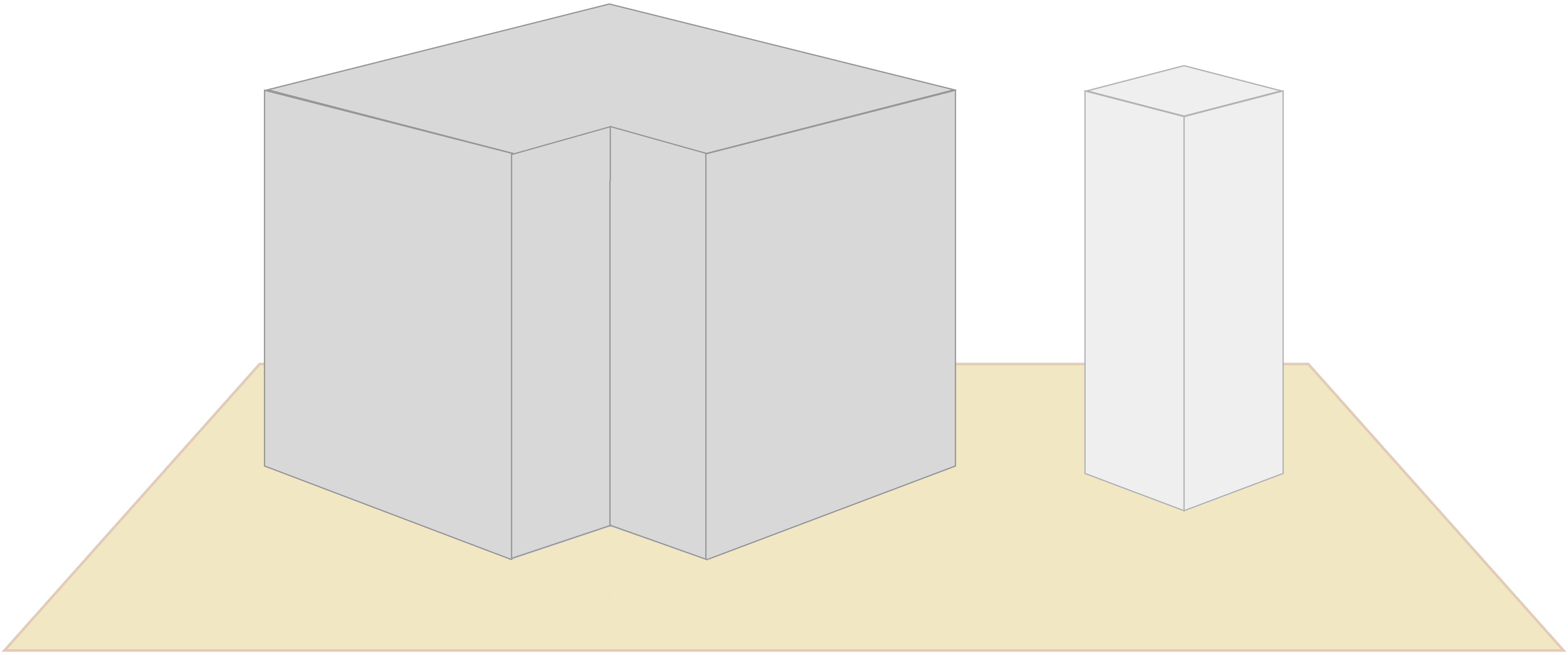


Instead a migration can happen in small, manageable steps which minimize the risk of failure and lead to an **evolutionary modernization** of big and complex systems.



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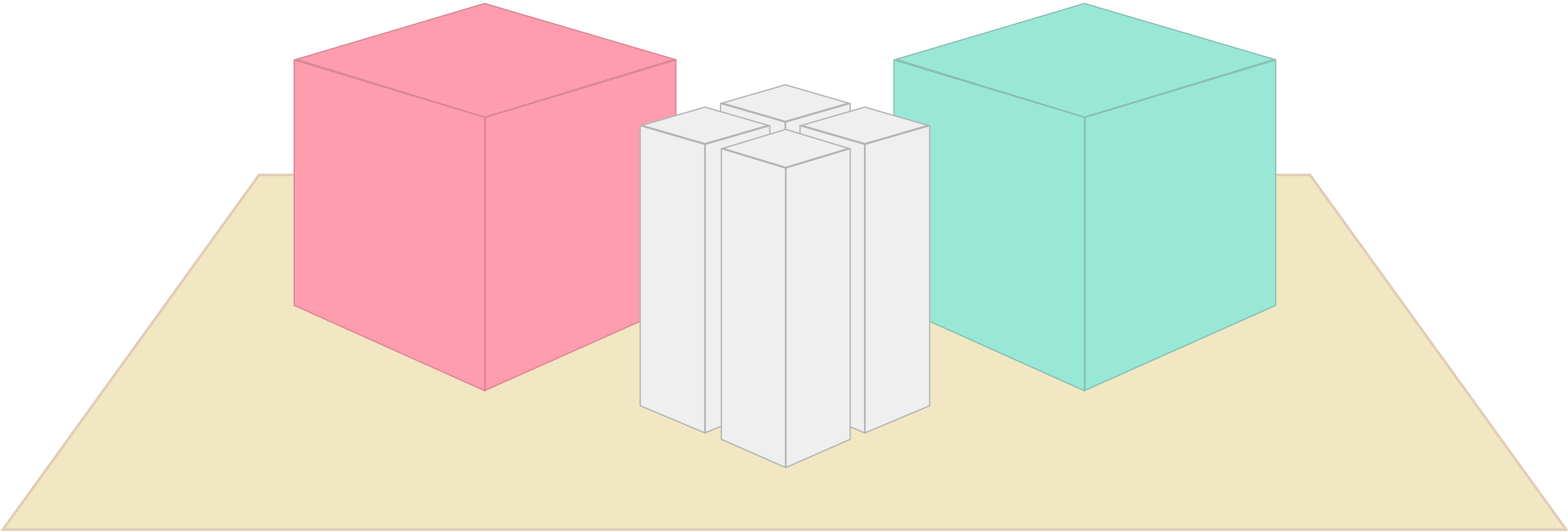
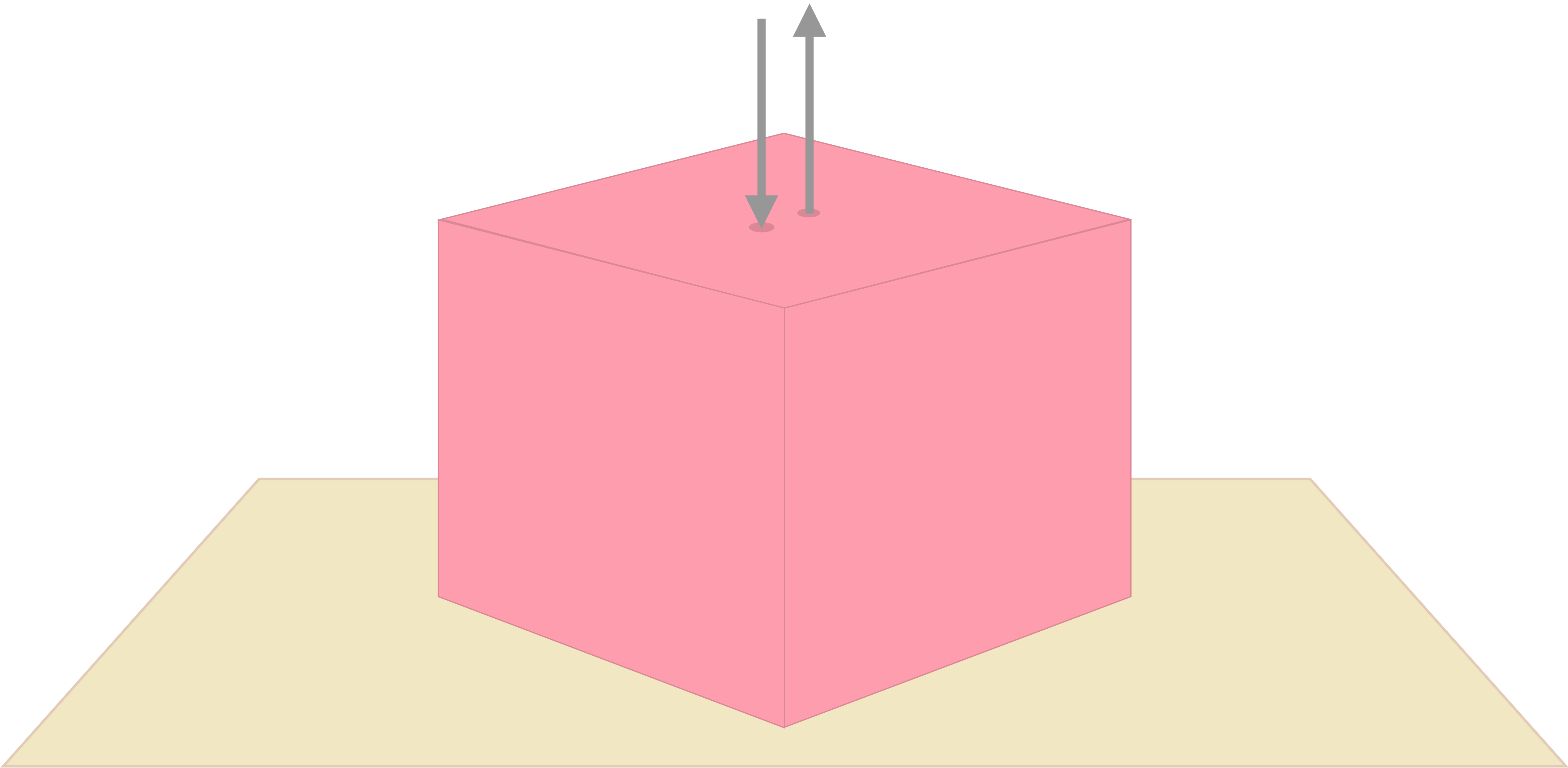
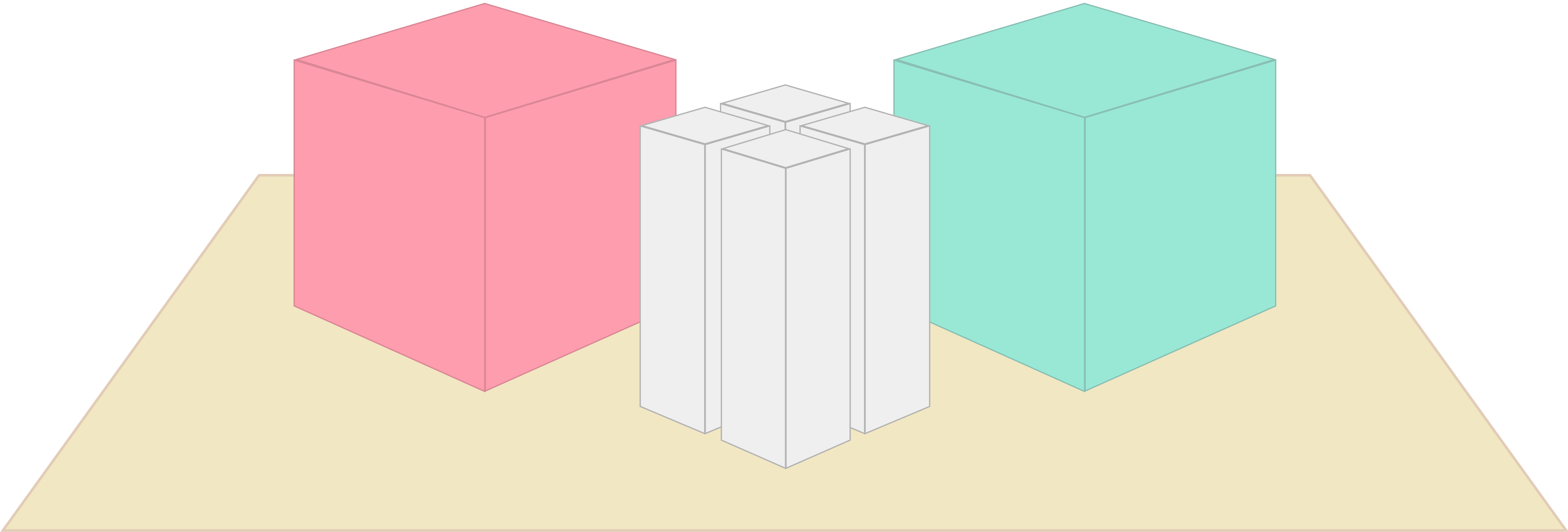


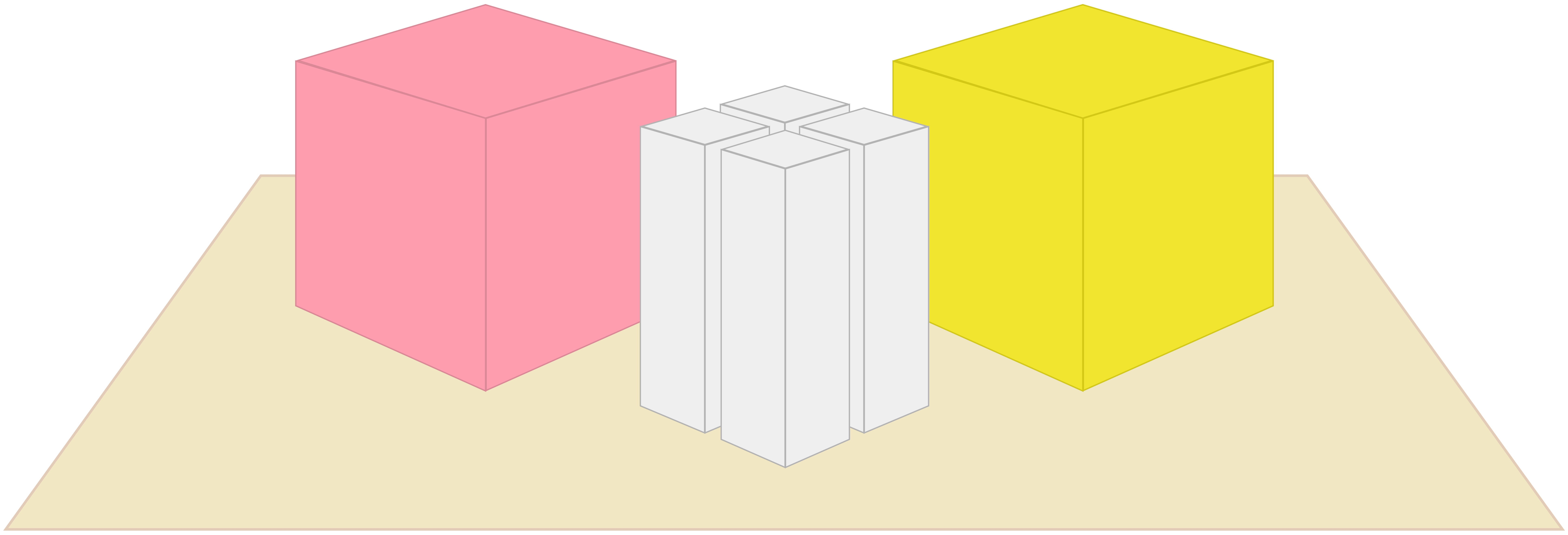
In reality a system of systems consists of individually developed software **and** standard products.



A product that fits well in a system of systems can be chosen by the following aspects: It has to solve a **defined set of tasks** and provide the same **integration mechanisms** that a self-contained system offers.



This ensures that products can be **replaced safely** by other products once their lifetime has ended.



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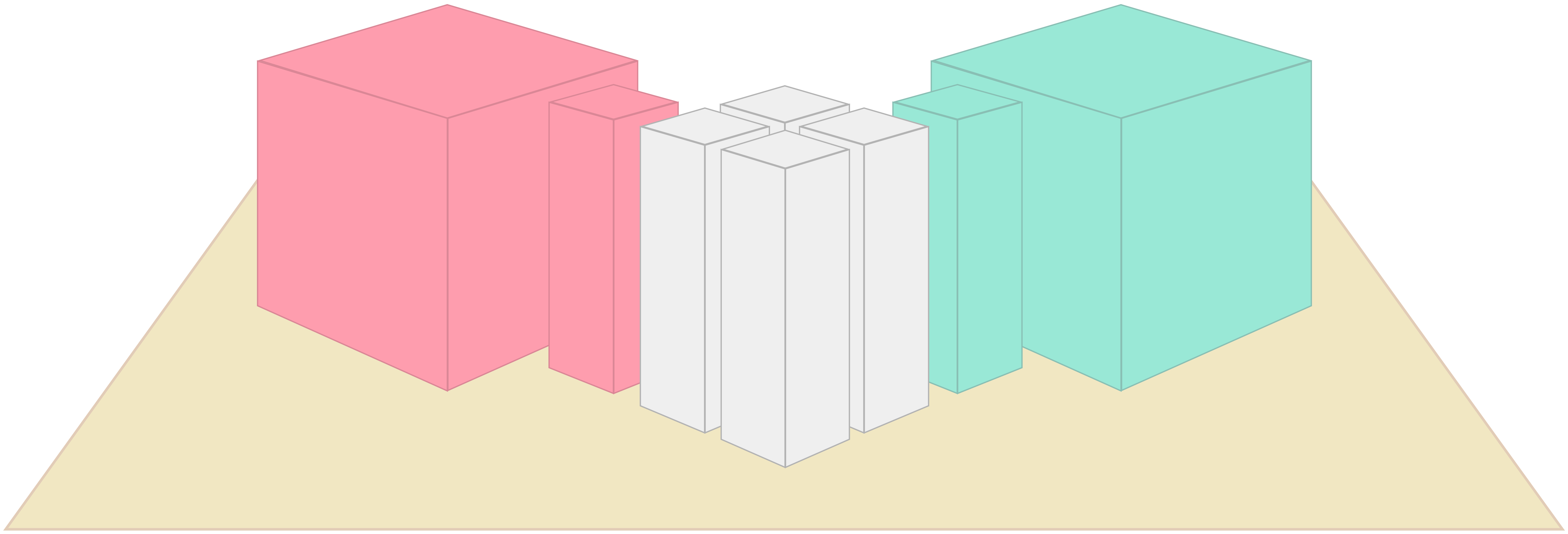

If a product with such integration mechanisms can not be found, it should at least be possible to extend that product with **uniform interfaces** that integrate well with the rest of the system.

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