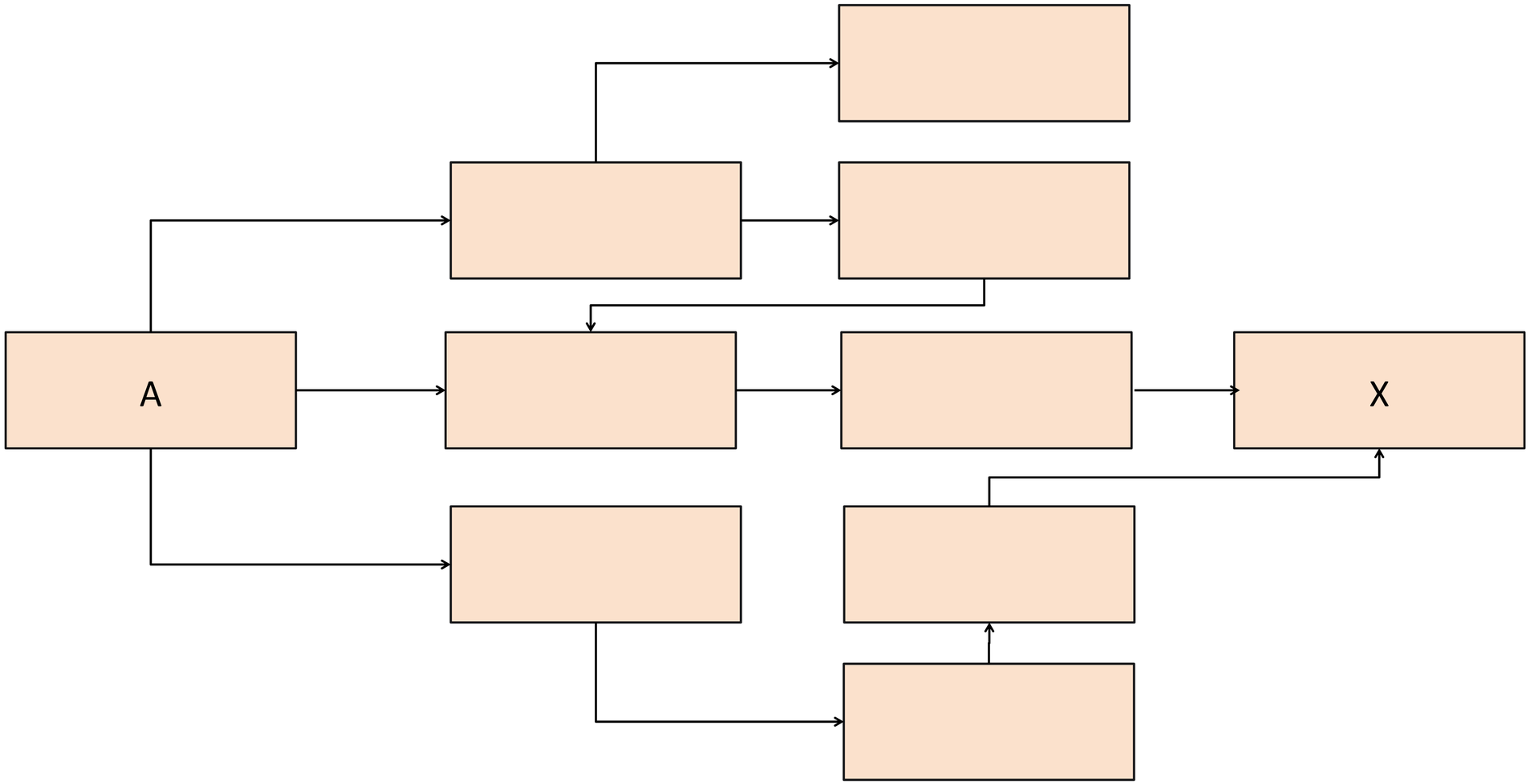
Kopplung

„Beziehungen (=Kopplung) zwischen Bausteinen ermöglichen deren Zusammenarbeit, bilden also die Grundsubstanz kooperierender Strukturen. Andererseits bedeuten Beziehungen auch Abhängigkeiten zwischen Bausteinen.“

Gernot Starke: Effektive Softwarearchitekturen: Ein praktischer Leitfaden. M: Carl Hanser Verlag, 2015.


A
X

Benachrichtigungskopplung

Aufrufkopplung

Datenkopplung

Kontrollkopplung

Externe Kopplung

Gemeinschaftliche Kopplung

Inhaltskopplung

Basierend auf Glenford J. Myers: *Reliable Software through Composite Design.* Mason and Lipscomb Publishers, New York 1974.

Benachrichtigungskopplung

Aufrufkopplung

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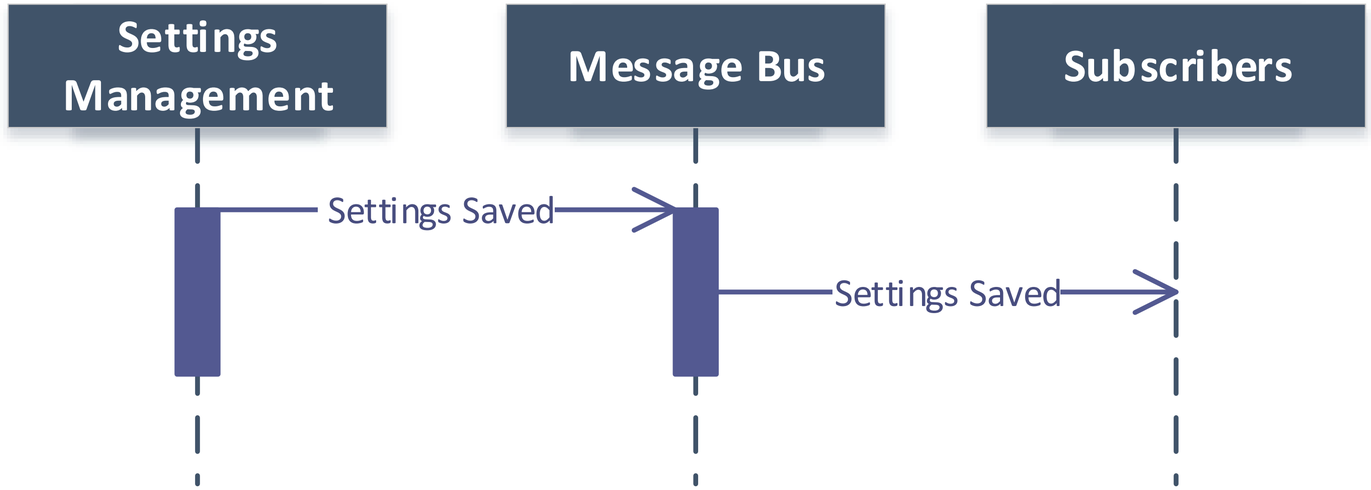
Externe Kopplung

Gemeinschaftliche Kopplung

Inhaltskopplung



Benachrichtigungskopplung

Aufrufkopplung

Datenkopplung

Kontrollkopplung

settings.Save()

Externe Kopplung

Gemeinschaftliche Kopplung

Inhaltskopplung

Basierend auf Glenford J. Myers: *Reliable Software through Composite Design.* Mason and Lipscomb Publishers, New York 1974.

Benachrichtigungskopplung

Aufrufkopplung

Datenkopplung

```
settings.GetValue("Max")
```

Kontrollkopplung

```
var setting = new Setting("Max", 6)
Settings.Save(setting)
```

Externe Kopplung

Gemeinschaftliche Kopplung

Inhaltskopplung

Basierend auf Glenford J. Myers: *Reliable Software through Composite Design.* Mason and Lipscomb Publishers, New York 1974.

Benachrichtigungskopplung

Aufrufkopplung

Datenkopplung

Kontrollkopplung

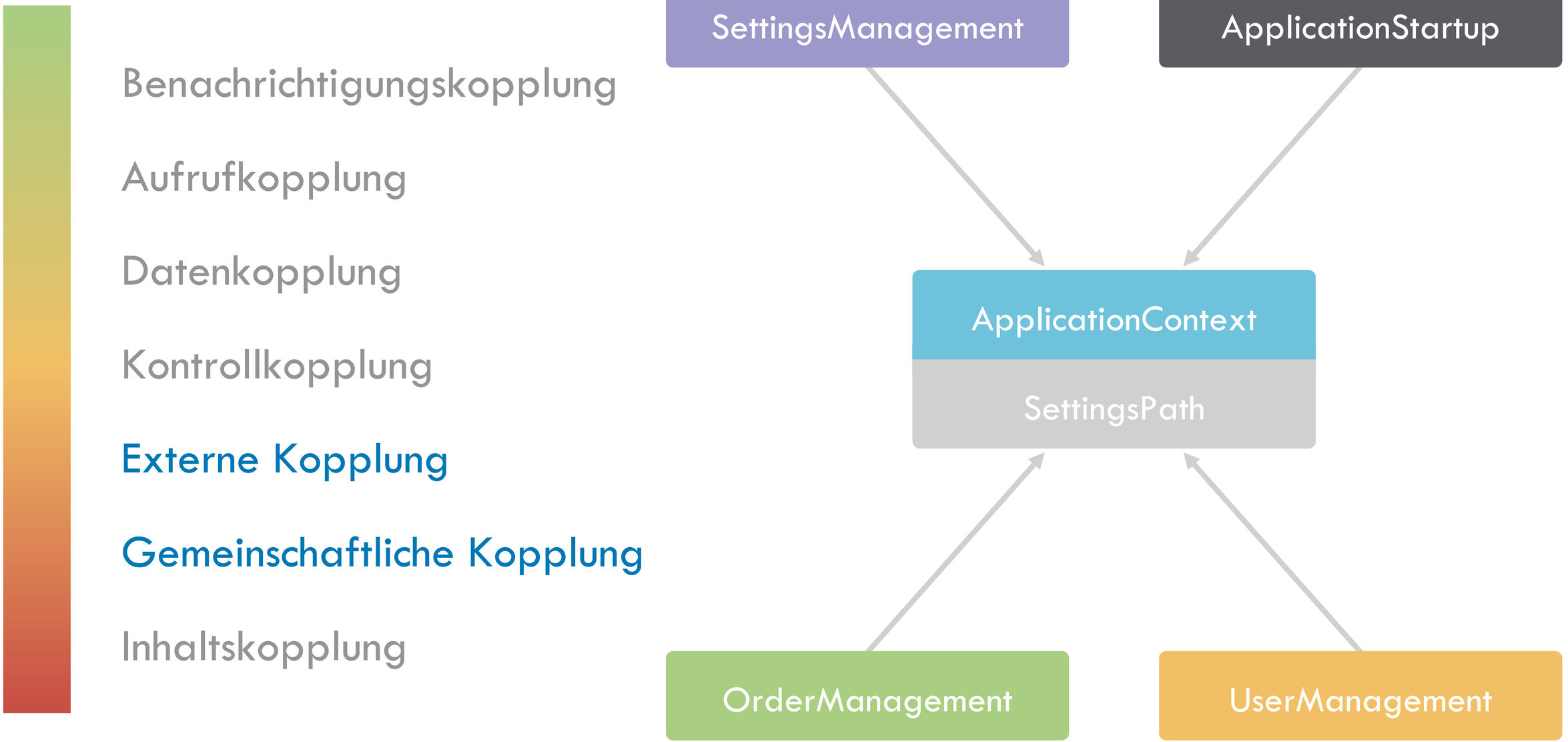
Externe Kopplung

Gemeinschaftliche Kopplung

Inhaltskopplung

```
var setting = new Setting()
...
settings.Update(setting, true)
```

Basierend auf Glenford J. Myers: *Reliable Software through Composite Design.* Mason and Lipscomb Publishers, New York 1974.



Basierend auf Glenford J. Myers: *Reliable Software through Composite Design.* Mason and Lipscomb Publishers, New York 1974.

Benachrichtigungskopplung

Aufrufkopplung

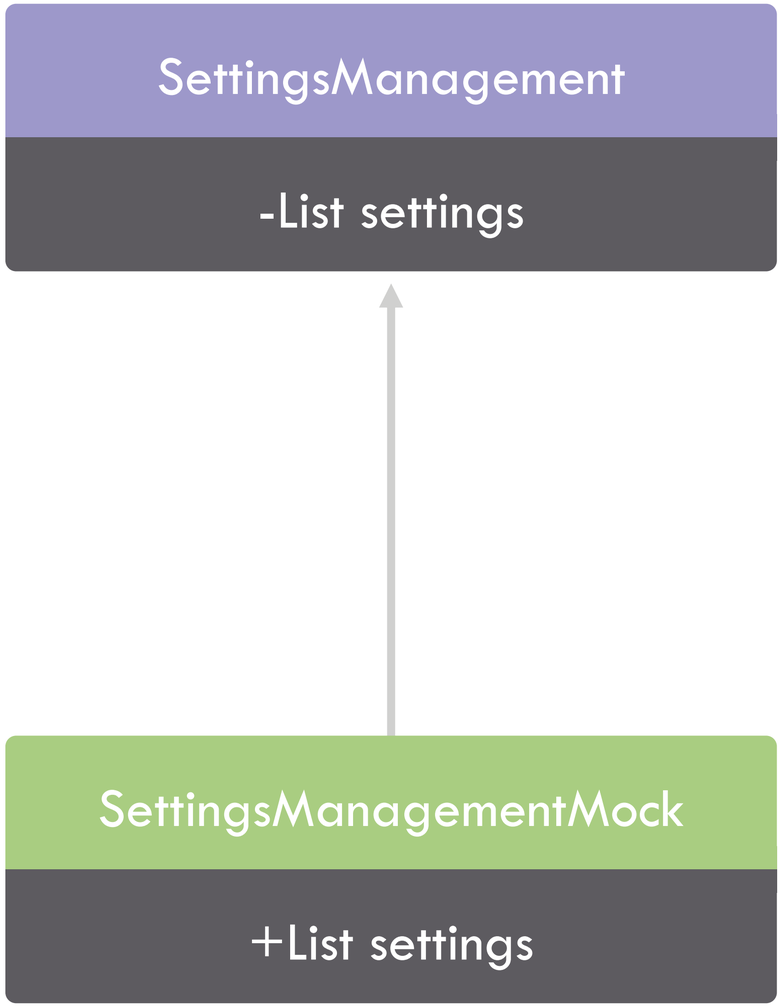
Datenkopplung

Kontrollkopplung

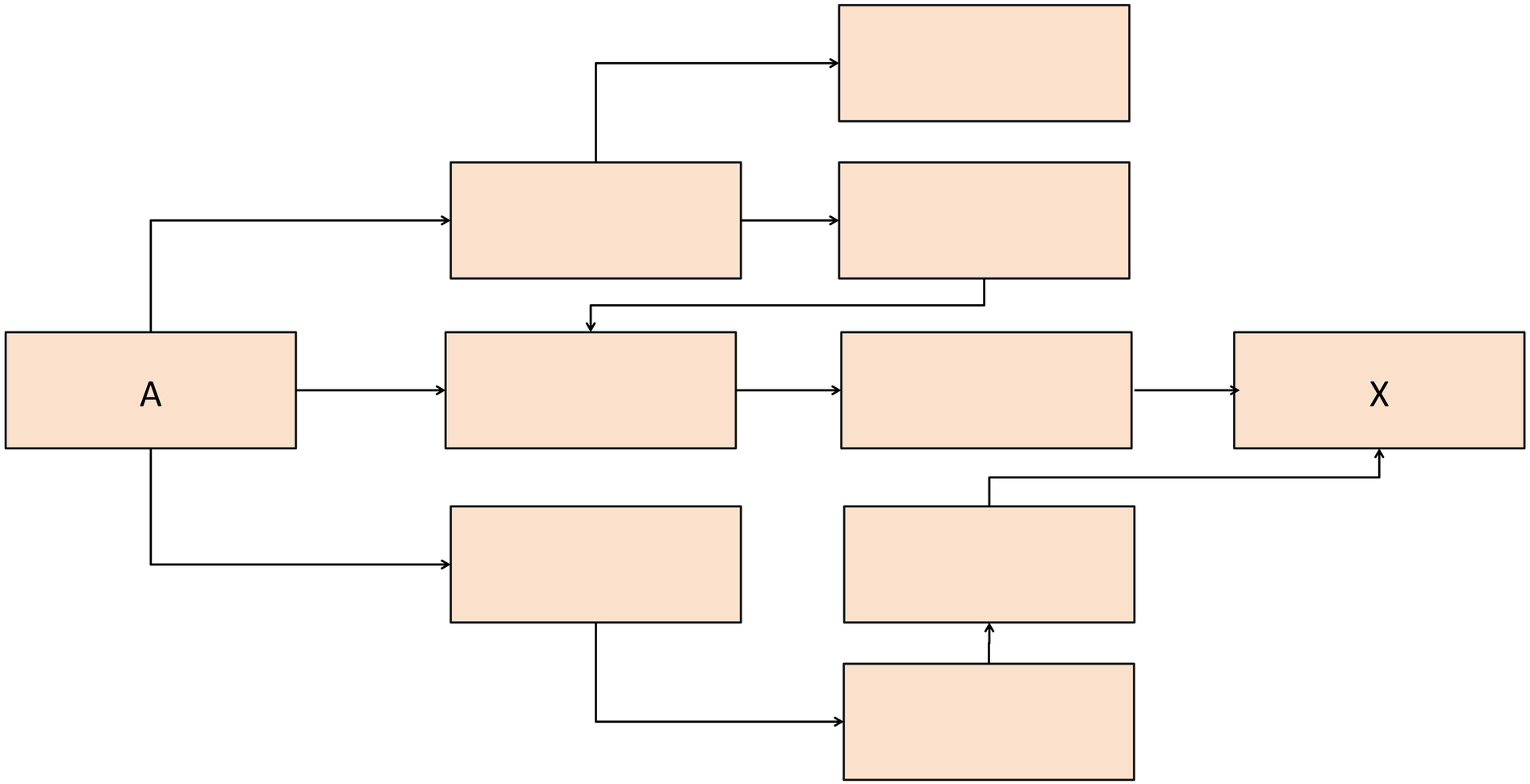
Externe Kopplung

Gemeinschaftliche Kopplung

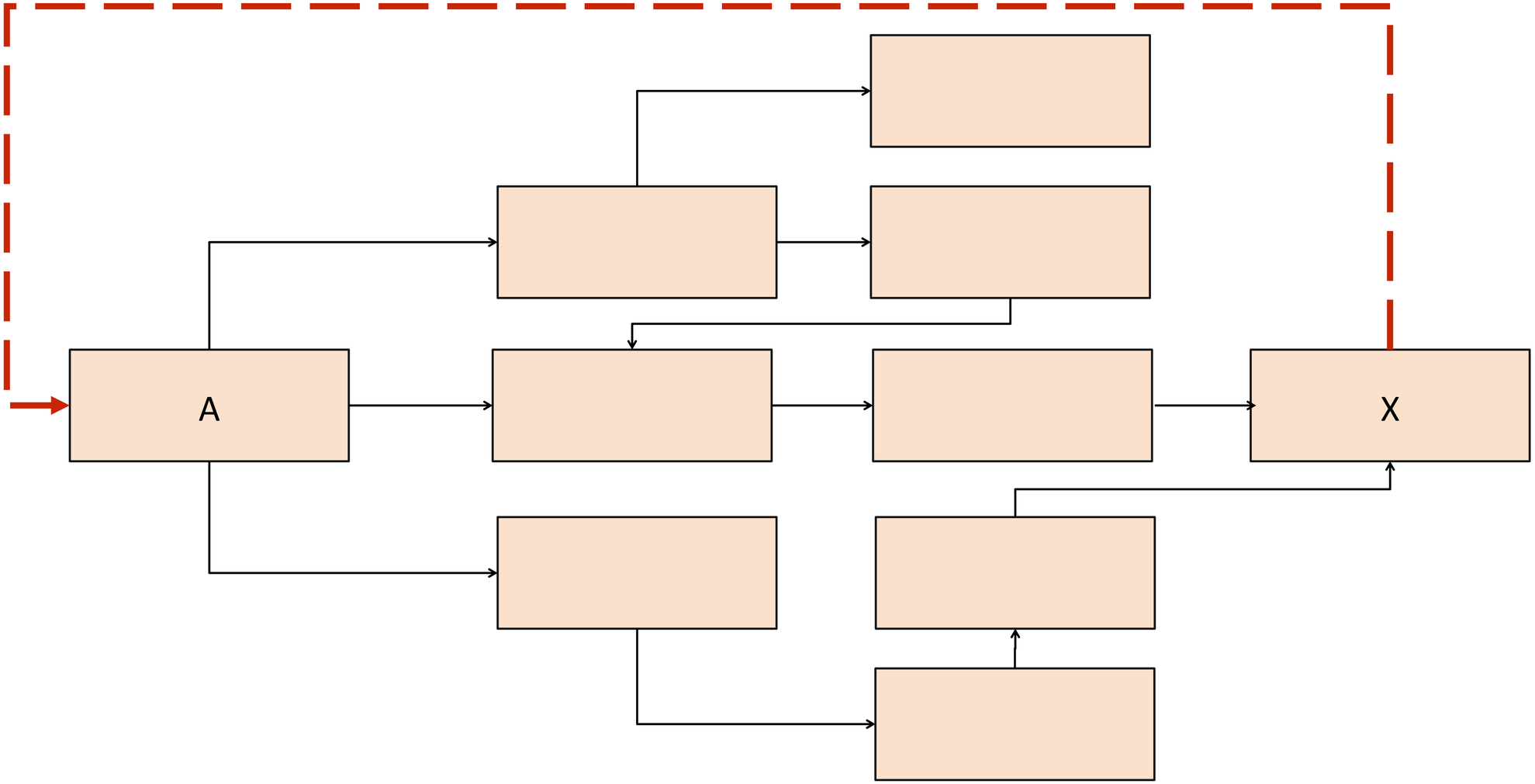
Inhaltskopplung

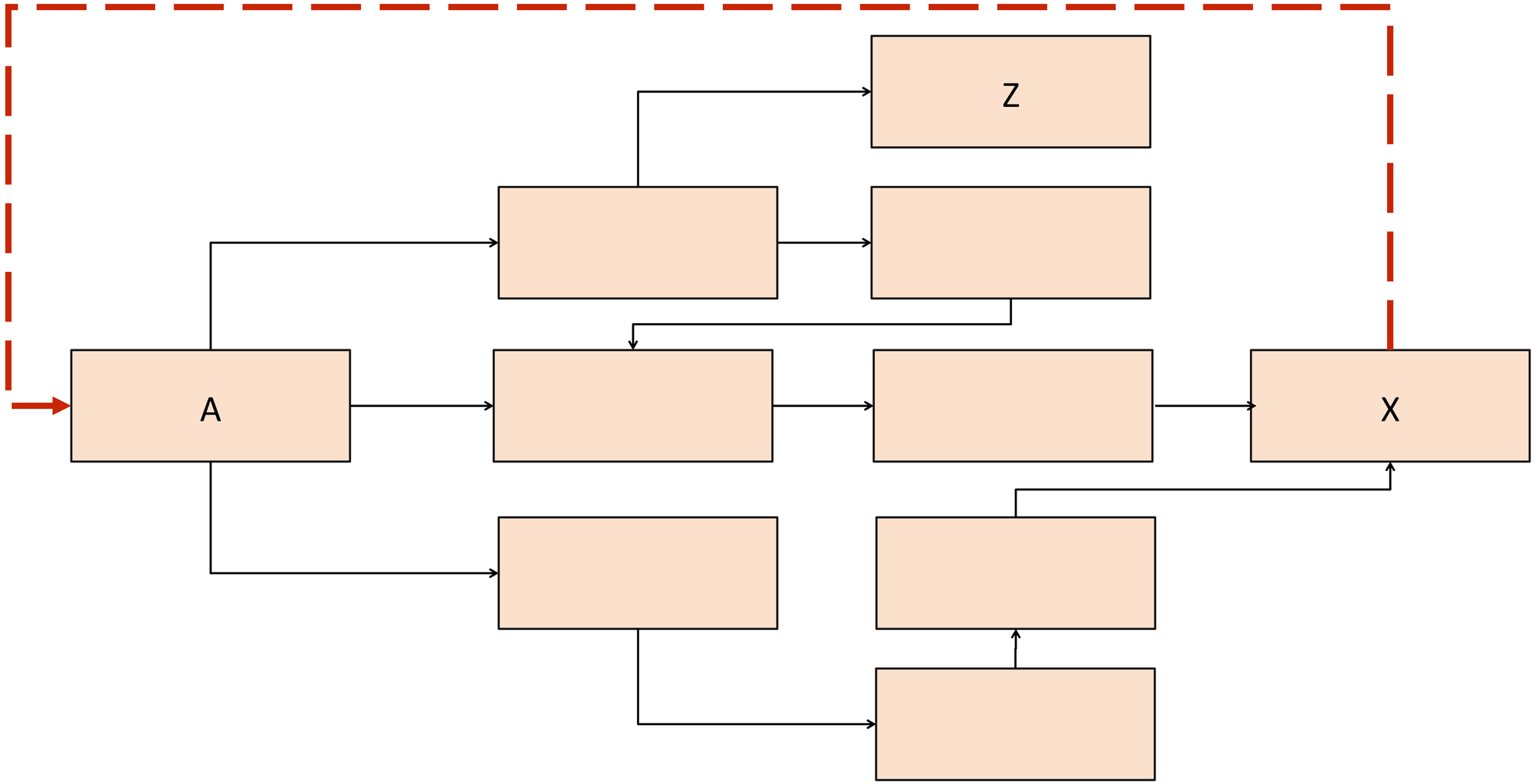


Basierend auf Glenford J. Myers: *Reliable Software through Composite Design.* Mason and Lipscomb Publishers, New York 1974.


A
X

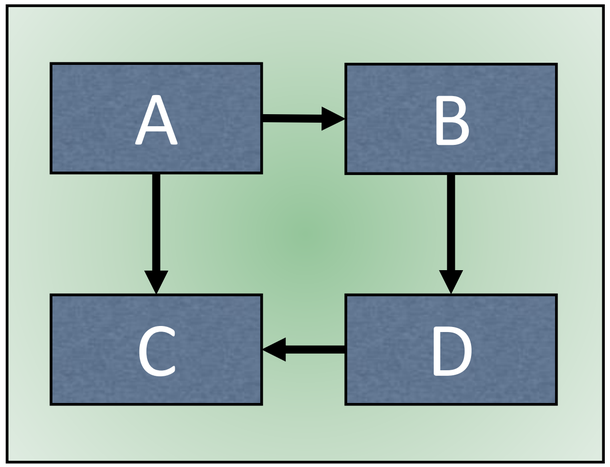
- Rot gestrichelt wichtig

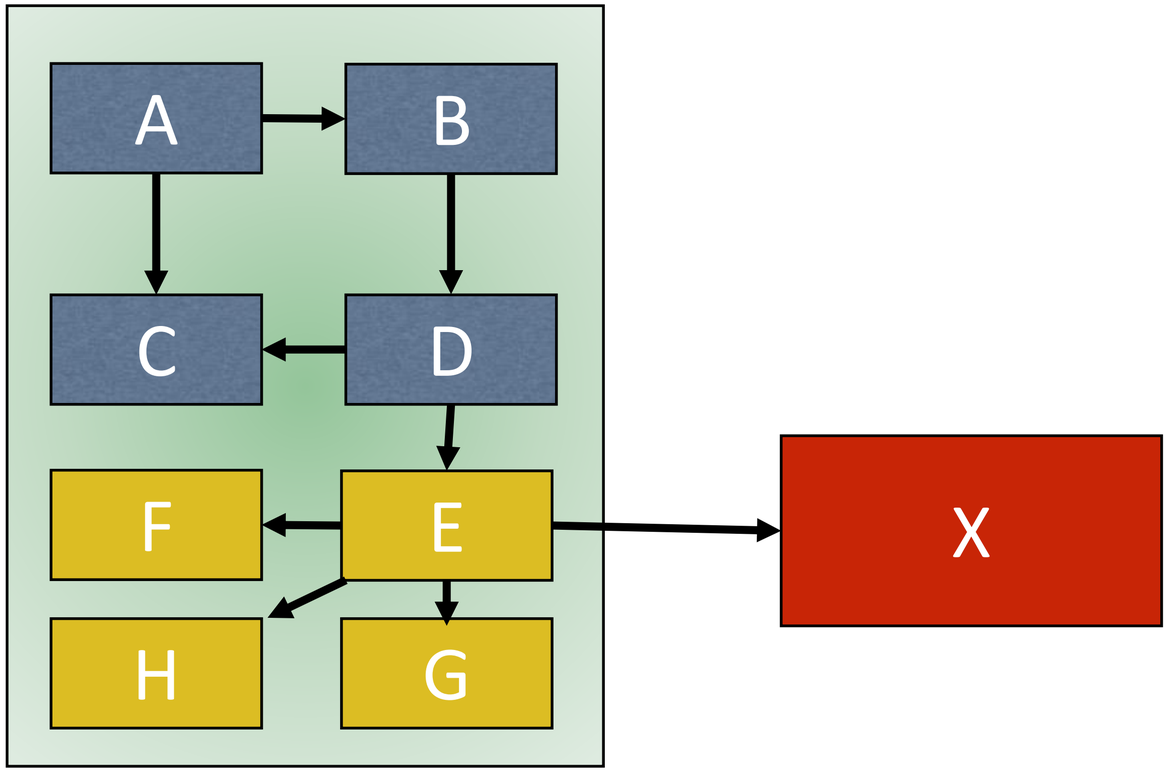


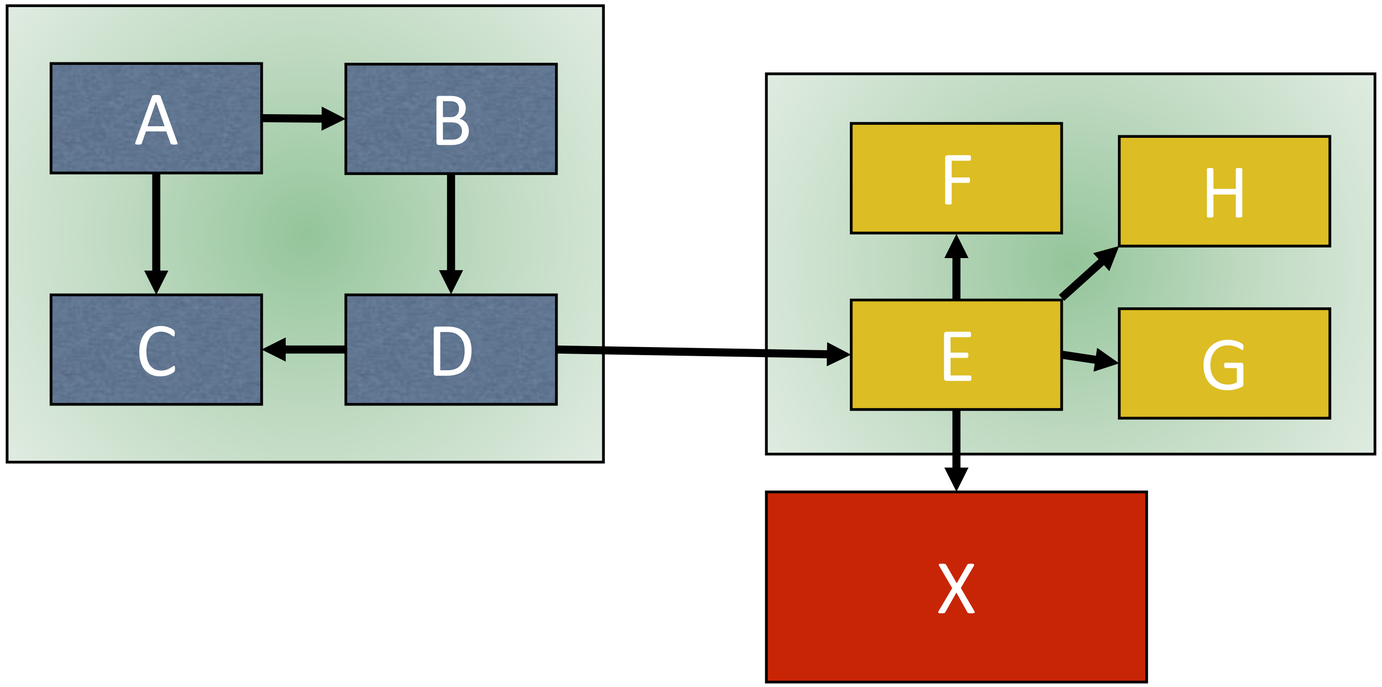

Z
A
X

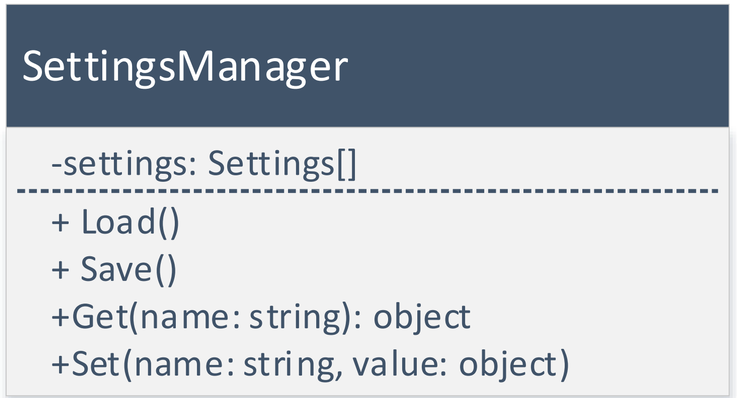
Kohäsion

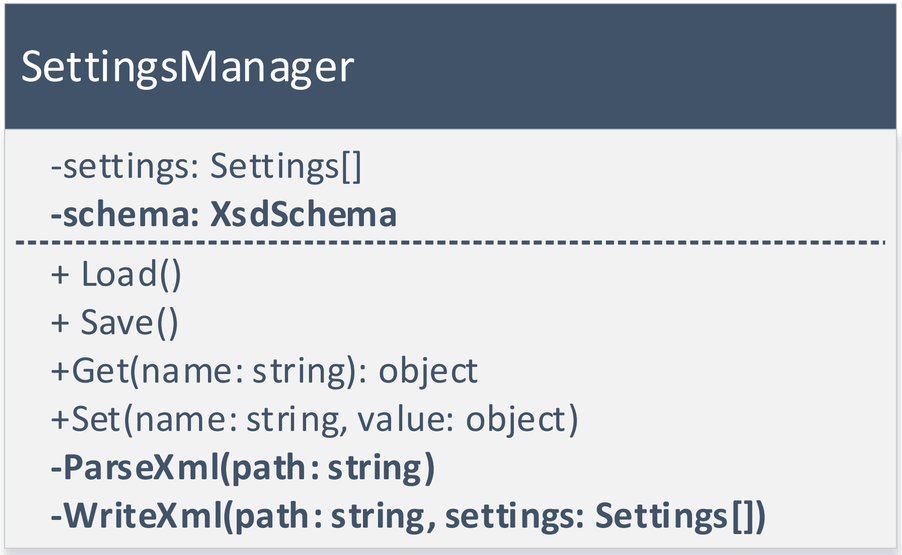
Kohäsion = Bindung = Innerer Zusammenhang

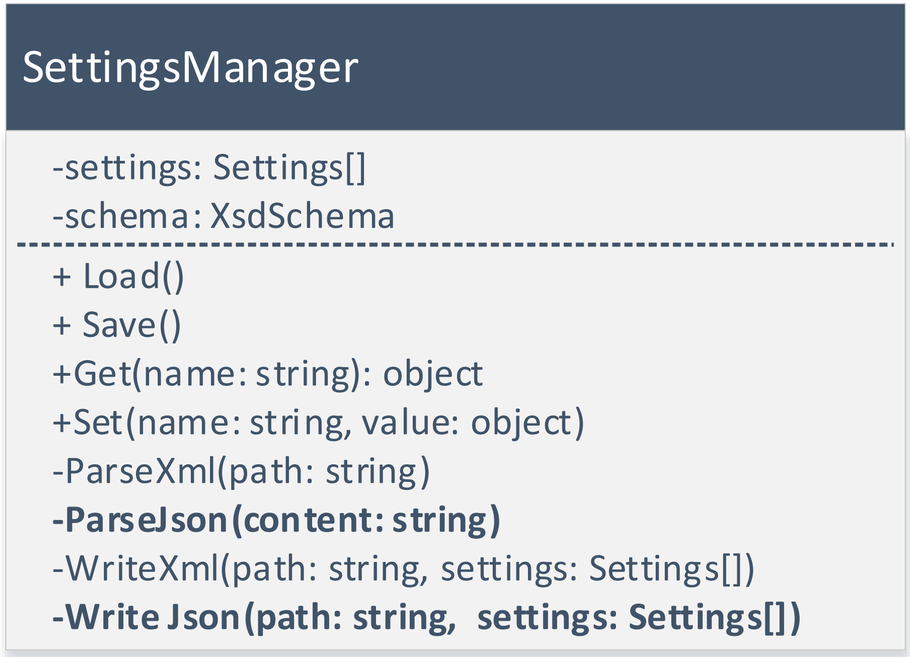

A
B
C
D

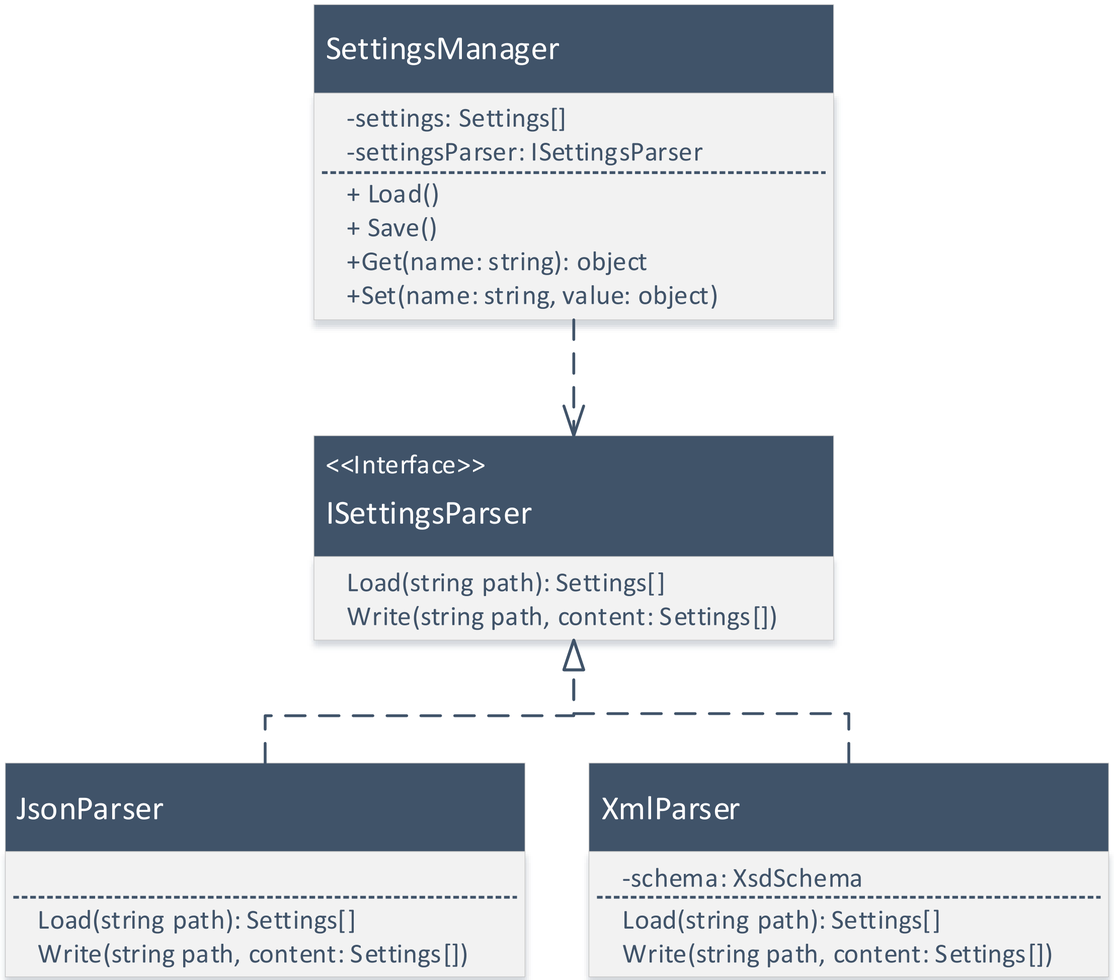

A
B
C
D
F
E
H
G
X


A
B
C
D
F
H
E
G
X


SettingsManager
-settings: Settings[]
+ Load()
+ Save()
+Get(name: string): object
+Set(name: string, value: object)


SettingsManager
-settings: Settings[]
-schema: XsdSchema
+ Load()
+ Save()
+Get(name: string): object
+Set(name: string, value: object)
-ParseXml(path: string)
-WriteXml(path: string, settings: Settings[])


SettingsManager
-settings: Settings[]
-schema: XsdSchema
+ Load()
+ Save()
+Get(name: string): object
+Set(name: string, value: object)
-ParseXml(path: string)
-ParseJson(content: string)
-WriteXml(path: string, settings: Settings[])
-Write Json(path: string, settings: Settings[])


SettingsManager
-settings: Settings[]
-settingsParser: ISettingsParser
+ Load()
+ Save()
+Get(name: string): object
+Set(name: string, value: object)
<<Interface>>
ISettingsParser
Load(string path): Settings[]
Write(string path, content: Settings[])
JsonParser
Load(string path): Settings[]
Write(string path, content: Settings[])
XmlParser
-schema: XsdSchema
Load(string path): Settings[]
Write(string path, content: Settings[])

Ziele

- Enge innere Bindung
- Lose Kopplung

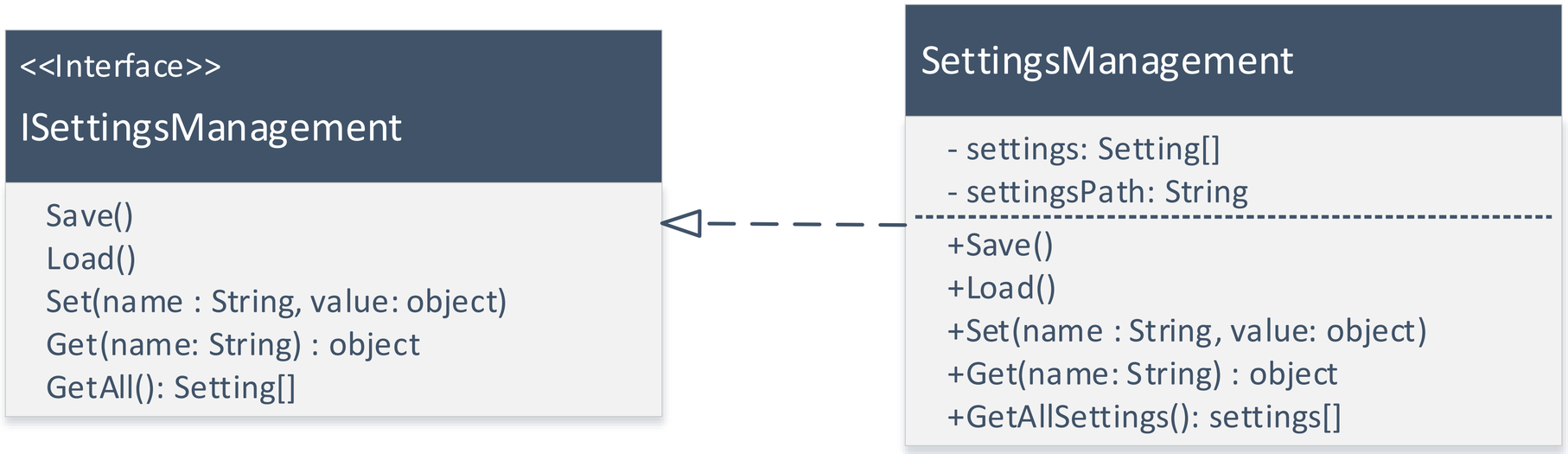
Entkopplung & Abstraktion

Lose Kopplung

Abstraktion

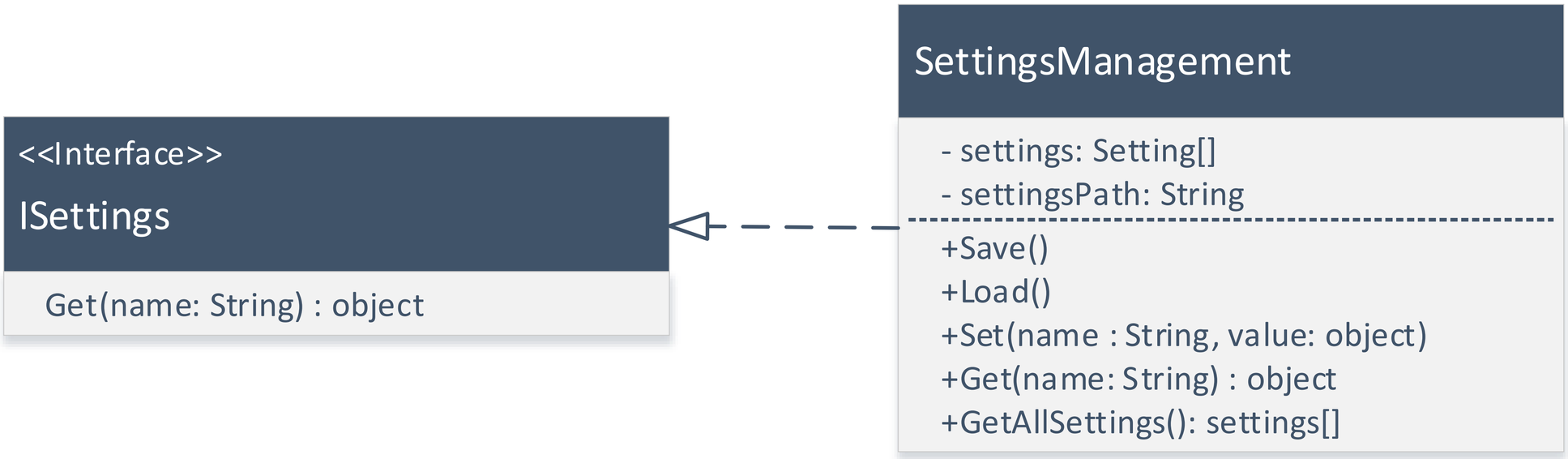
was

wie



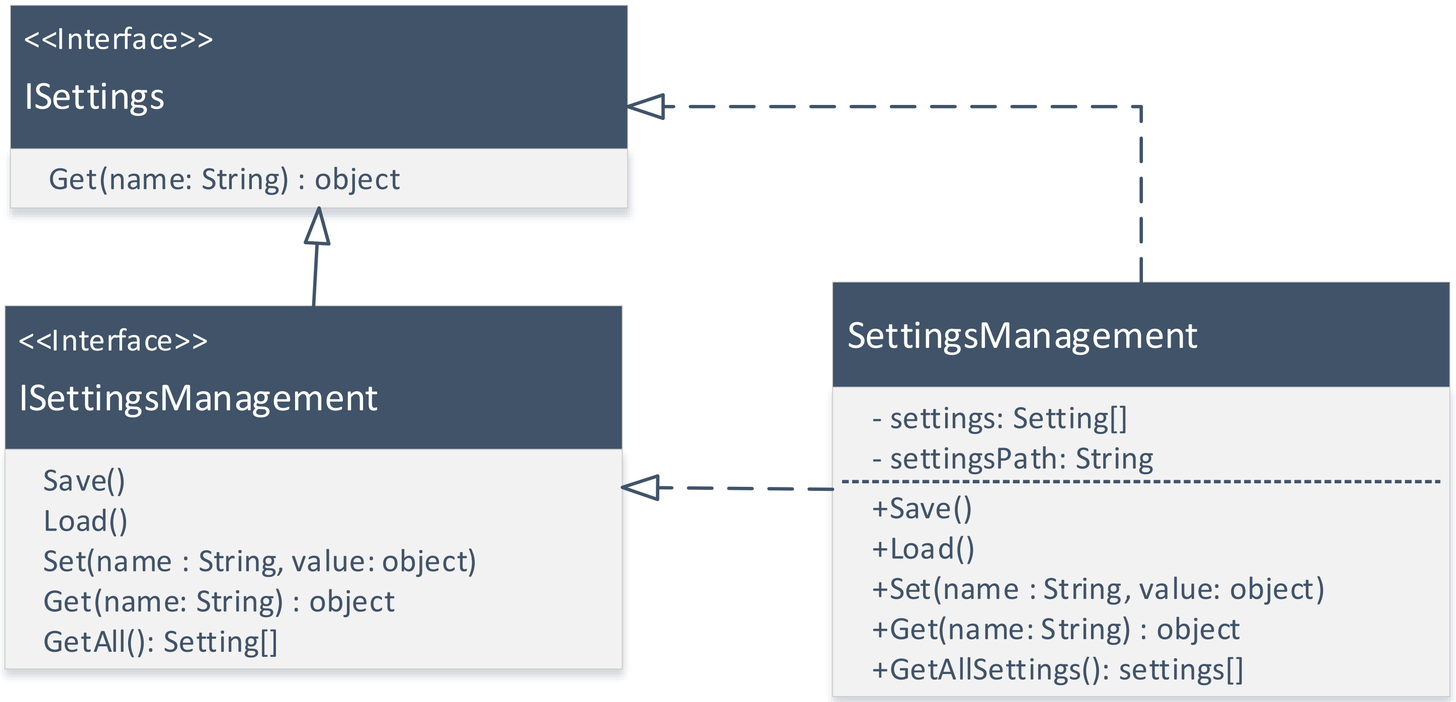
was

wie


<<Interface>>
ISettings
Get(name: String) : object
SettingsManagement
- settings: Setting[]
- settingsPath: String
+Save()
+Load()
+Set(name : String, value: object)
+Get(name: String) : object
+GetAllSettings(): settings[]

was

wie


<<Interface>>
ISettings
Get(name: String) : object
<<Interface>>
ISettingsManagement
Save()
Load()
Set(name : String, value: object)
Get(name: String) : object
GetAll(): Setting[]
SettingsManagement
- settings: Setting[]
- settingsPath: String
+Save()
+Load()
+Set(name : String, value: object)
+Get(name: String) : object
+GetAllSettings(): settings[]


<<Interface>>
ISettings
Get(name: String) : object
InvoiceService
-settings: ISettings
+Calculate(invoice: Invoice)
<<Interface>>
ISettingsManagement
Save()
Load()
Set(name : String, value: object)
Get(name: String) : object
GetAll(): Setting[]
SettingsManagementViewModel
+Settings : Setting[]
-settingsManagement : ISettingsManagement
Save()
Load()

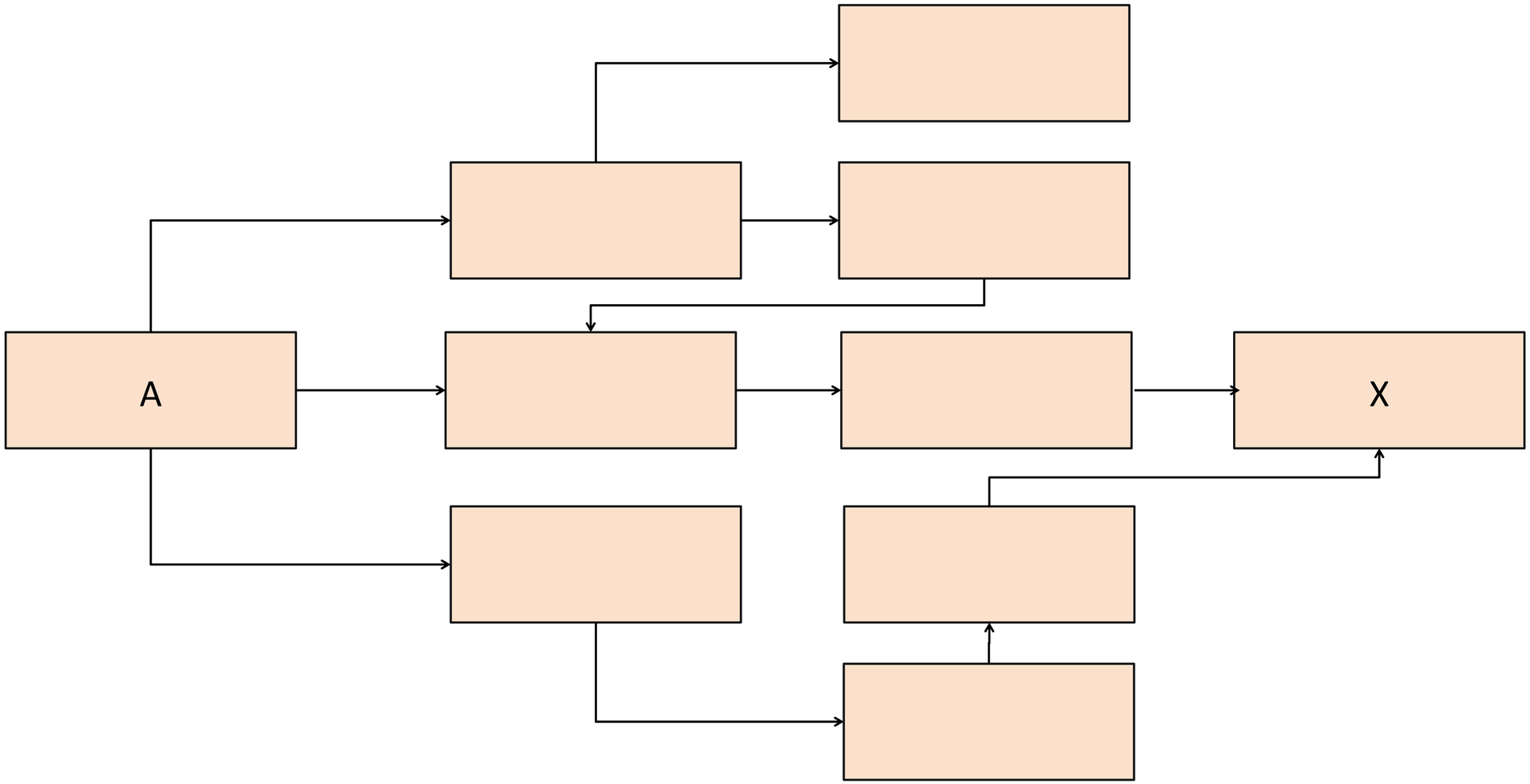
Frühe Bindung

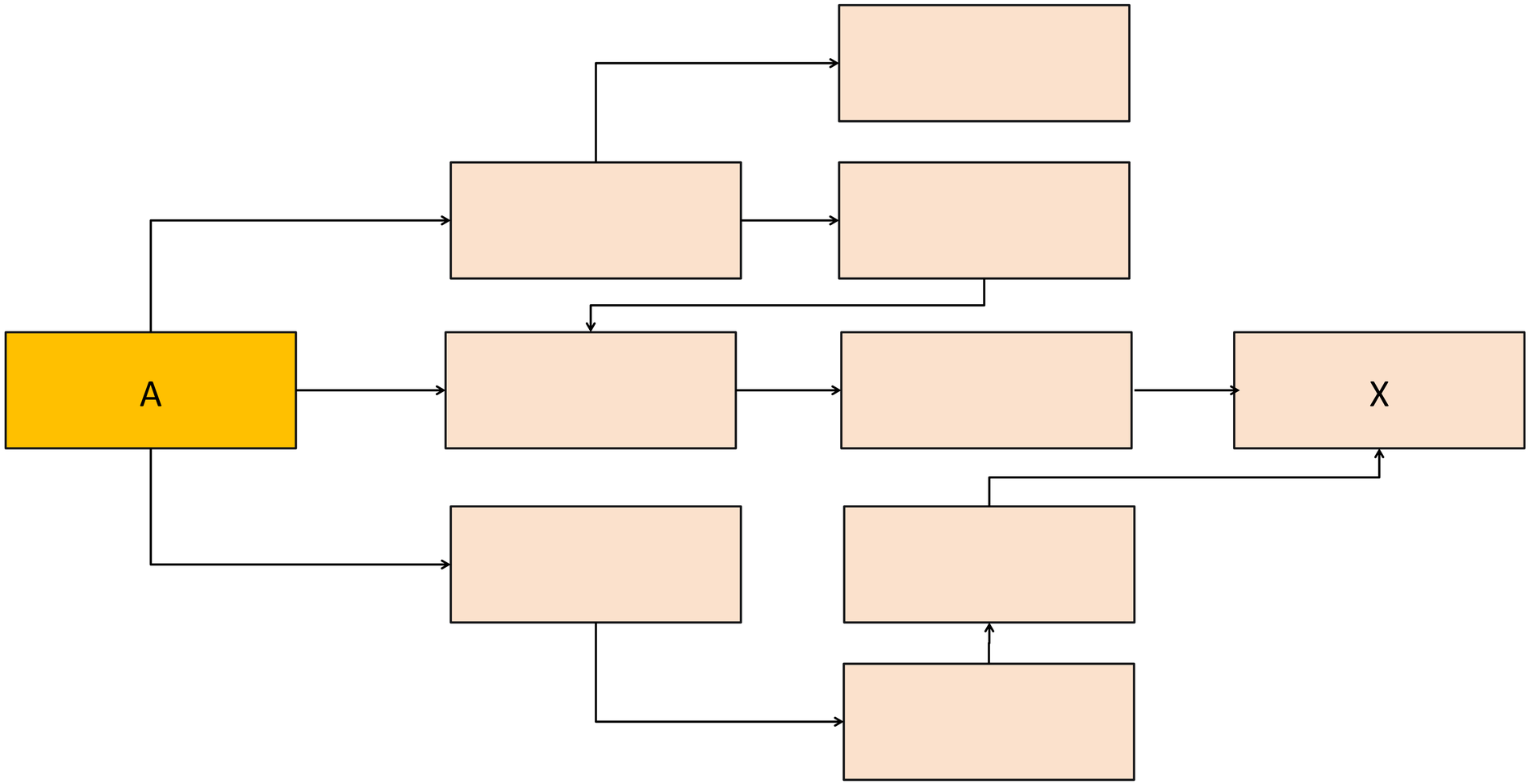
```
public class InvoiceService
{
    private ISettings settings;

     public InvoiceService()
     {
         this.settings = new SettingsManagement()
     }
}
```

Späte Bindung

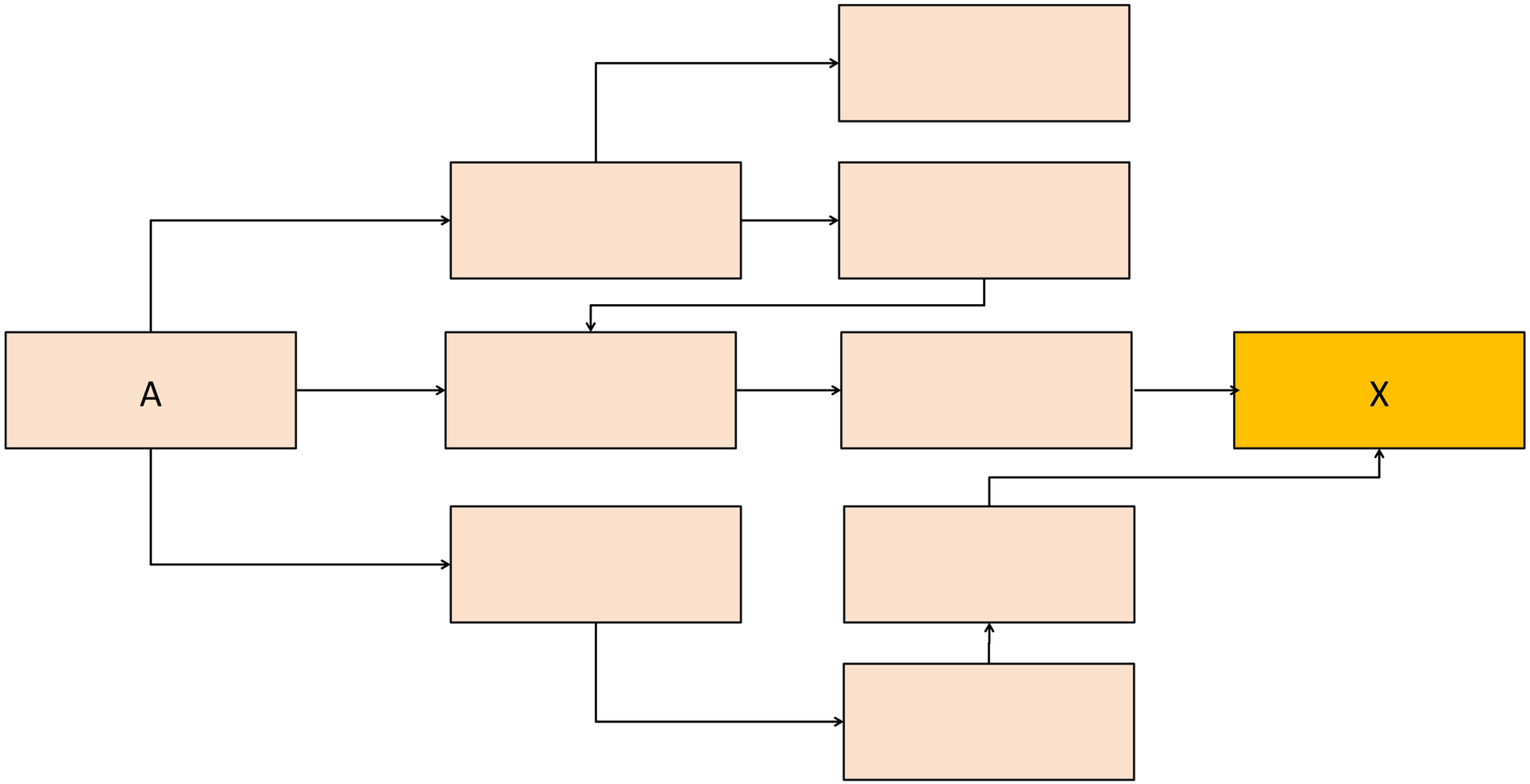
```
public class InvoiceService
{
    private ISettings settings;

     public InvoiceService(ISettings settings)
     {
         this.settings = settings;
     }
}
```

Instabilität vs. Abstraktion


A
X



Efferent Coupling (Ce)



Afferent Coupling (Ca)

$$Instability = Ce / (Ce + Ca)$$

Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod

$$Instability = Ce / (Ce + Ca)$$

$$Instability = 2 / (2 + 2) = 0,50$$

$$Instability = 2 / (2 + 4) = 0,33$$

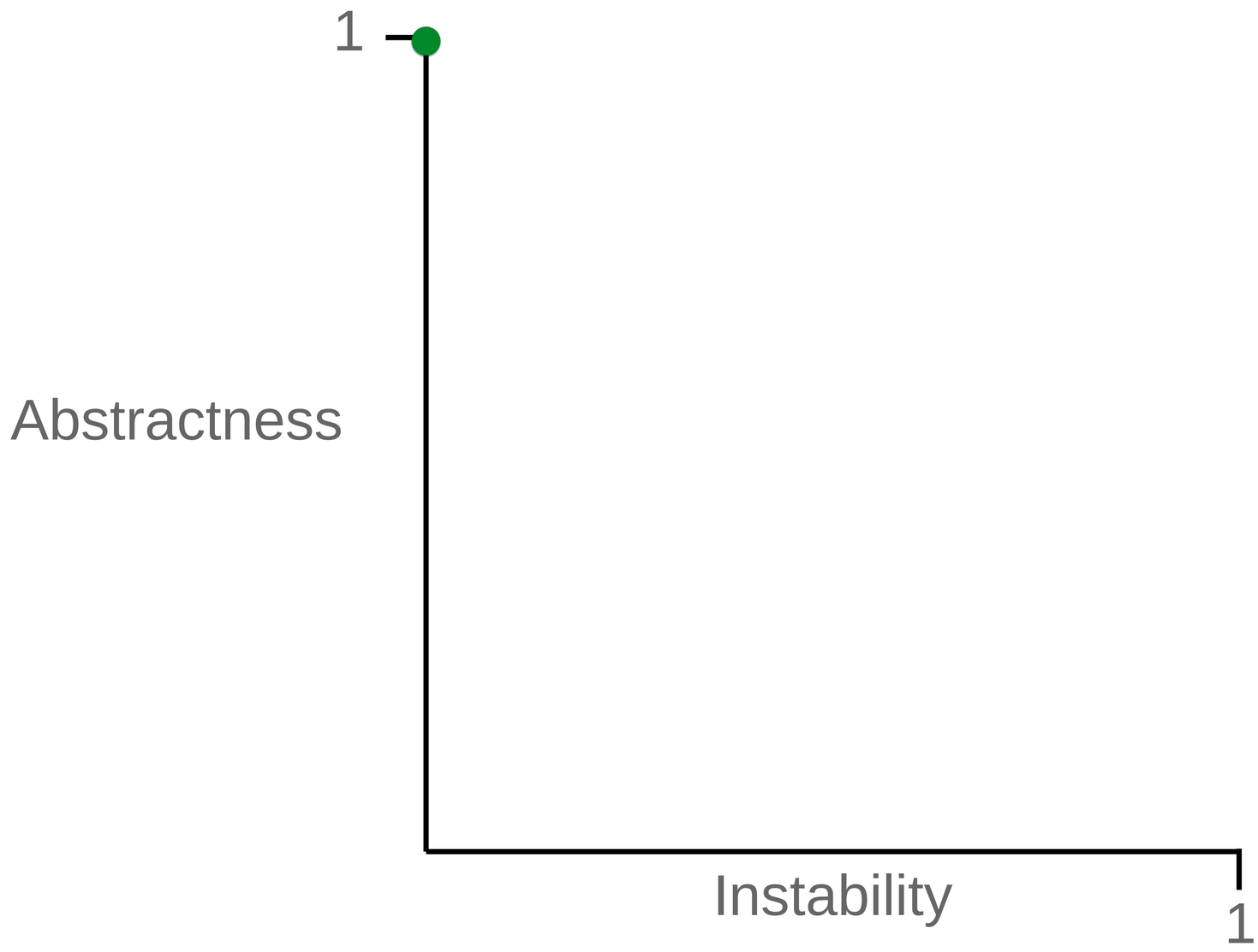
$$Instability = 3 / (3 + 0) = 1,00$$

Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod

Abstractness = Na / N

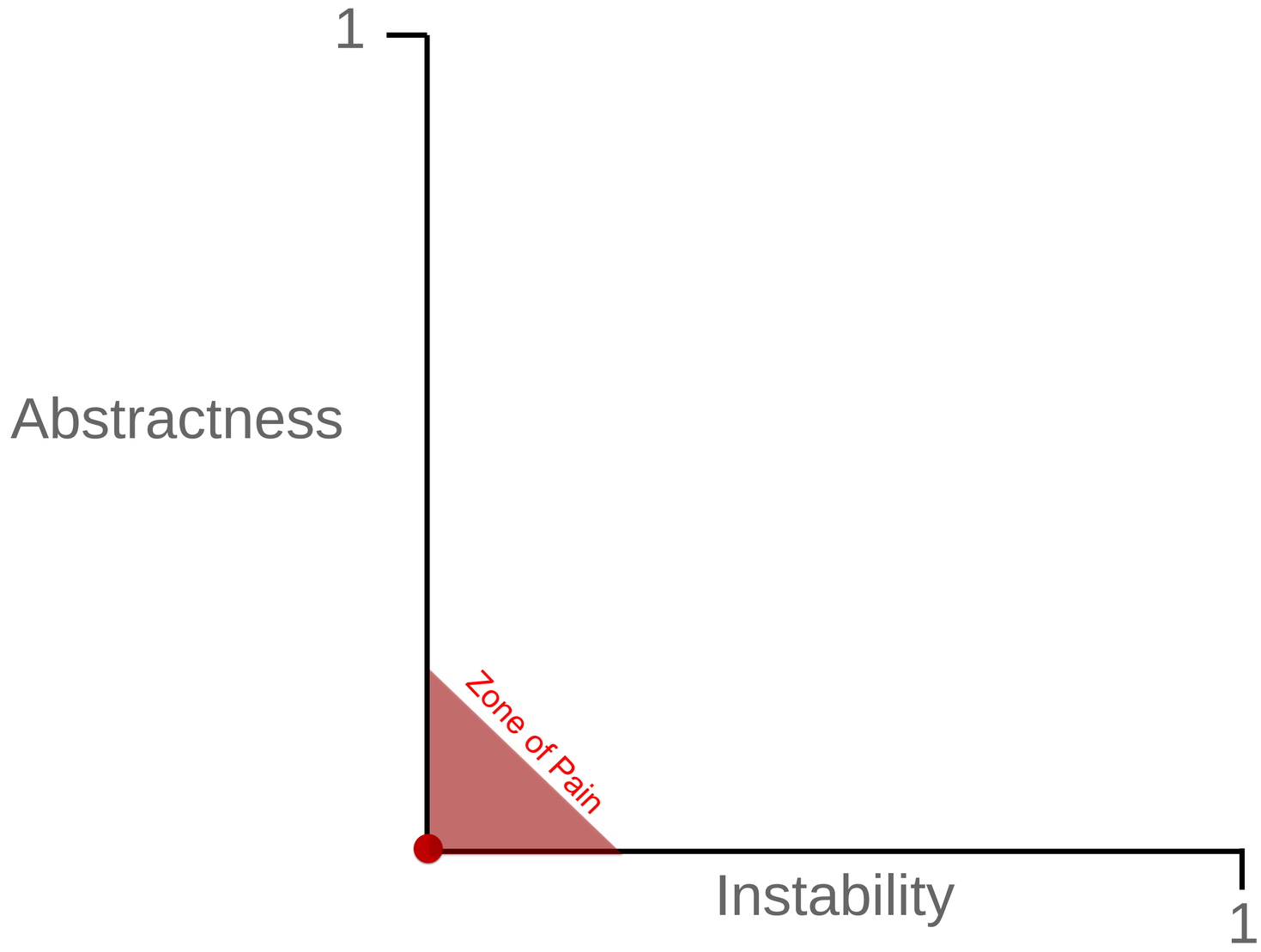
Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod

Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod

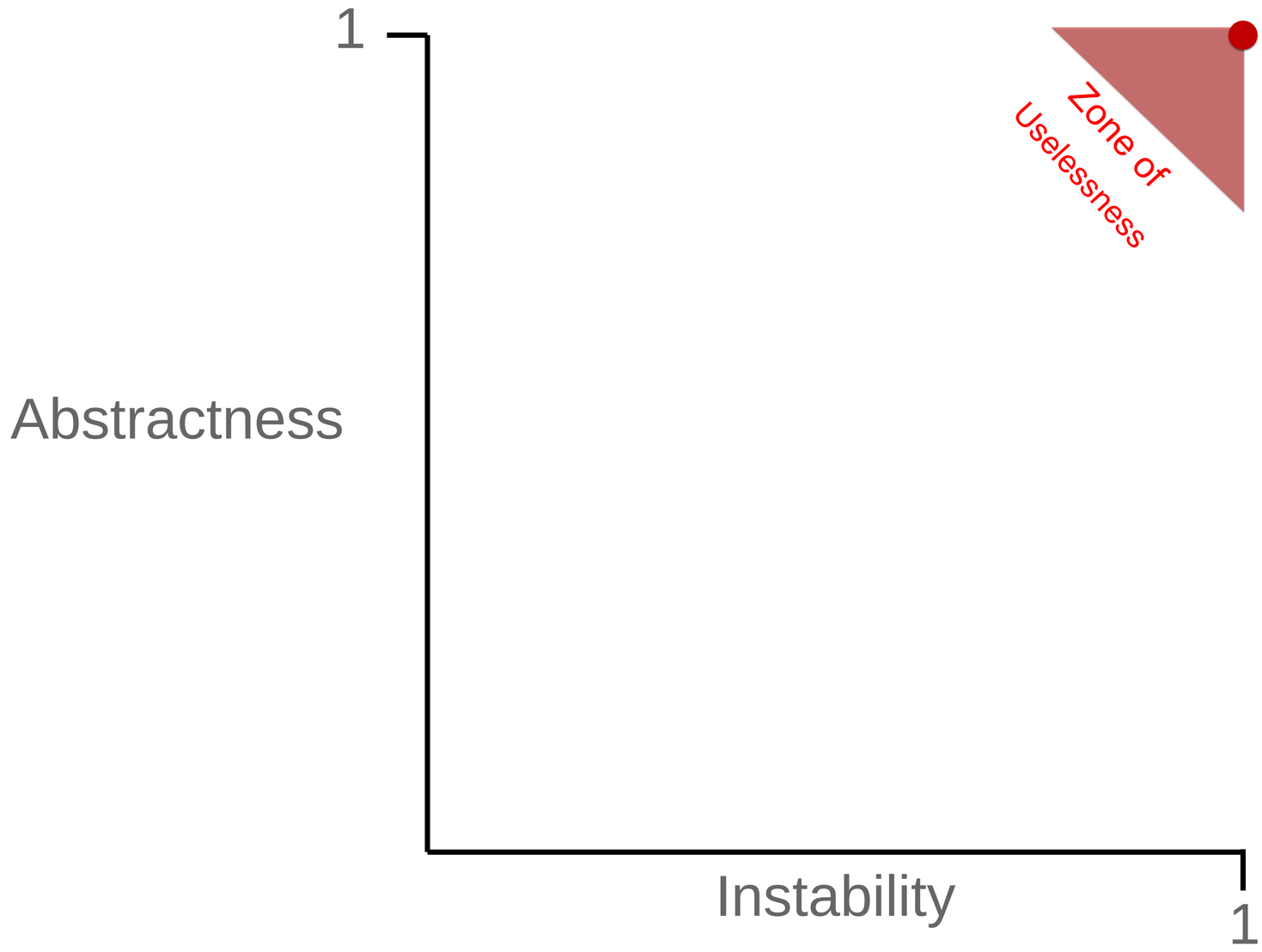


Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod

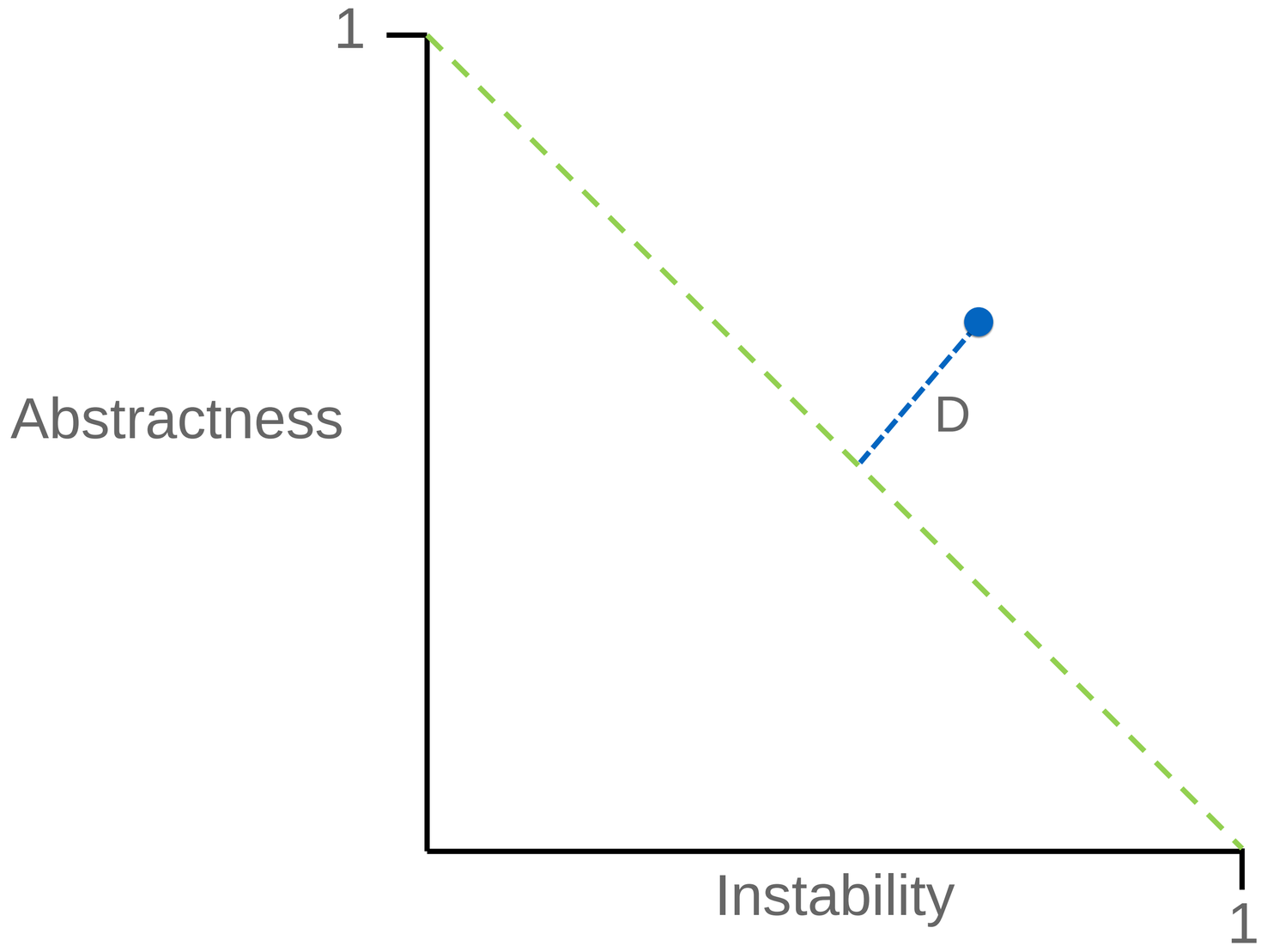
Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod



Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod



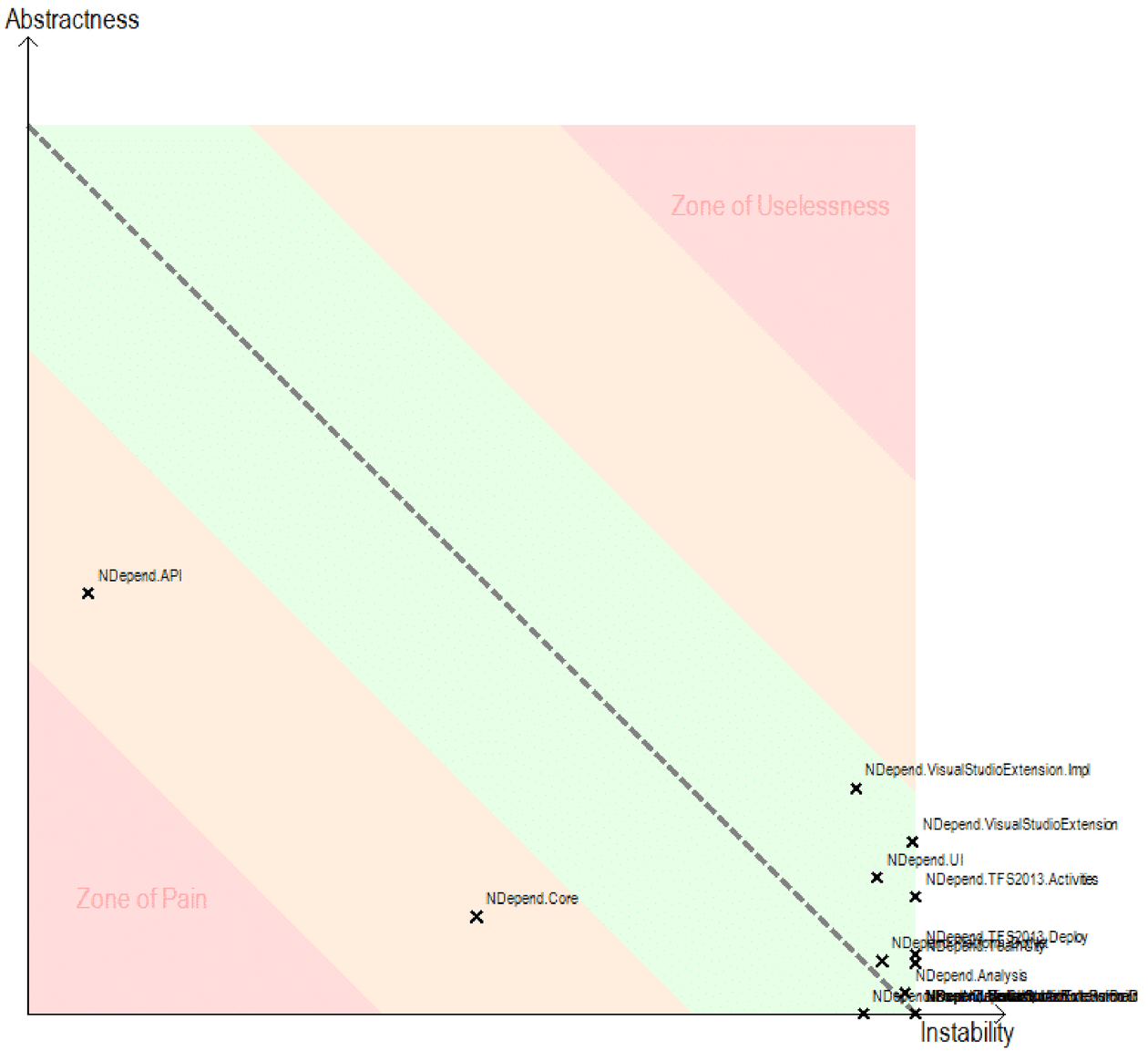
Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod



$$D = \frac{|A + I - 1|}{\sqrt{2}}$$

$$D' = |A + I - 1|$$

Quelle: http://butunclebob.com/ArticleS.UncleBob.PrinciplesOfOod



Quelle: https://blog.ndepend.com