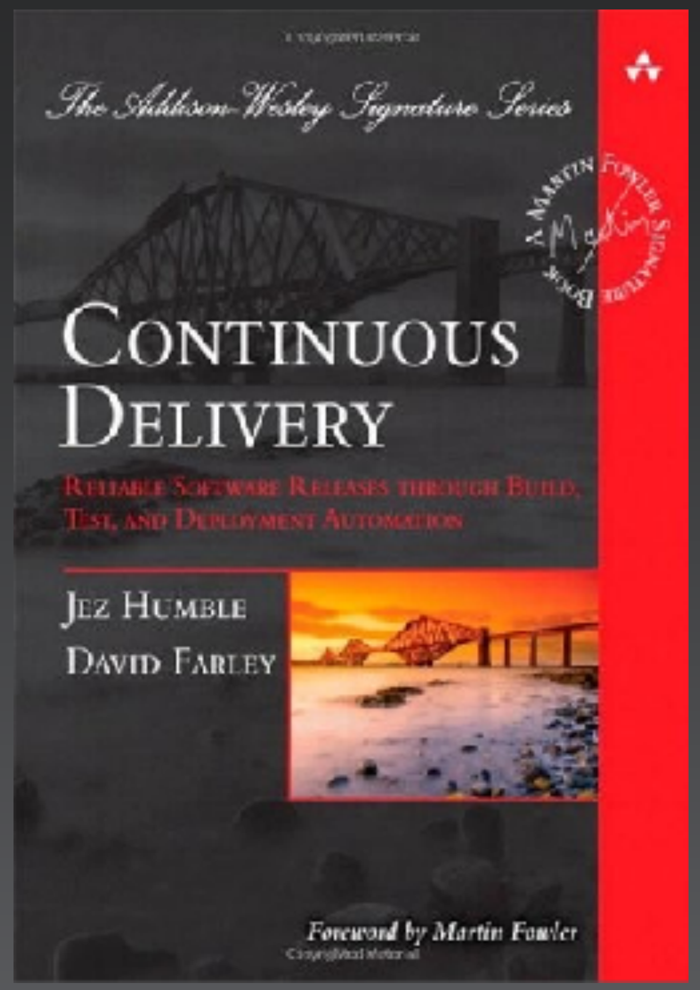
Taking Back ‘Software Engineering’

Craftsmanship is insufficient

Dave Farley
http://www.davefarley.net
@davefarley77

Continuous
Delivery ltd

http://www.continuous-delivery.co.uk



The Addison-Wesley Signature Series
Continuous Delivery
Reliable Software Releases through Build, Test, and Deployment Automation
Jez Humble
David Farley
Foreword by Martin Fowler

«interface» PersistenceInitializationActivator
+isPersistenceProviderSupported()
«interface» PersistenceUnitInfo
EquinoxInitializer
JPAInitializer
-initializationClassloader
+initialize()
OSGiInitializer
JavaSECMPInitializer
-javaSECMPInitializer
+initializeClassLoader()
Bug# 253701 cache PersistenceInitializationHelper on EntityManagerSetupImpl so we can call unsetInitialized()
ClassLoader
-singleton
«uses»
JavaSECMPInitializer
«interface» PersistenceProvider
PersistenceProvider
-initializationHelper
PersistenceInitializationHelper
+getInitializer()
+unsetInitializer()
osgi.PersistenceProvider
-initializationClassName
OSGiPersistenceInitializationHelper
NoServerPlatform
-final
WebLogicPlatform
CustomServerPlatform
-final
JPAClassLoaderHolder
-classLoader
ServerPlatformBase
«interface» ServerPlatform
JTATransactionController
«interface» ExternalTransactionController
JTASynchronizationListener
TransactionImpl
-dataSource
+invokeAfterCompletion()
AbstractTransactionController
-synchronizationListenerFactory
-session
-activeUnitOfWorkThreadLocal
AbstractSynchronizationListener
-transaction
-controller
-session
-unitOfWork
+afterCompletion()
-unitOfWorkChangeSet
UnitOfWorkChangeSet
RepeatableWriteUnitOfWork
RemoteUnitOfWork
-containerUnitOfWork
UnitOfWorkImpl
-parent
-containerUnitOfWork
-lastUsedMergeManager
-unitOfWorkChangeSet
+mergeClonesAfterCompletion()
«interface» Session
«interface» UnitOfWork
ConnectionPool
-owner
-login
«interface» Server
«interface» DatabaseSession
EntityManagerSetupImpl
-serverSession
-persistenceUnitInfo
#persistenceInitializationHelper
-processor
-metamodel
+predeploy()
+undeploy()
ServerSession
-readConnectionPool
DatabaseSessionImpl
-serverPlatform
SessionBroker
SequencingManager
-lockMap
-ownerSession
ConcurrencyManager
-depth
-activeThread
-lockedByMergeManager
+acquire()
+release()
+releaseDeferredLock()
DeferredLockManager
-deferredLocks
-activeLocks
-cacheMutex
-lastUsedMergeManager
AbstractSession
-project
-transactionMutex
-accessor
-platform
-commitManager
-brokerSession
-sessionProfiler
-sessionEventManager
-externalTransactionController
-activeCommandThreads
-lastDescriptorAccessed
-integrityChecker
+acquireUnitOfWork()
MergeManager
#session
#writeLockQueued
-lockThread
IdentityMapManager
-session
-cacheMutex
-lastAccessedIdentityMap
-writeLockManager
WriteLockManager
-prevailingQueue
«interface» IdentityMapAccessor
+printIdentityMapLocks()
IdentityMapAccessor
#session
#identityMapAccessor
UnitOfWorkIdentityMapAccessor
+getAndCloneCacheKeyFromParent()
IsolatedClientSessionIdentityMapAccessor
EntityManagerFactoryImpl
-setupImpl
-serverSession
+finalize()
«interface» EntityManagerFactory
EntityManagerImpl
-serverSession
-transaction
-factory
-extendedPersistenceContext
«interface» JpaEntityManager
«interface» EntityManager
+getMetamodel()
PersistenceUnitProcessor
+buildClassSet()
MetadataProcessor
-project
-session
-loader
DistributedSession
ClientSession
#parent
#connectionPolicy
HistoricalSession
RemoteSession
IsolatedClientSession
ExclusiveIsolatedClientSession
-End1
-End2
Project
-descriptors
-orderedDescriptors
-aliasDescriptors
-datasourceLogin
-mappedSuperclasses
«interface» Login
DatasourceLogin
-platform
«interface» Platform
DatasourcePlatform
DatabaseLogin
DatabasePlatform
XMLPlatform
database.DatabasePlatform
OraclePlatform
DatabaseTable
TableMetadata
ORMetadata
EmbeddedIdAccessor
EmbeddedAccessor
TransientAccessor
MappingAccessor
MetadataAccessor
-descriptor
-owningDescriptor
-project
MetadataProject
-persistenceUnitInfo
-session
BasicAccessor
+process()
DirectAccessor
VariableOneToOneAccessor
OneToOneAccessor
ObjectAccessor
RelationshipAccessor
ManyToOneAccessor
OneToManyAccessor
CollectionAccessor
ManyToManyAccessor
ClassAccessor
EmbeddableAccessor
MetadataDescriptor
-classAccessor
-descriptor
-rootDescriptor
-parentDescriptor
-root
-parent
MappedSuperclassAccessor
+process()
EntityAccessor
-mappedSuperclasses
+addPotentialMappedSuperclass()
BasicTypeImpl
TypeImpl
-javaClass
+getPersistenceType()
PluralAttributeImpl
-elementType
MapAttributeImpl
-keyType
SetAttributeImpl
ListAttributeImpl
MetamodelImpl
-session
-managedTypes
-types
ManagedTypeImpl
-descriptor
-supertype
-members
-metamodel
AttributeImpl
-mapping
-managedType
EmbeddableTypeImpl
MappedSuperclassType
CollectionAttributeImpl
-superType
IdentifiableTypeImpl
SingularAttributeImpl
EntityTypeImpl
JPA 2.0 metamodel package
RelationalDescriptor
ObjectRelationalDataDescriptor
-structureName
-OrderedFieldsVector
AttributeAccessor
StructureMapping
AbstractCompositeObjectMapping
XMLCompositeObjectMapping
«interface» XMLMapping
«interface» XMLNillableMapping
XMLObjectReferenceMapping
AggregateMapping
XMLCompositeCollectionMapping
AbstractCompositeCollectionMapping
AggregateObjectMapping
ObjectArrayMapping
«interface» ContainerMapping
«interface» ArrayCollectionMapping
ArrayMapping
ObjectArrayMapping
AbstractCompositeDirectCollectionMapping
DatabaseMapping
-descriptor
-attributeAccessor
-fields
-properties
AbstractDirectMapping
AbstractTransformationMapping
-attributeTransformer
DirectToFieldMapping
TransformationMapping
OneToOneMapping
ForeignReferenceMapping
VariableOneToOneMapping
ObjectReferenceMapping
No hierarchy
«interface» RelationalMapping
+empty()
ManyToManyMapping
CollectionMapping
AggregateCollectionMapping
ClassDescriptor
-objectBuilder
-eventManager
-queryManager
-mappings
ObjectBuilder
TreeObjectBuilder
XMLObjectBuilder
DescriptorQueryManager
InheritancePolicy
«interface» Map
«interface» Record
AbstractRecord
DatabaseRecord
EmptyRecord
DoesExistQuery
DatabaseQuery
JPAQuery
ModifyQuery
-modifyRow
no descriptor
ReadQuery
DataModifyQuery
DataReadQuery
ModifyAllQuery
ObjectLevelModifyQuery
ObjectBuildingQuery
DeleteAllQuery
UpdateAllQuery
DeleteObjectQuery
WriteObjectQuery
ResultSetMappingQuery
ObjectLevelReadQuery
DatasourceAccessor
XMLEntityMappingsReader
DatabaseAccessor
DatabaseQueryMechanism
DatasourceCallQueryMechanism
DatasourceCall
«interface» Call
«interface» QueryStringCall
JPQLCall
CallQueryMechanism
DatabaseCall
StatementQueryMechanism
StoredProcedureCall
SQLCall
ExpressionQueryMechanism
JPQLCallQueryMechanism
QueryByExampleMechanism
Basic
Embeddable
Mapped Superclass
Entity
Identifiable Type
Managed Type
Type
PersistenceType. BASIC
PersistenceType. EMBEDDABLE
PersistenceType. ENTITY
PersistenceType. MAPPED_SUPERCLASS
«interface» Metamodel
+embeddable()
+entity()
+type()
«interface» Type
«interface» BasicType
«interface» ManagedType
«interface» EmbeddableType
«interface» MappedSuperclassType
«interface» IdentifiableType
«interface» EntityType
«interface» SingularAttribute
«interface» MapAttribute
+getKeyJavaType()
+getKeyType()
«interface» java.util.Map
«interface» Attribute
«interface» Bindable
«interface» SetAttribute
«interface» java.util.Set
«interface» PluralAttribute
«interface» ListAttribute
«interface» java.util.List
CollectionType
«interface» CollectionAttribute
«interface» java.util.Collection
metamodel package

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DatabaseQuery
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AbstractRecord
DatabaseRecord
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ModifyQuery
ReadQuery
DataModifyQuery
DataReadQuery
ModifyAllQuery
ObjectLevelModifyQuery
ObjectBuildingQuery
DeleteAllQuery
UpdateAllQuery
DeleteObjectQuery
WriteObjectQuery
ResultSetMappingQuery
ObjectLevelReadQuery
no descriptor
Metamodel
Type
BasicType
ManagedType
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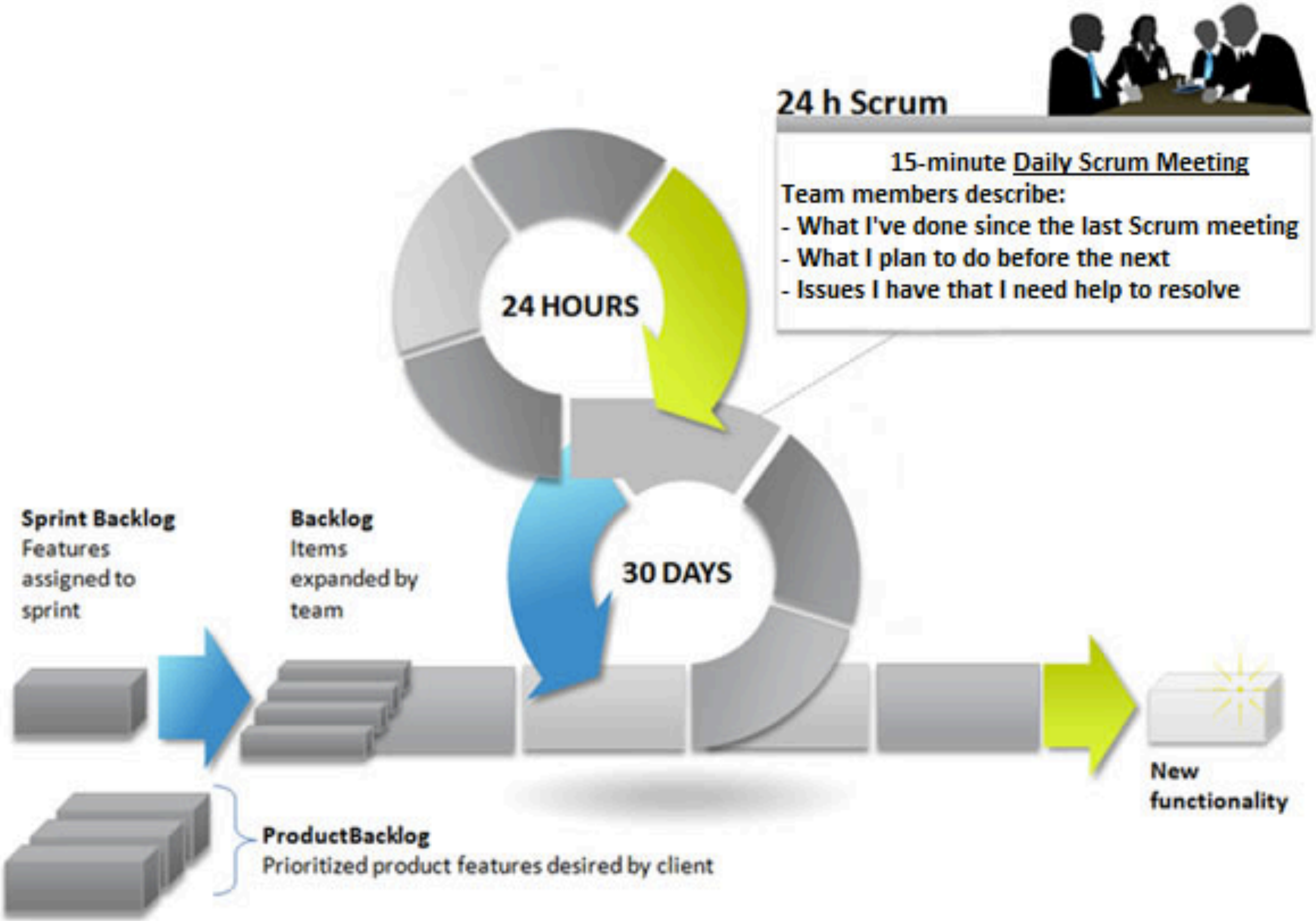
SCRUM PROCESS



24 h Scrum

15-minute Daily Scrum Meeting

Team members describe:

- What I've done since the last Scrum meeting
- What I plan to do before the next
- Issues I have that I need help to resolve

24 HOURS

30 DAYS

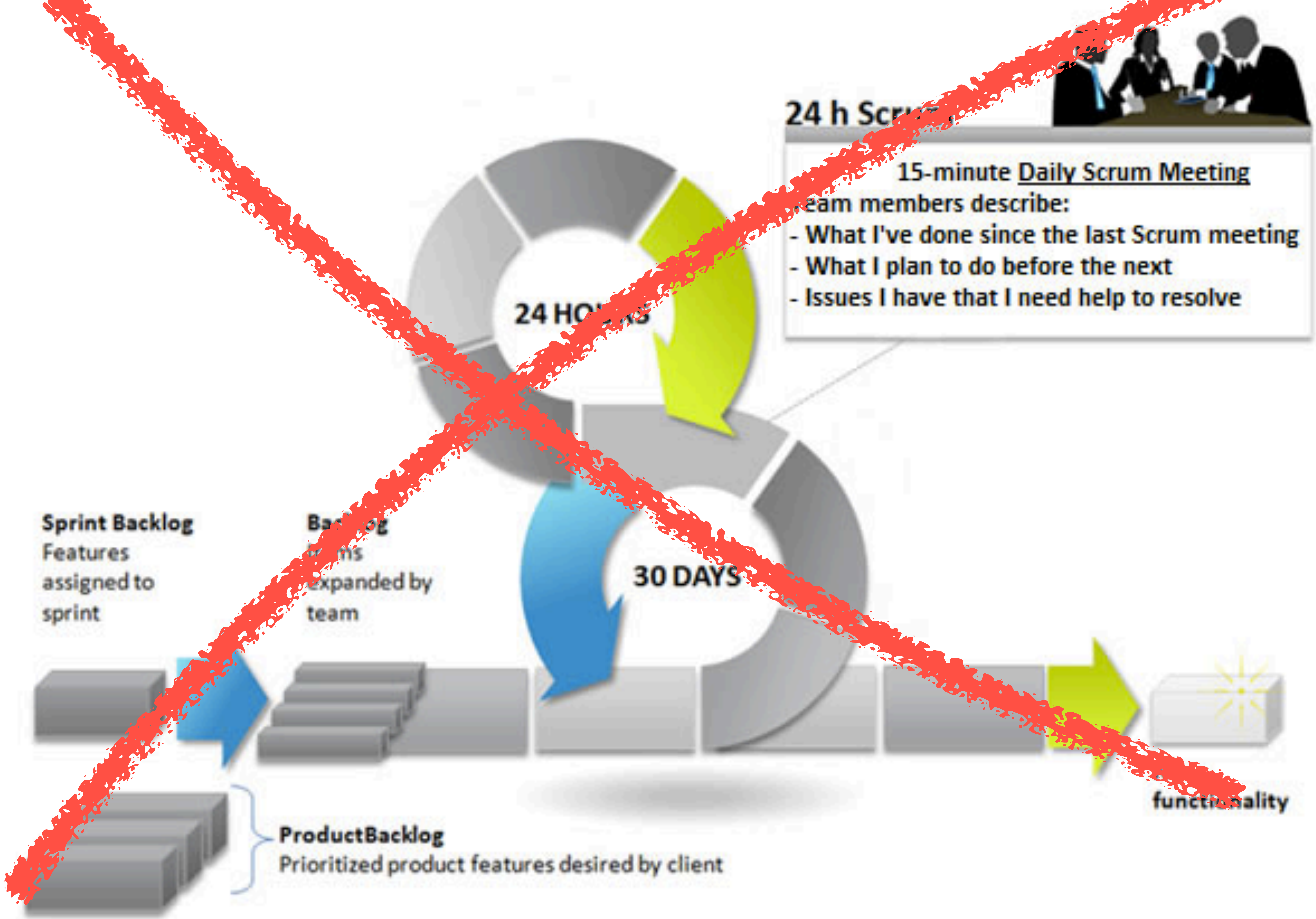
Sprint Backlog
Features assigned to sprint

Backlog
Items expanded by team

New functionality

ProductBacklog
Prioritized product features desired by client

SCRUM PROCESS



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functionality

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The Evolution of Production

- **Craft**

- **Mass Production**

- **Lean Production Techniques**

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History of Production - Craft

Craft Based

- Art rather than science
- No work standards
- Each Piece of work is individually crafted and unique
- Based on Individual Expertise

History of Production - Mass Production

Mass Production

- Assembly Line
- Standardised Components
- Standardised Steps
- Piece-based Metrics
  (Measure how long to create a component)

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History of Production - Lean Production

Lean Production

- Quality At Source
- Pull based System
- Minimise Work In Progress
- Minimise Waste
- One-Piece-Flow

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Defined Process Model

“The defined process control model requires that every piece of work be completely understood. Given a well-defined set of inputs, the same outputs are generated every time. A defined process can be started and allowed to run until completion, with the same results every time”

Source: Schwaber, Ken; Beedle, Mike (2002), Agile Software Development with Scrum

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Mass Production

Assembly Lines

Waterfall Process

Source: Schwaber, Ken; Beedle, Mike (2002), Agile Software Development with Scrum

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Empirical Process Model

“The empirical model of process control provides and exercises control through frequent inspection and adaptation for processes that are imperfectly defined and generate unpredictable and unrepeatable outputs.”

Source: https://en.wikipedia.org/wiki/Empirical_process_(process_control_model)

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Empirical Process Model

"The empirical model of process control provides and exercises control through frequent inspection and adaptation for processes that are imperfectly defined and generate unpredictable and unrepeatable outputs."

Craft Based Production

Exploration

Continual Improvement

Lean Process

Source: https://en.wikipedia.org/wiki/Empirical_process_(process_control_model)

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Where is the Software Industry?

- Craft

- Mass Production

- Lean Production Techniques

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Where is the Software Industry?

- Craft

- ~~Mass Production~~

- Lean Production Techniques

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Where is the Software Industry?

- Craft

We are here!

- ~~Mass Production~~

- Lean Production Techniques

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Where is the Software Industry?

- Craft

We are here!

- ~~Mass Production~~

- Lean Production Techniques

We should be here!

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If Software Projects Worked…

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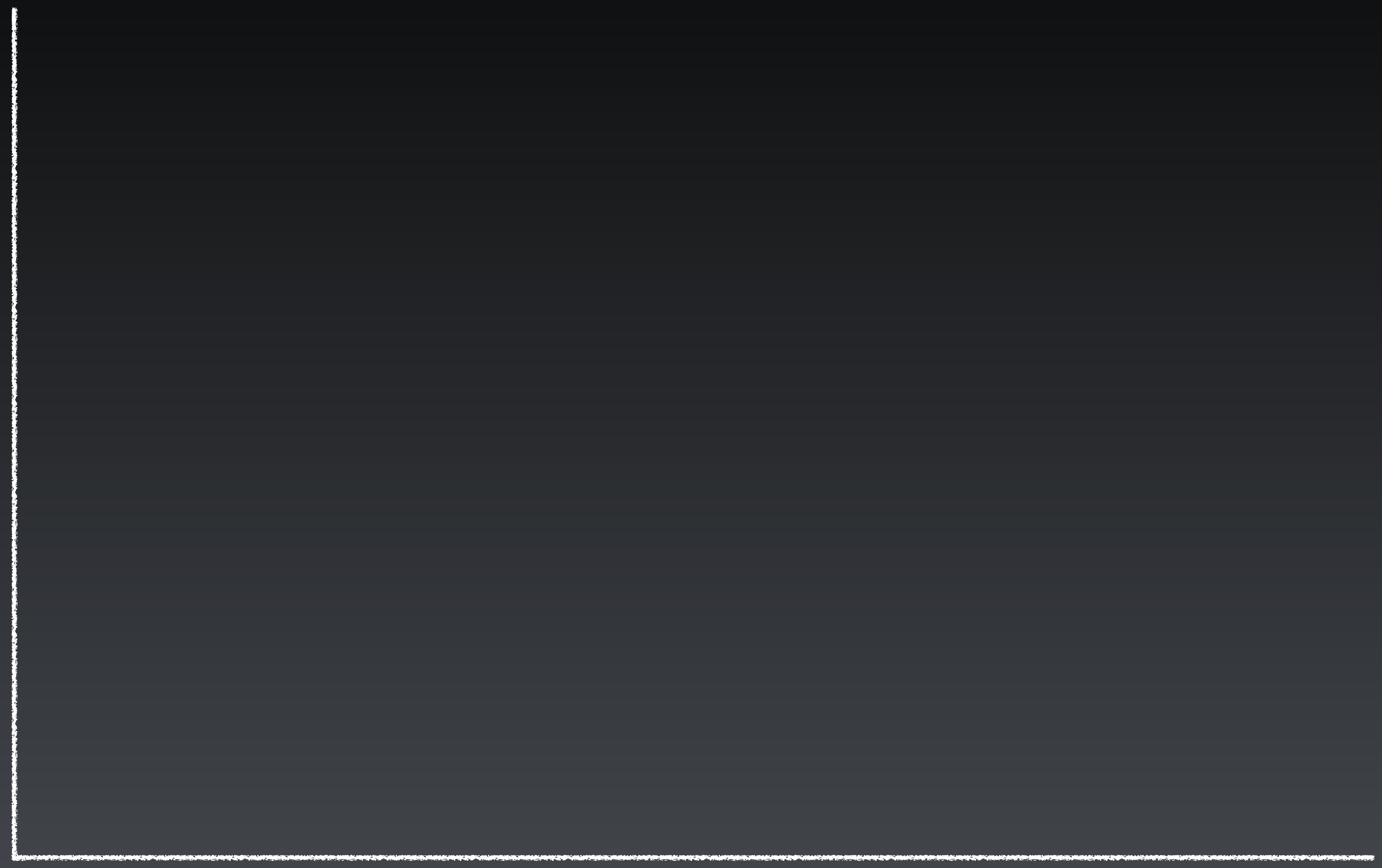

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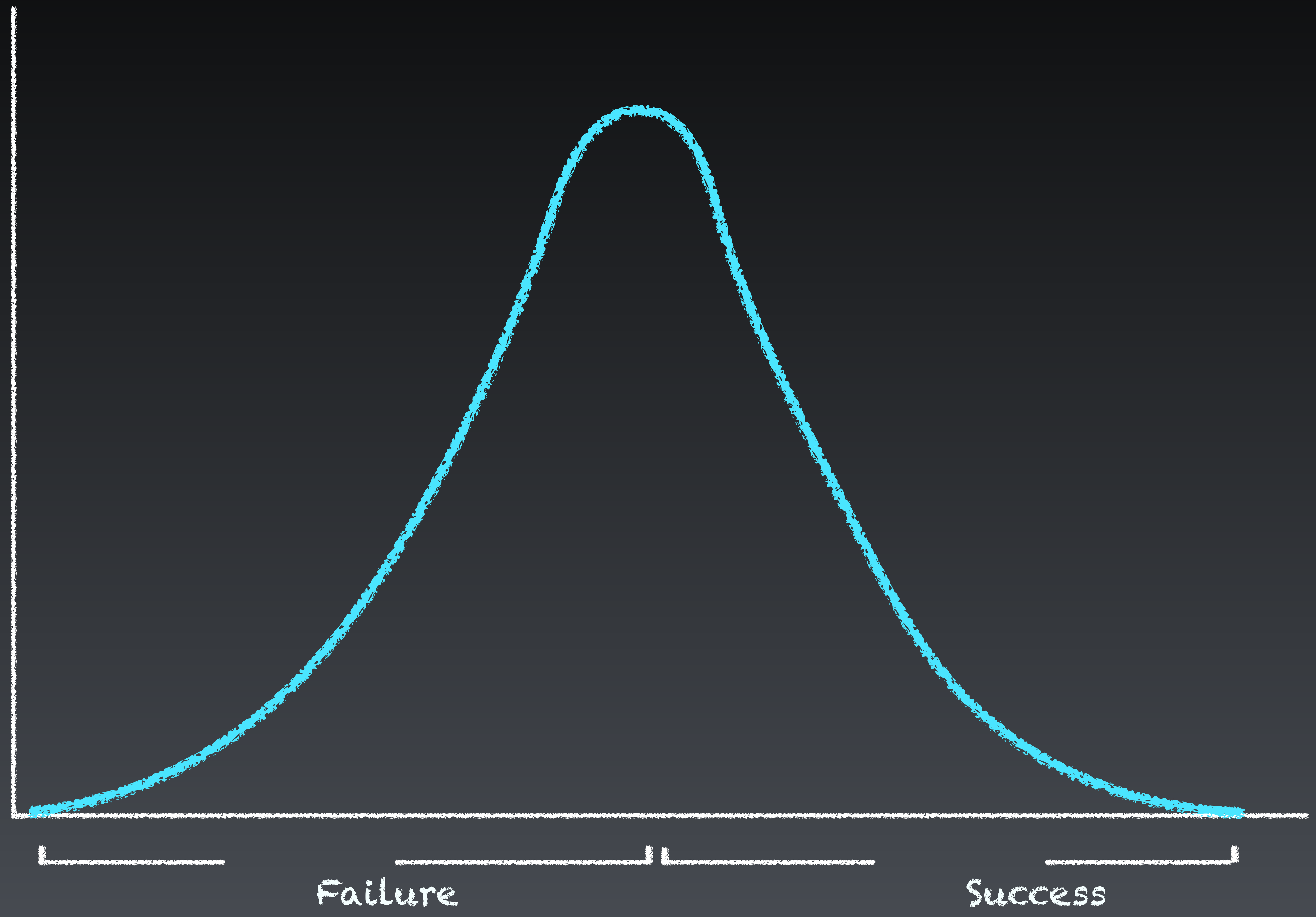

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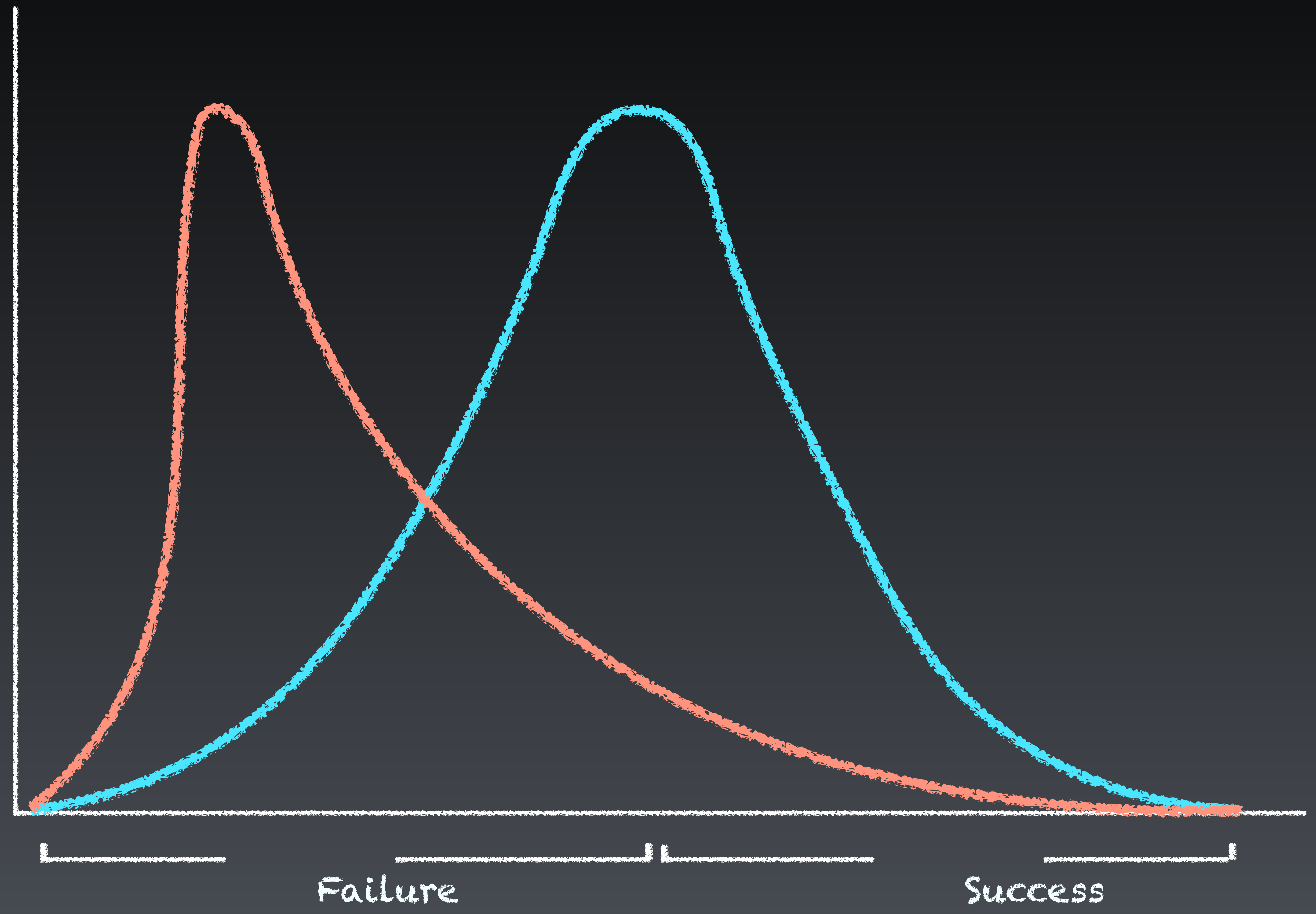
If Software Projects Worked…



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The Impact of “Engineering” in Software

Source: “ Lianping Chen Paddy Power (http://www.sciencedirect.com/science/article/pii/S0164121217300353)

The Impact of “Engineering” in Software

90% lower defect rate

Source: “ Lianping Chen Paddy Power (http://www.sciencedirect.com/science/article/pii/S0164121217300353)

The Impact of “Engineering” in Software

Source: “2014 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

The Impact of “Engineering” in Software

8000x faster deployment lead times

Source: “2014 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

The Impact of “Engineering” in Software

Source: “2017 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

The Impact of “Engineering” in Software

21% Less time spent on unplanned work and rework

Source: “2017 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

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Source: “2017 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

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44% More time
on new work

Source: “2017 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

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The Impact of “Engineering” in Software

50% lower change-failure rates

Source: “2017 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

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The Impact of “Engineering” in Software

Source: “2017 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

The Impact of “Engineering” in Software

50% Less time spent fixing security issues

Source: “2017 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

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The Impact of “Engineering” in Software

50%
Higher Market cap growth over 3 years

Source: “2014 State of DevOps report”, Jez Humble, Gene Kim, Nicole Forsgren Velasquez, Puppet Labs (2014)

All Engineering is not the same!

All Engineering is not the same!

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What is ‘Engineering’?

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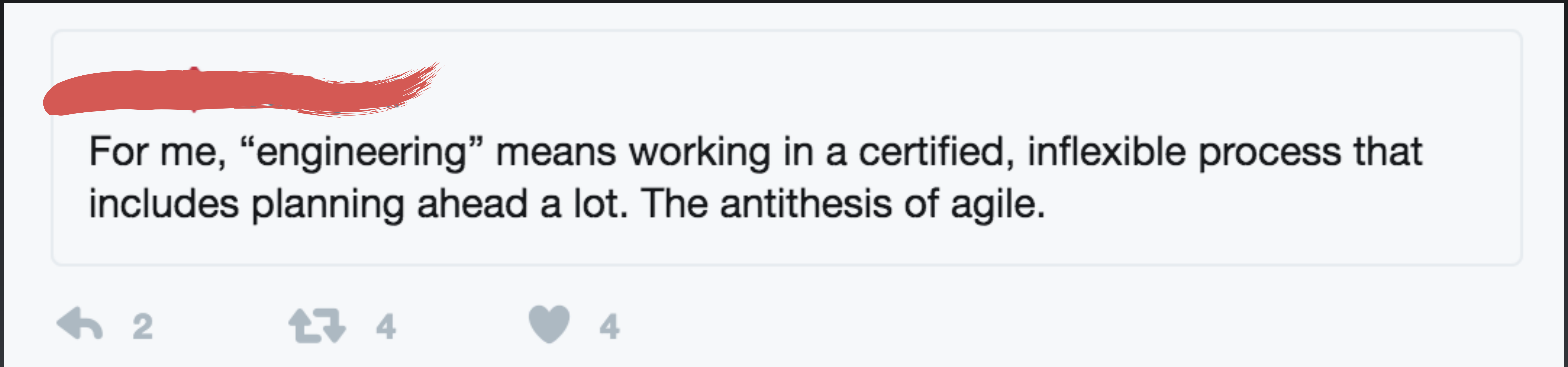

[redacted]

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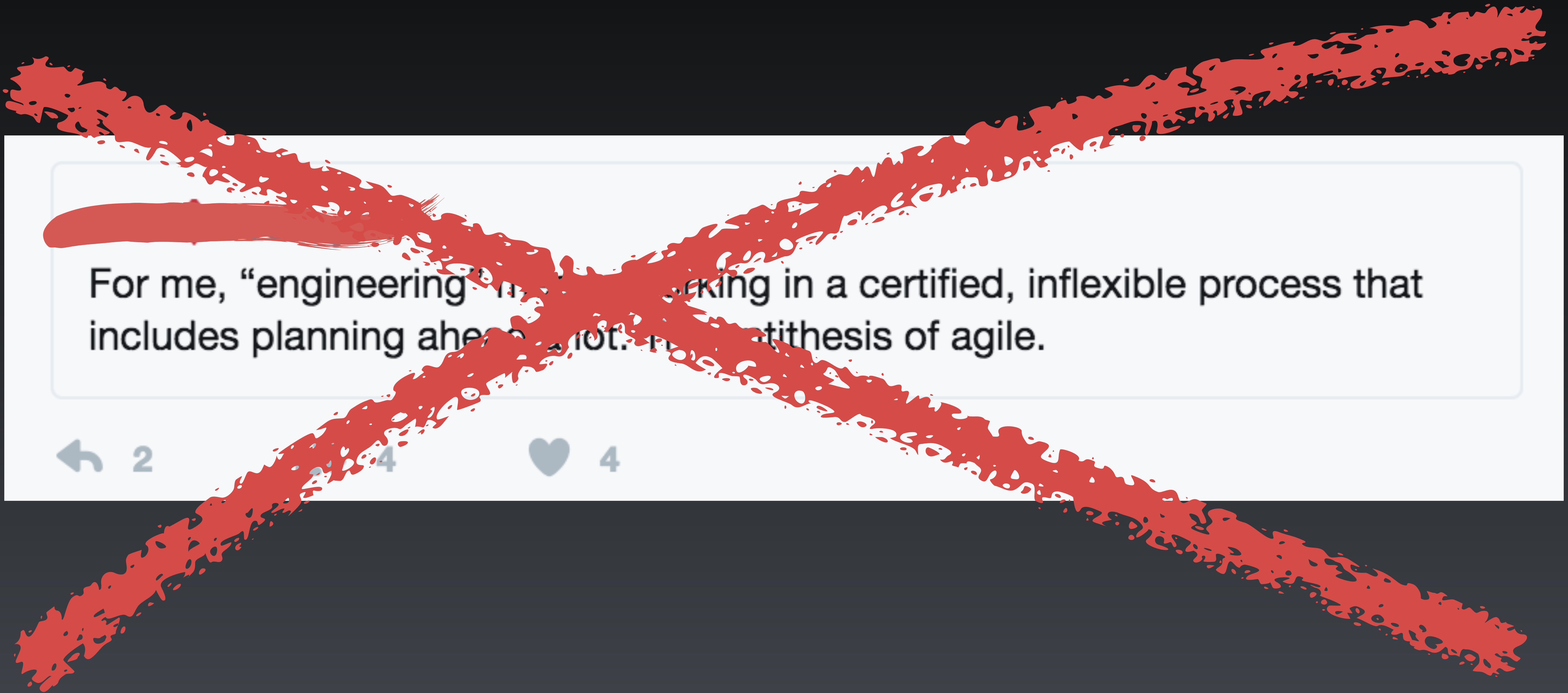
What is ‘Engineering’?



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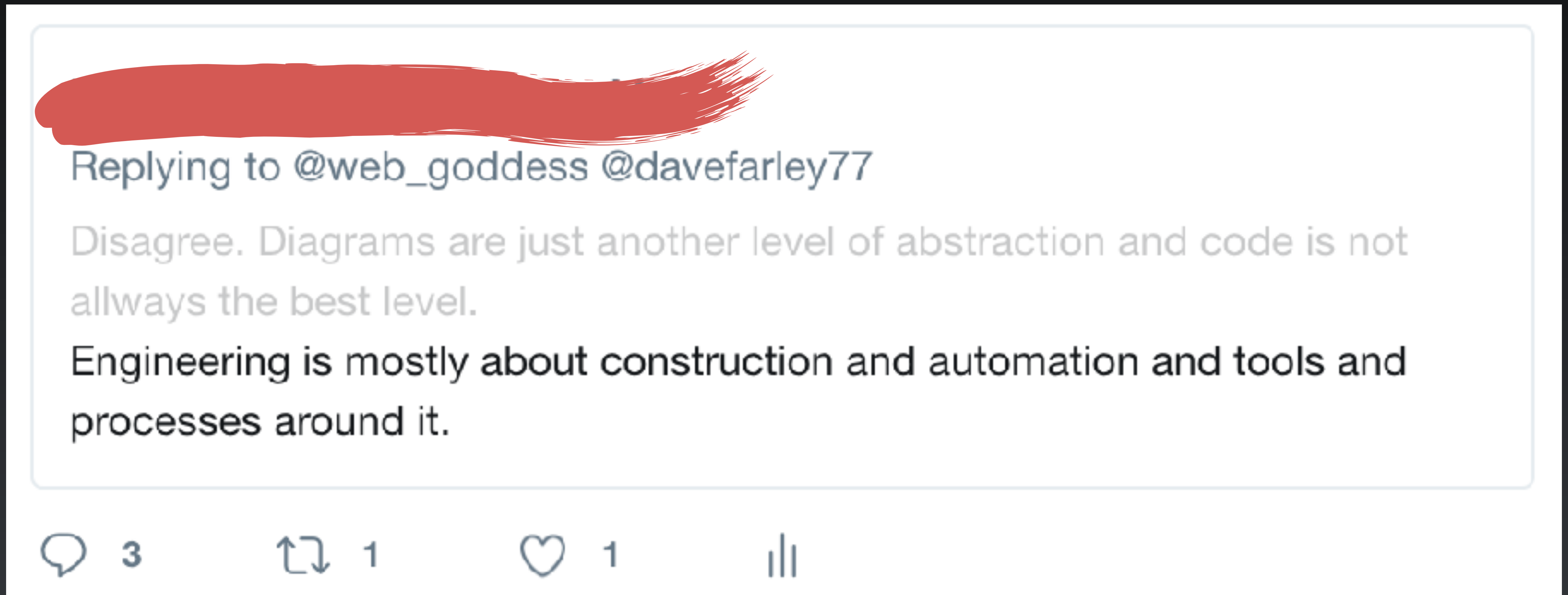

[redacted]

Replying to @web_goddess @davefarley77

Disagree. Diagrams are just another level of abstraction and code is not allways the best level.

Engineering is mostly about construction and automation and tools and processes around it.

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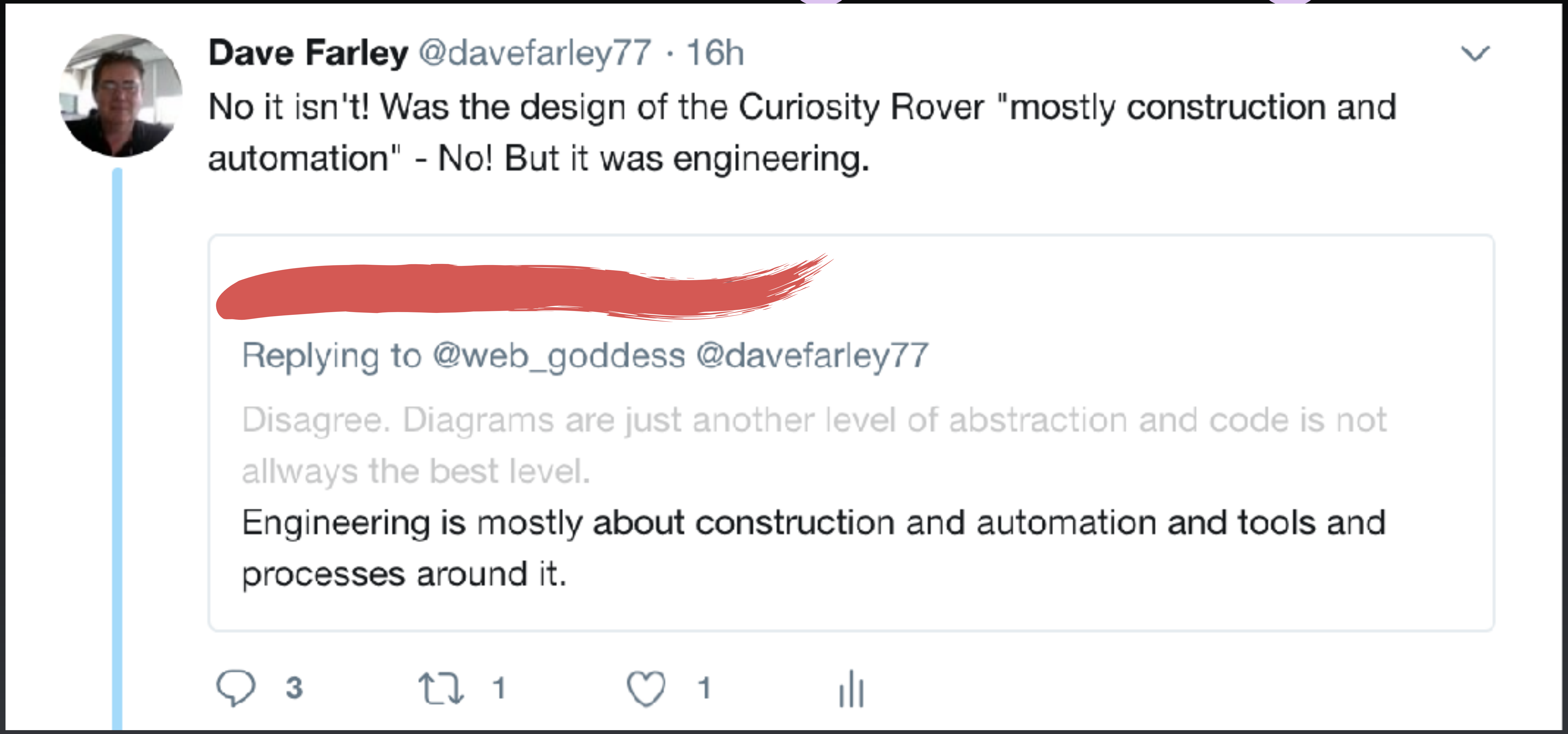

Dave Farley @davefarley77 · 16h

No it isn't! Was the design of the Curiosity Rover "mostly construction and automation" - No! But it was engineering.

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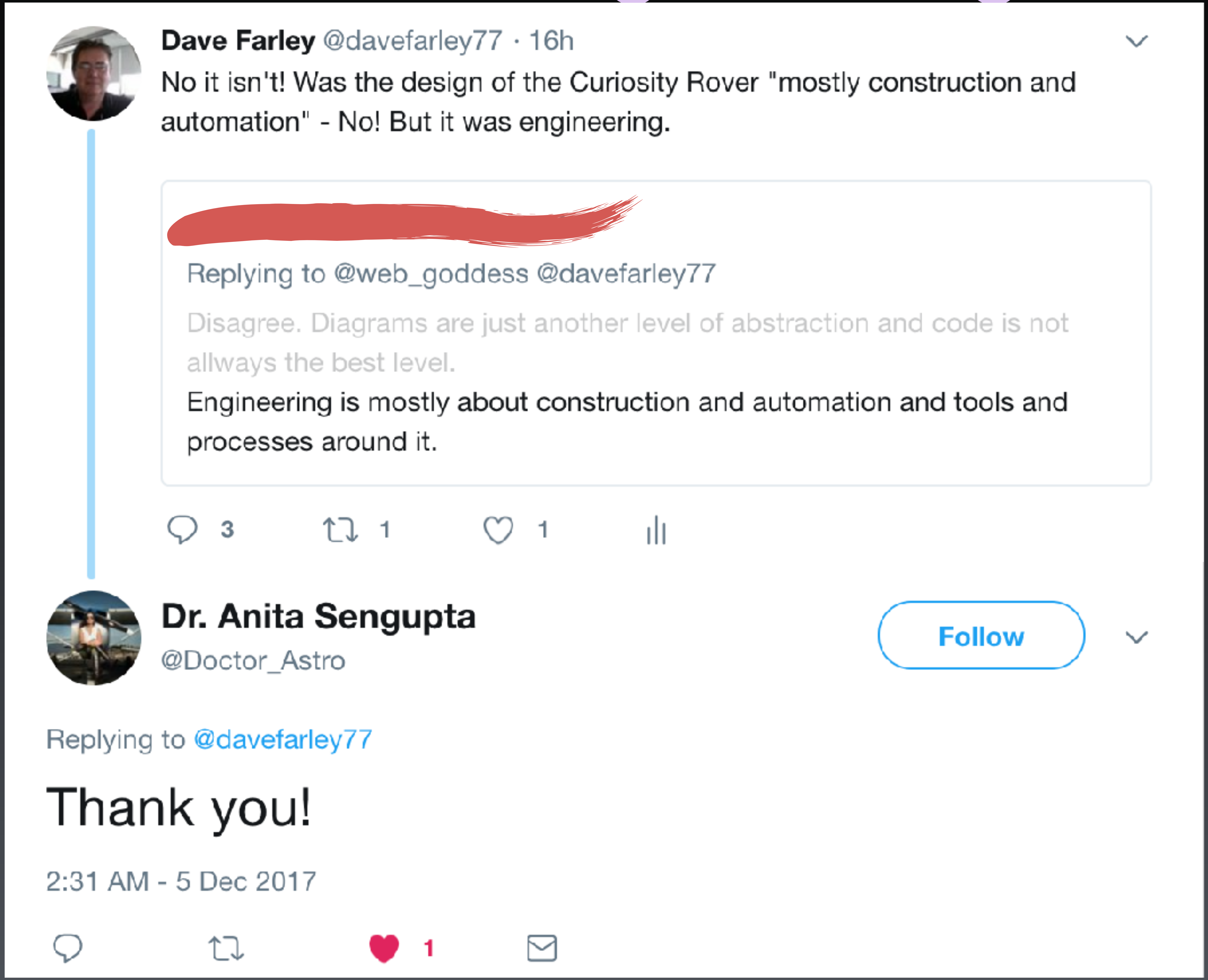

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Dr. Anita Sengupta
@Doctor_Astro

Replying to @davefarley77

Thank you!

2:31 AM - 5 Dec 2017

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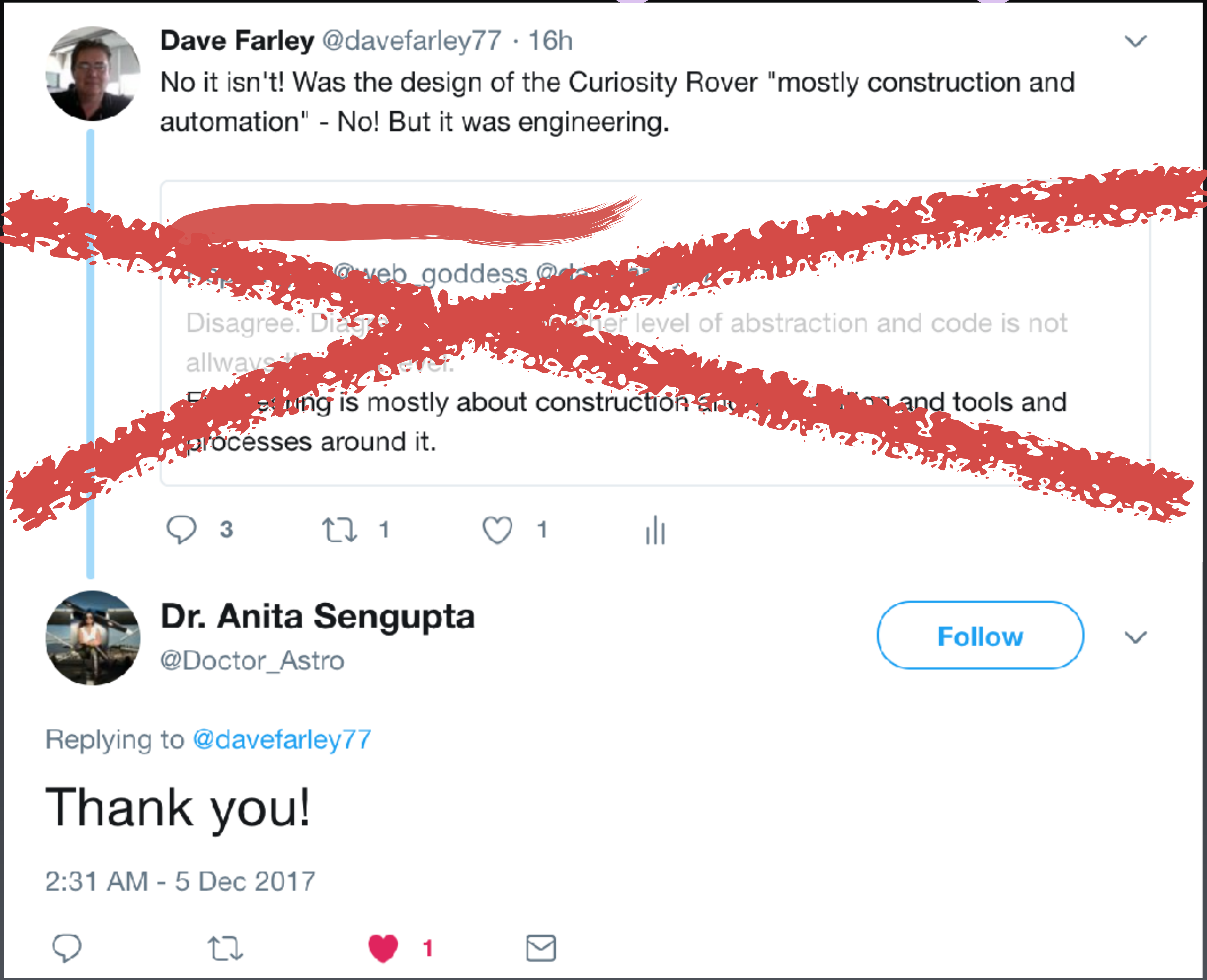

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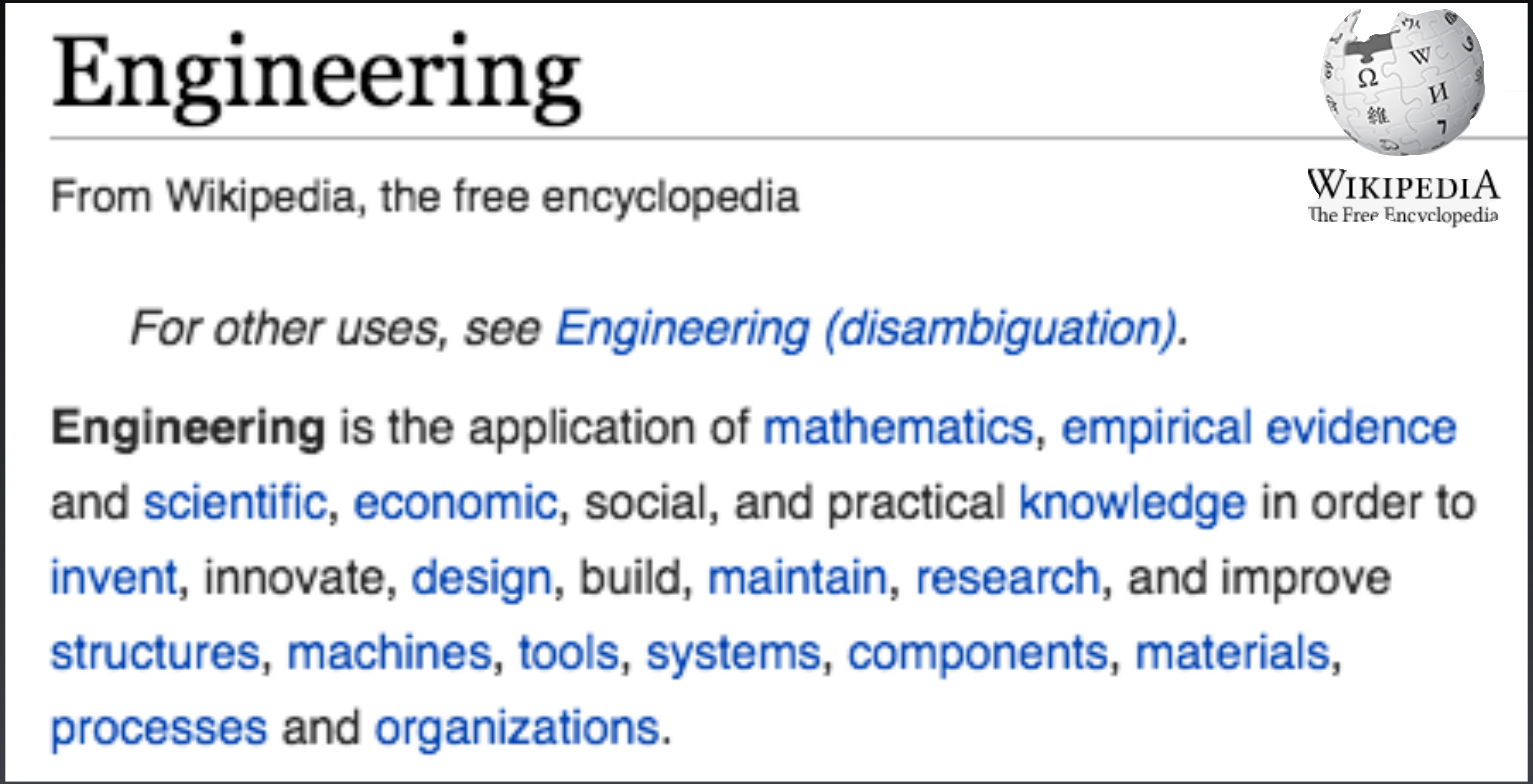

Engineering

From Wikipedia, the free encyclopedia

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Engineering is the application of mathematics, empirical evidence and scientific, economic, social, and practical knowledge in order to invent, innovate, design, build, maintain, research, and improve structures, machines, tools, systems, components, materials, processes and organizations.

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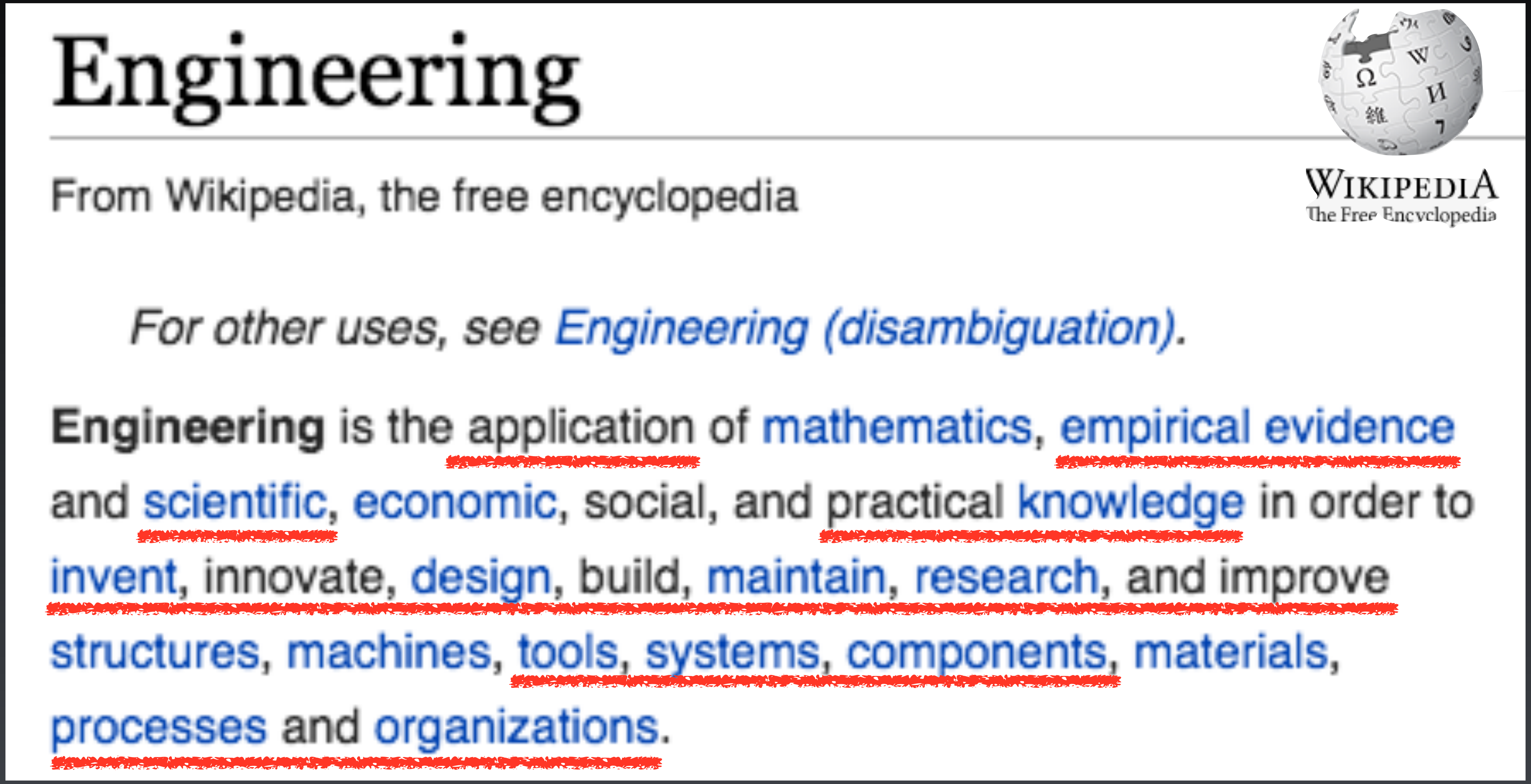

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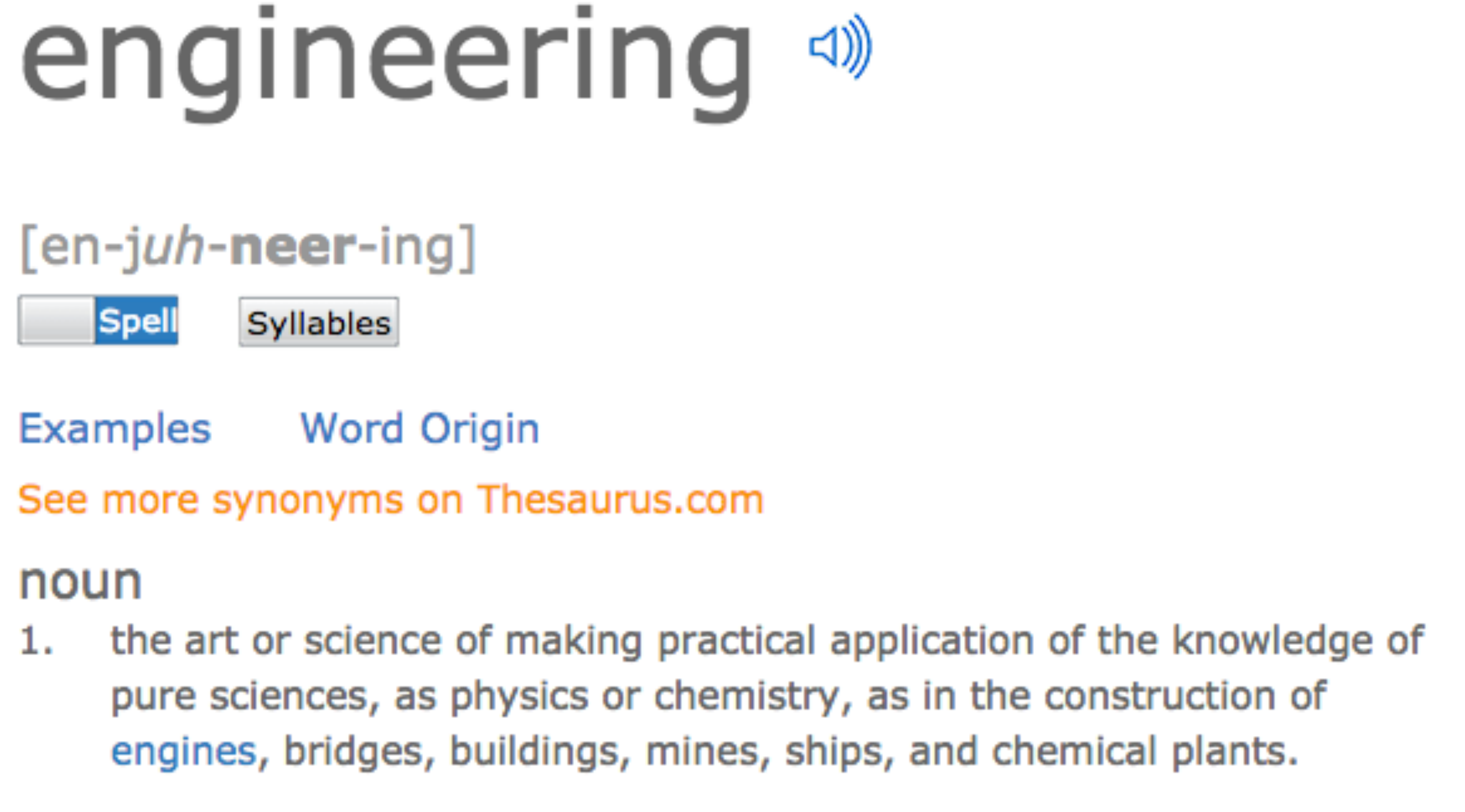

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Dictionary.com

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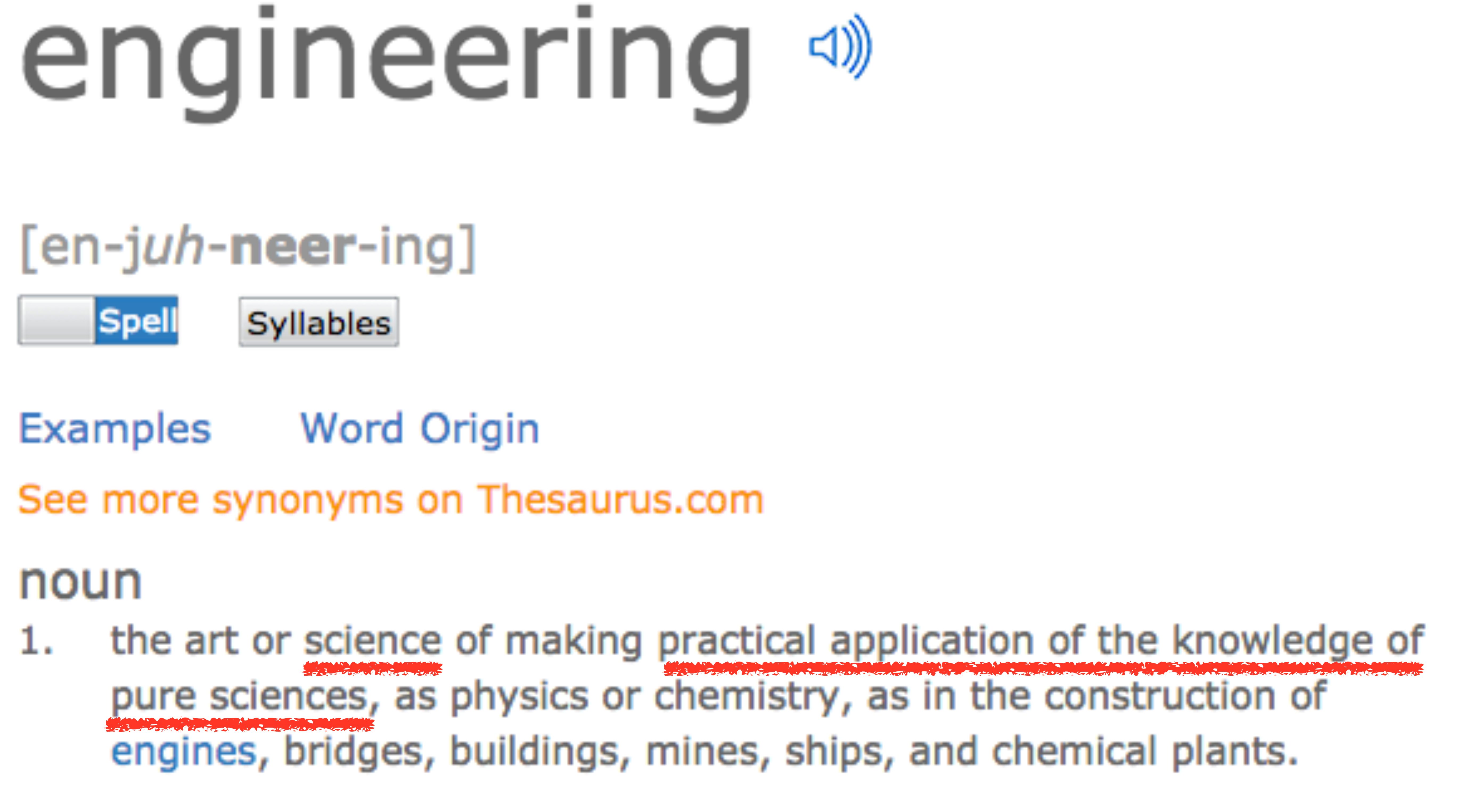

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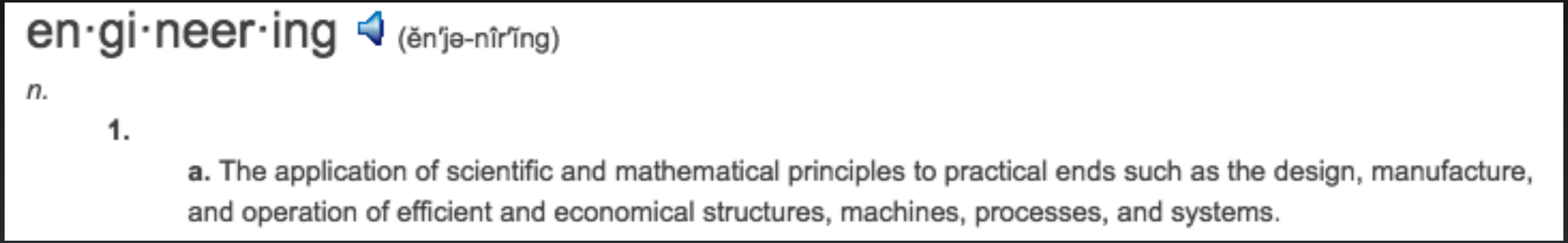

en·gi·neer·ing (ĕn′jə-nîr′ĭng)

n.

1.

a. The application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems.

THE FREE DICTIONARY BY FARLEX

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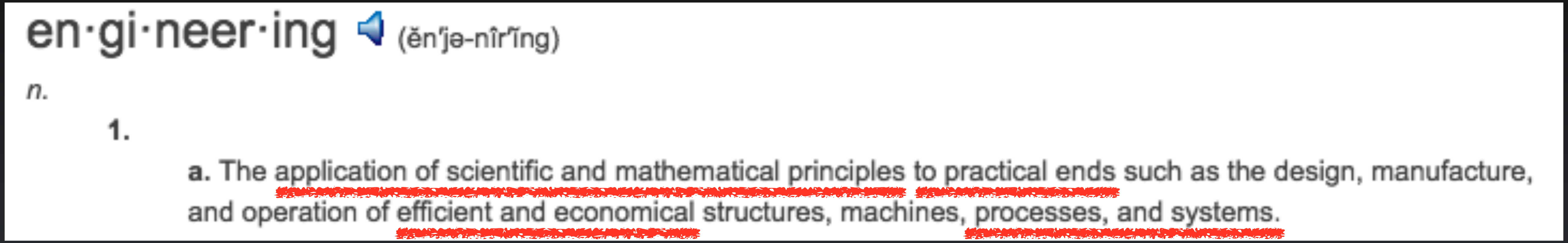
What is ‘Engineering’?



en·gi·neer·ing (ĕn′jə-nîr′ĭng)

n.

1\.

a. The application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems.

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What is ‘Engineering’?

What is ‘Engineering’?

***Engineering** is the application of an empirical, scientific approach to finding efficient solutions to practical problems.*

(Dave Farley - Just Now!)

Fundamentals of an ‘Engineering’ Approach

- Iterative
- Employs Feedback
- Incremental
- Experimental
- Empirical

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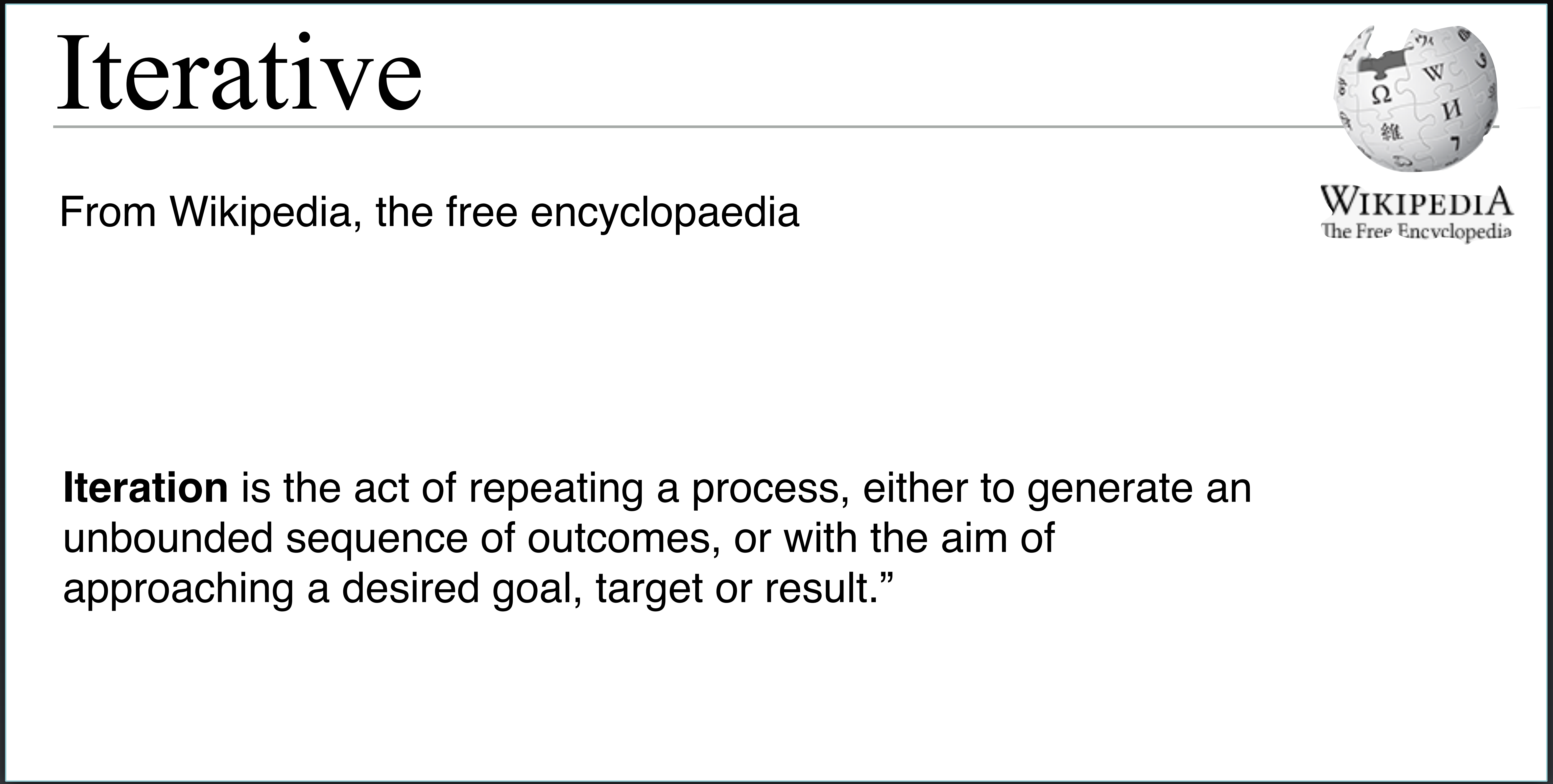
Iterative



Iterative

From Wikipedia, the free encyclopaedia

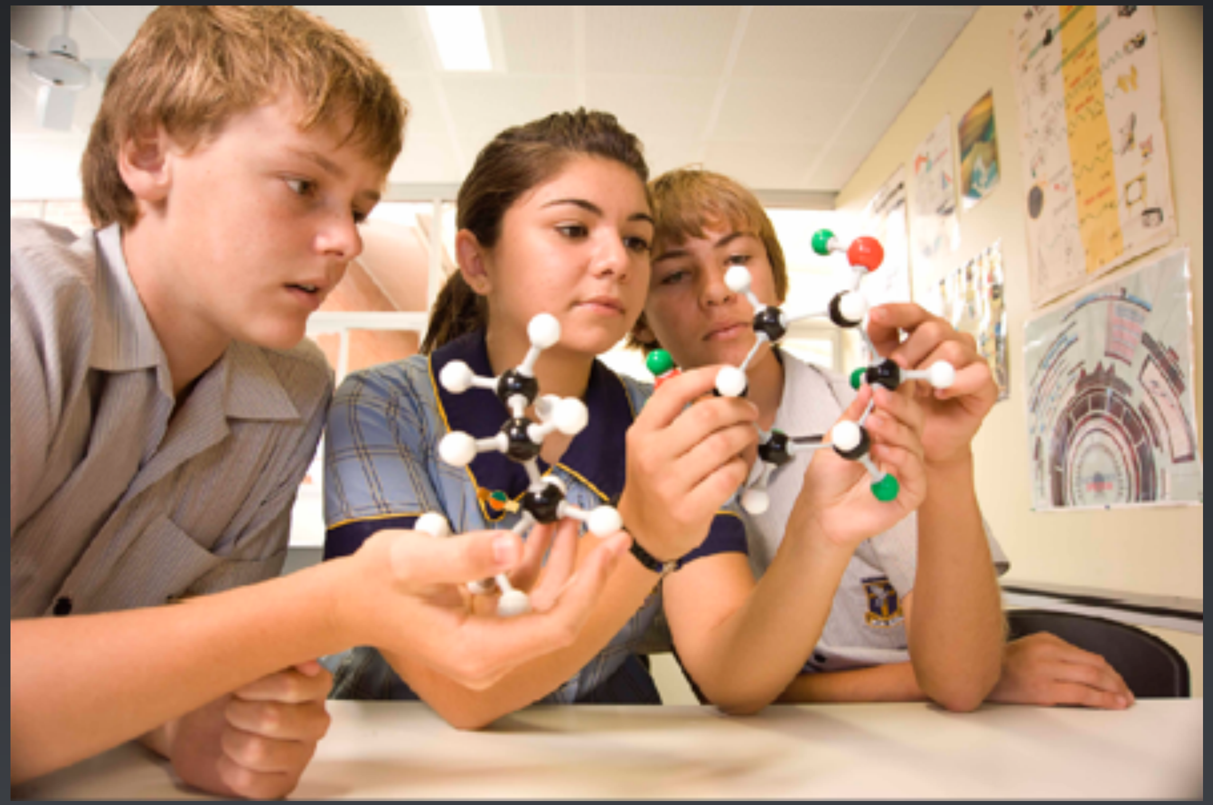
Iteration is the act of repeating a process, either to generate an unbounded sequence of outcomes, or with the aim of approaching a desired goal, target or result.”

Being Iterative Matters

Means we can learn, react and adapt

Being Iterative Matters

Means we can learn, react and adapt



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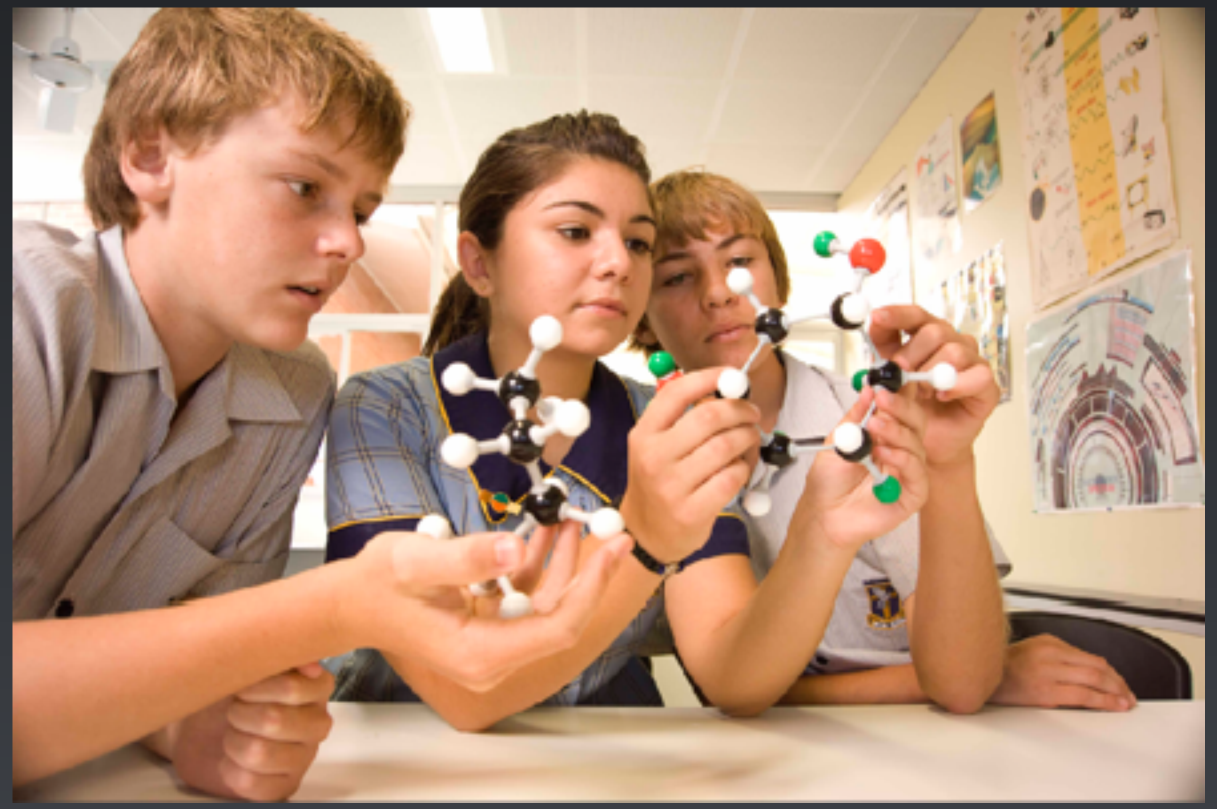
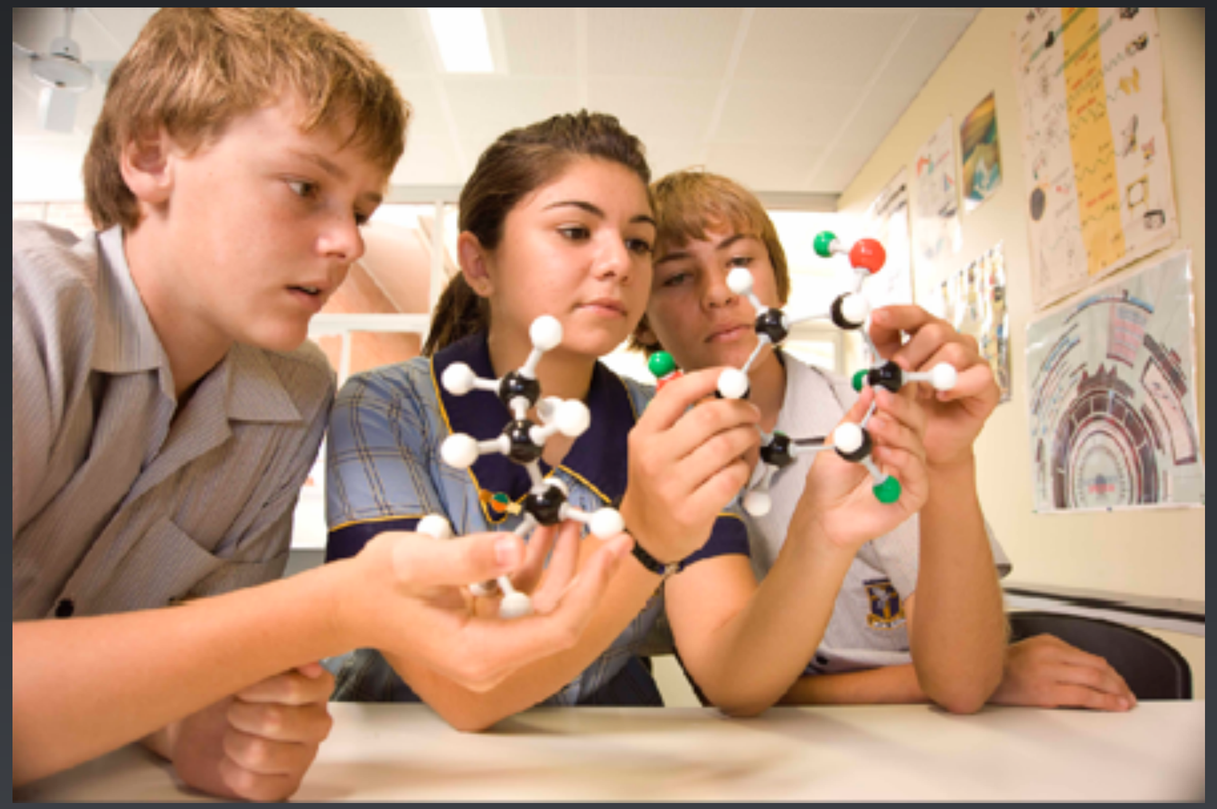
Being Iterative Matters

Means we can learn, react and adapt



Being Iterative Matters

Means we can learn, react and adapt



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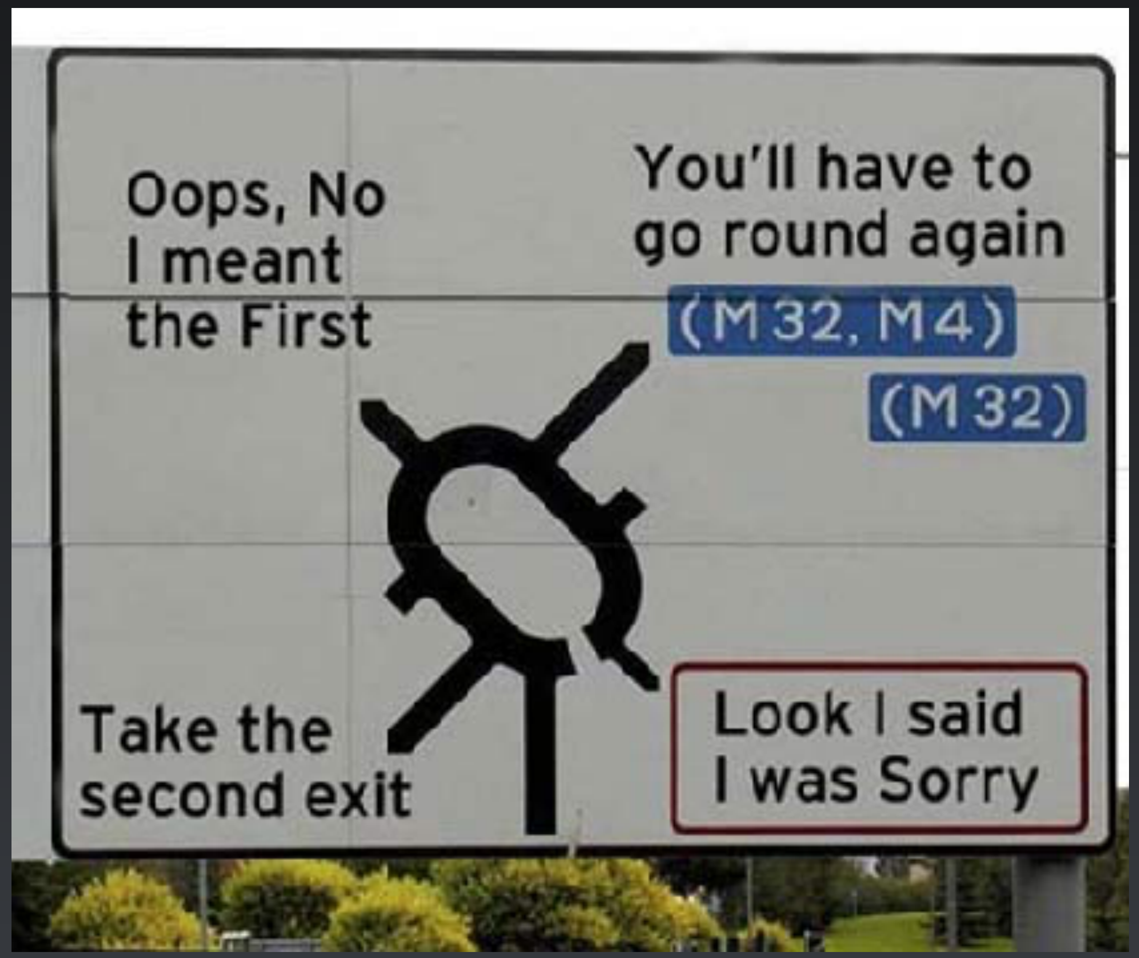
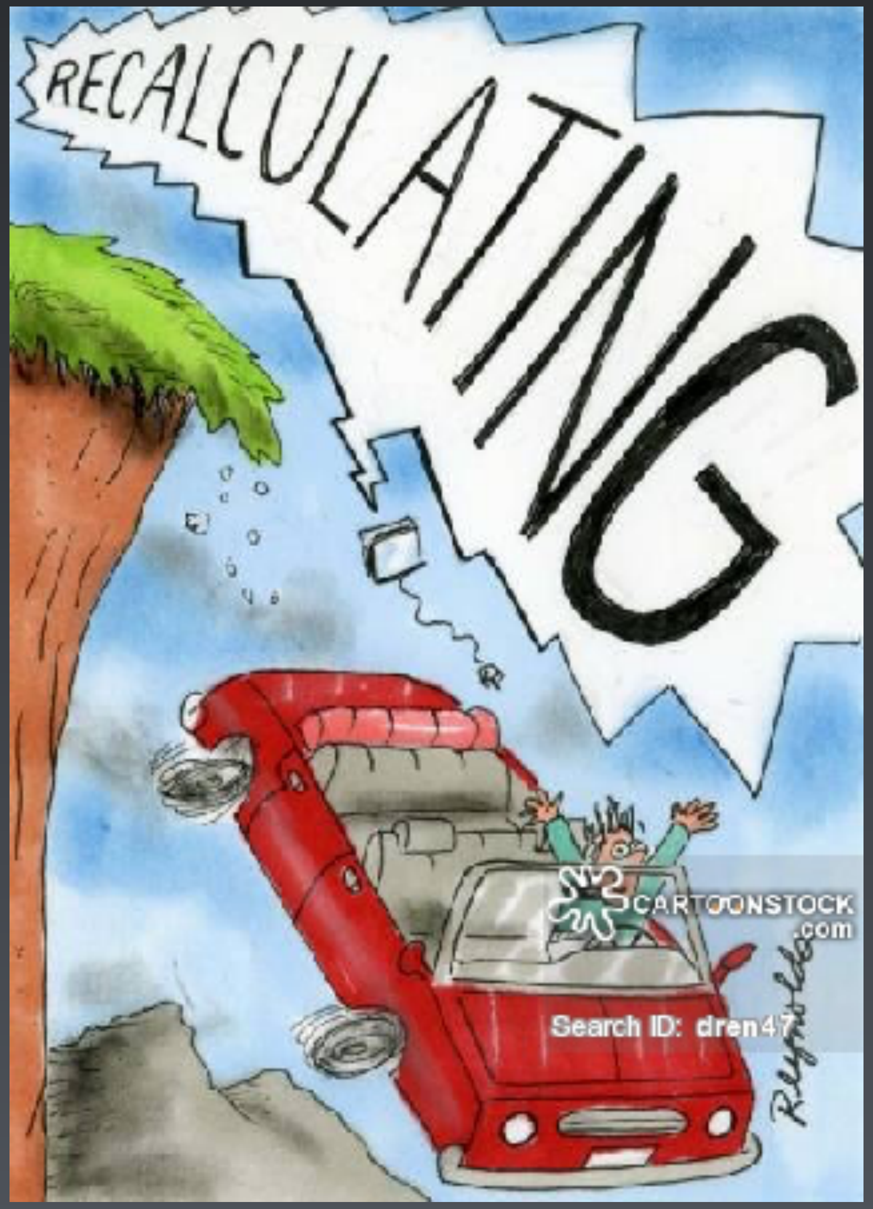
Being Iterative Matters

Allows us to steer towards a goal

Being Iterative Matters

Allows us to steer towards a goal





Being Iterative Matters

Fundamental to a process of “Continual Improvement”

Being Iterative Matters

Fundamental to a process of “Continual Improvement”

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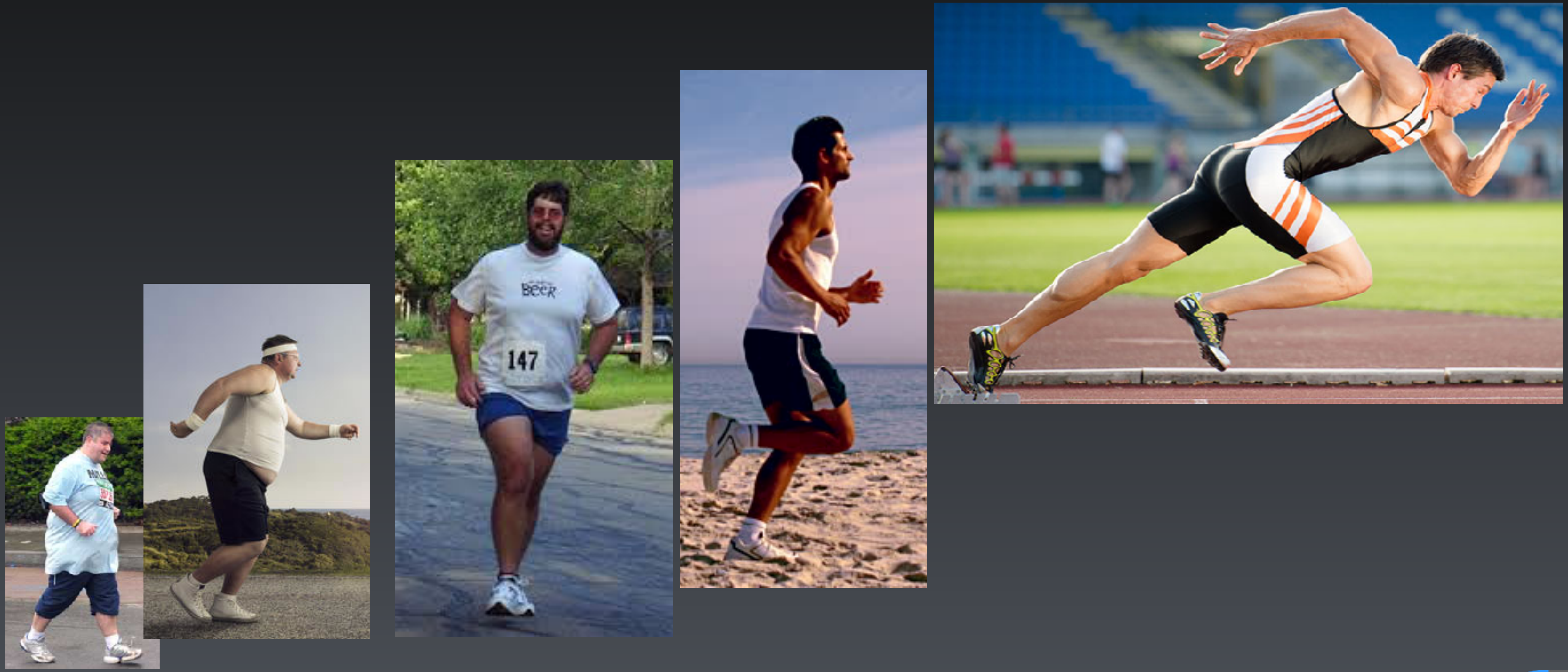
Being Iterative Matters

Allowing us to refine our processes and get better at what we do through practice and repetition

Being Iterative Matters

Allowing us to refine our processes and get better at what we do through practice and repetition



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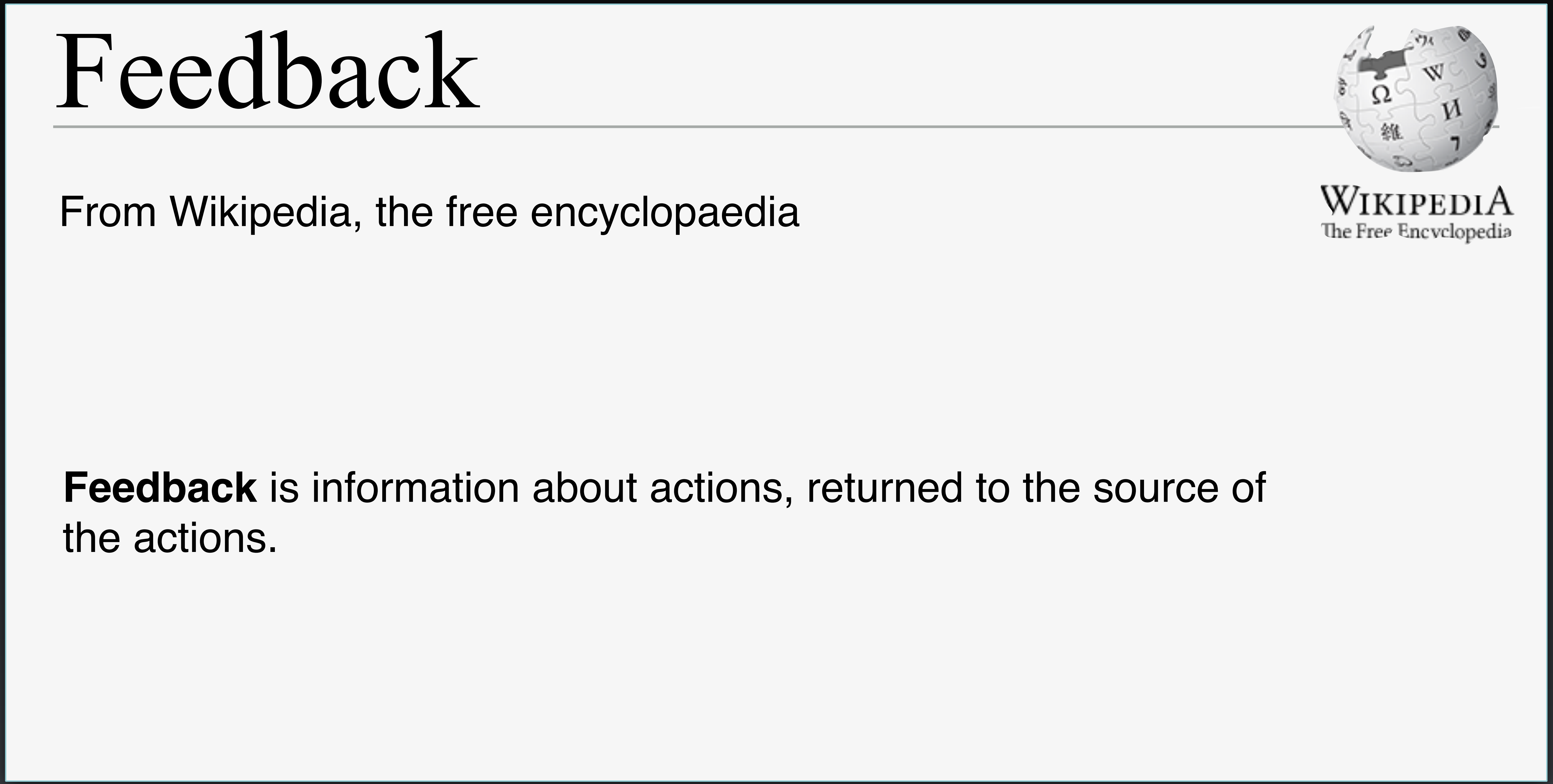
Feedback



Feedback

From Wikipedia, the free encyclopaedia

Feedback is information about actions, returned to the source of the actions.

Feedback Matters

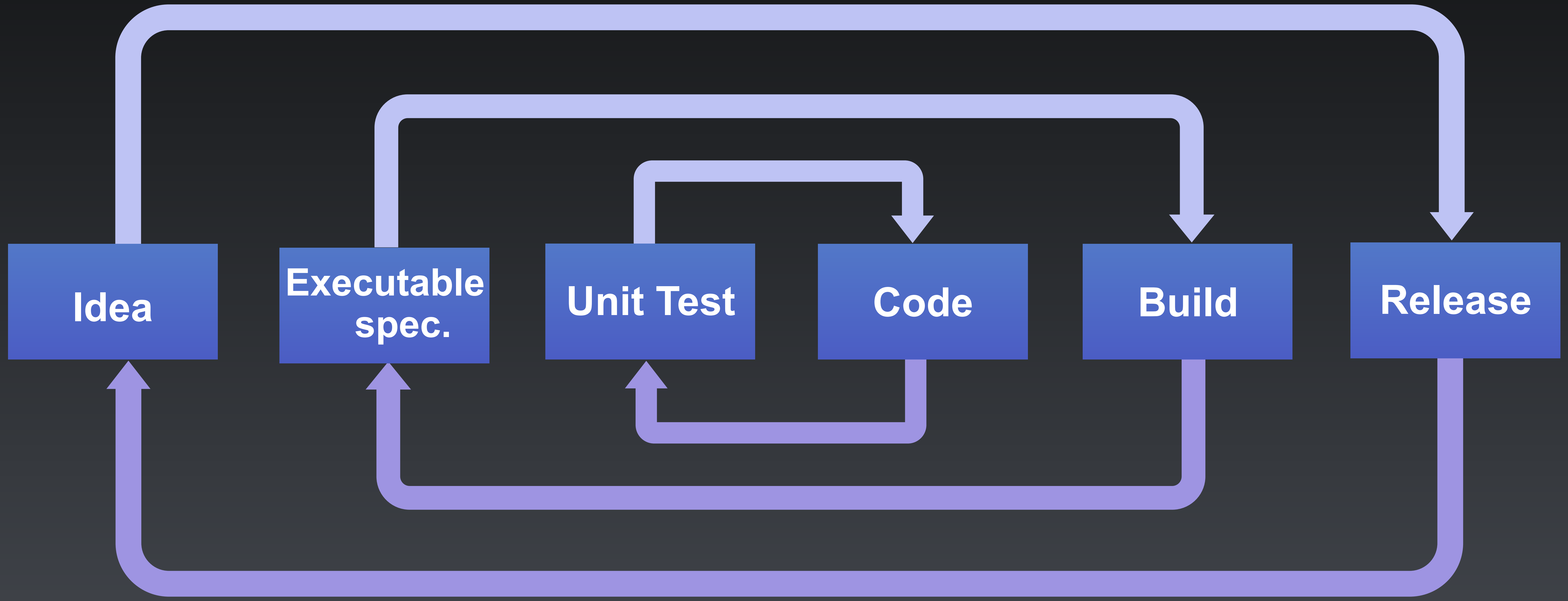
Means we can observe the impact of our choices

Feedback Matters

Means we can observe the impact of our choices

☑ AWESOME!
□ Excellent
□ Very Good
□ Satisfactory
□ Marginal
□ Poor

Feedback!!!



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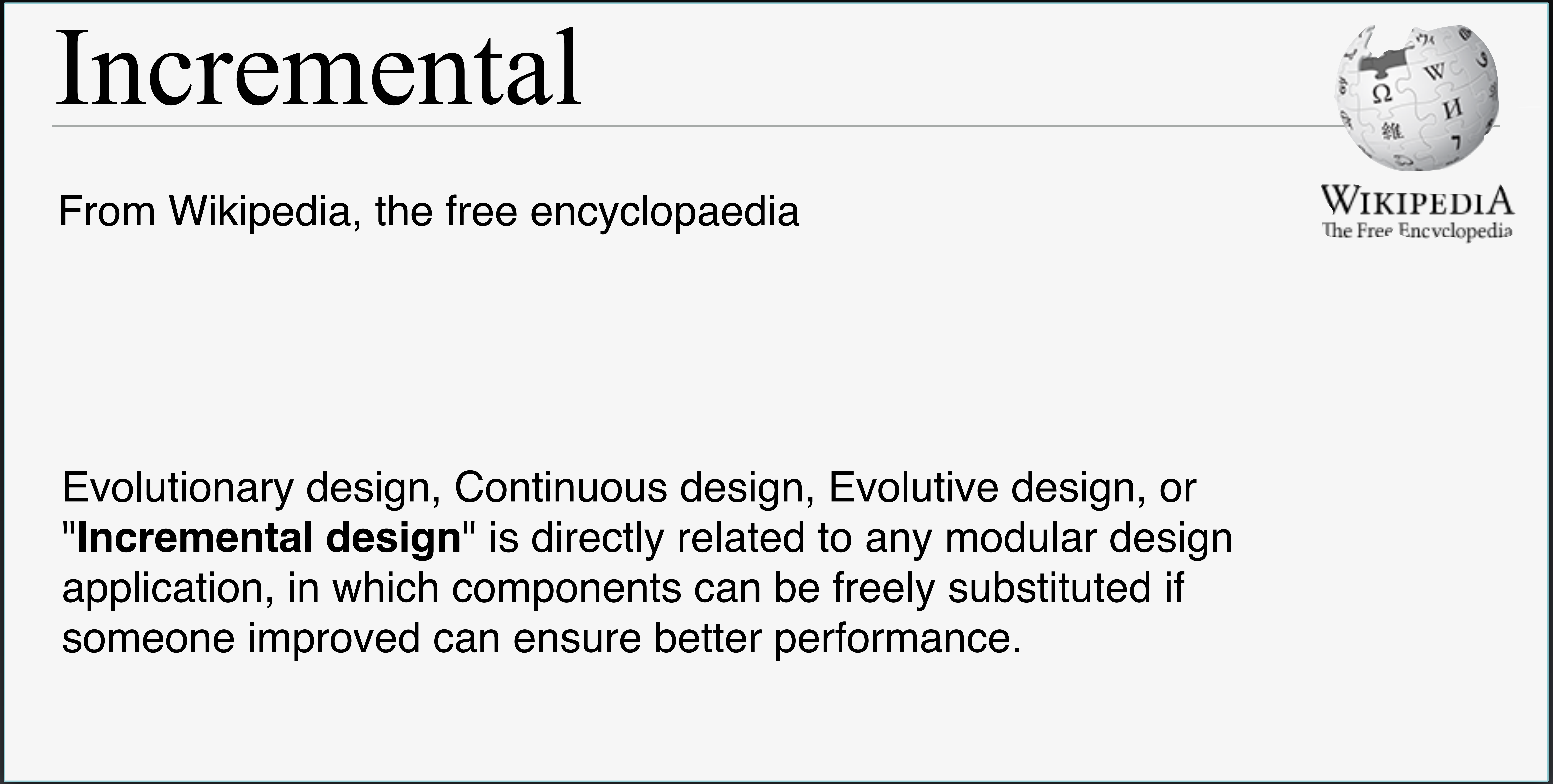
Incremental



Incremental

From Wikipedia, the free encyclopaedia

Evolutionary design, Continuous design, Evolutive design, or "**Incremental design**" is directly related to any modular design application, in which components can be freely substituted if someone improved can ensure better performance.

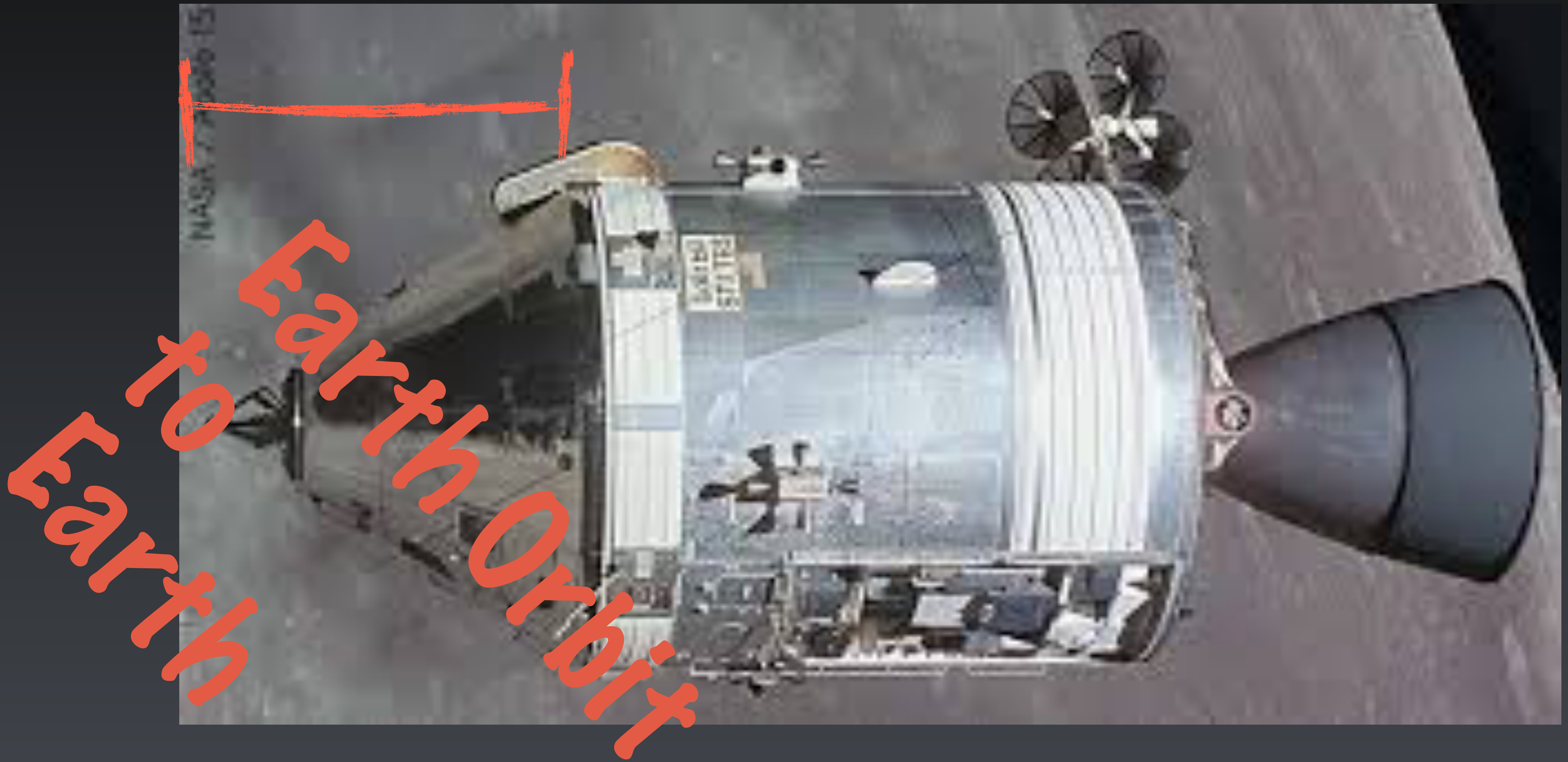
Incrementalism - Modular Systems

Incrementalism - Modular Systems

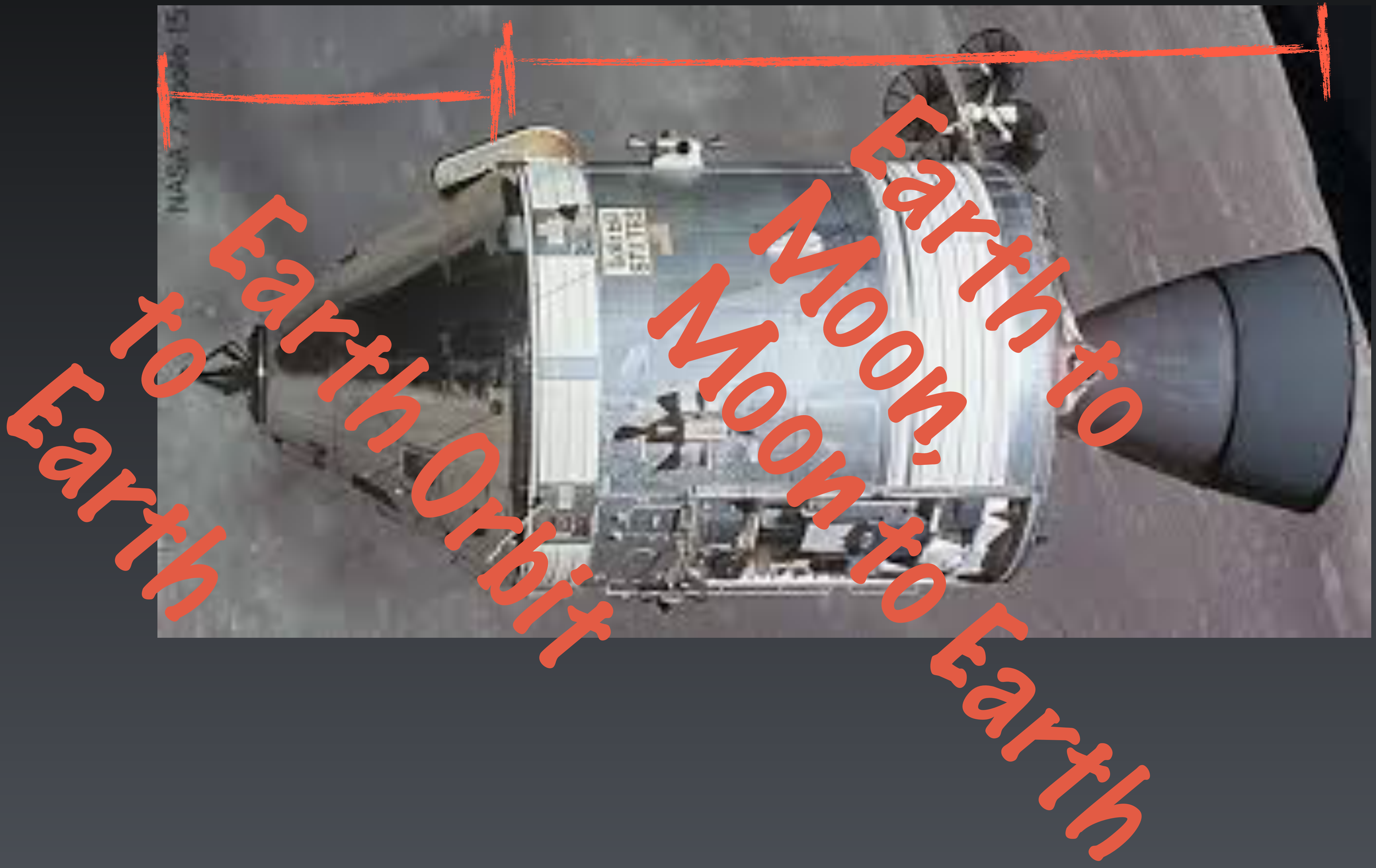
Incrementalism - Modular Systems

Incrementalism - Modular Systems

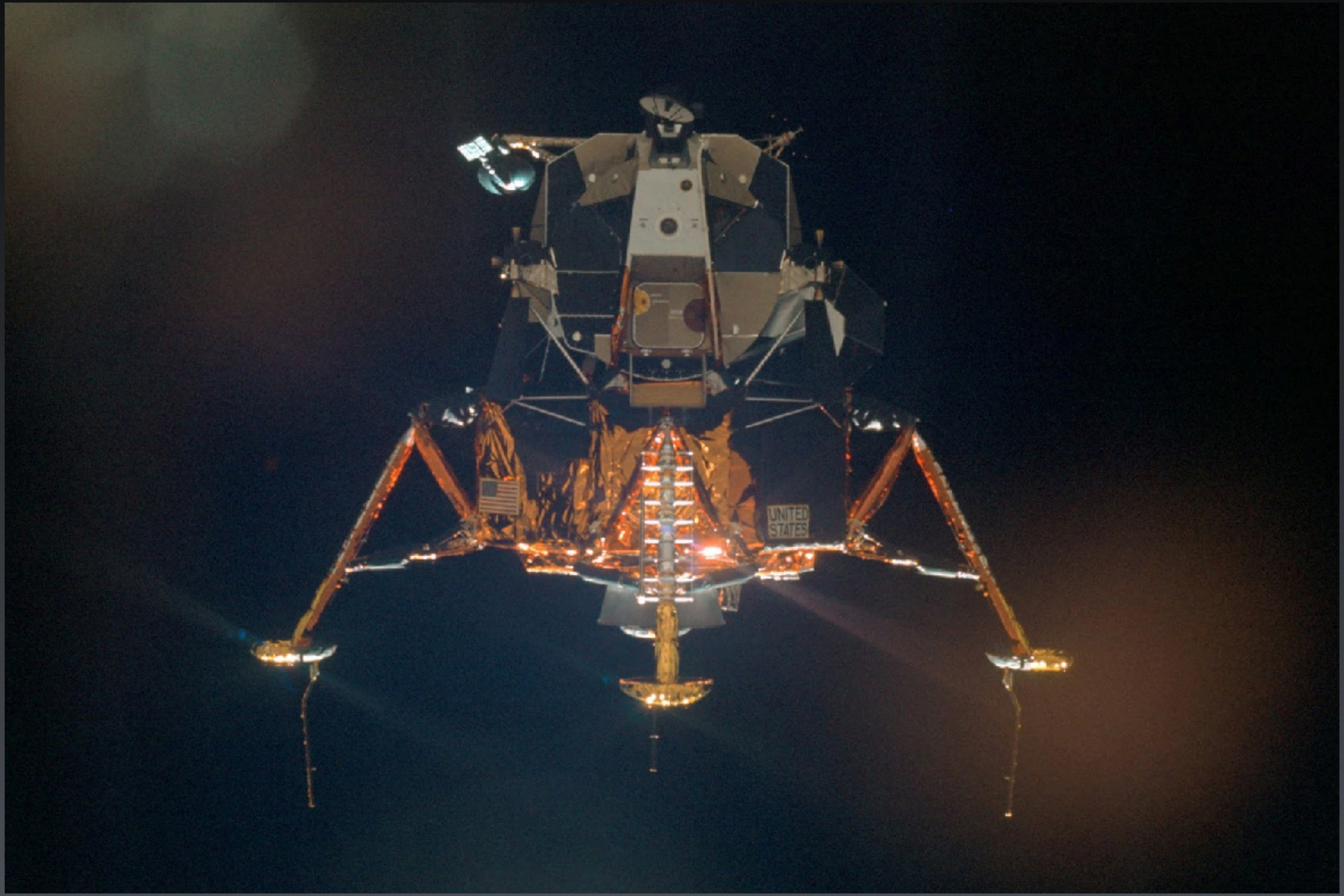
Incrementalism - Modular Systems



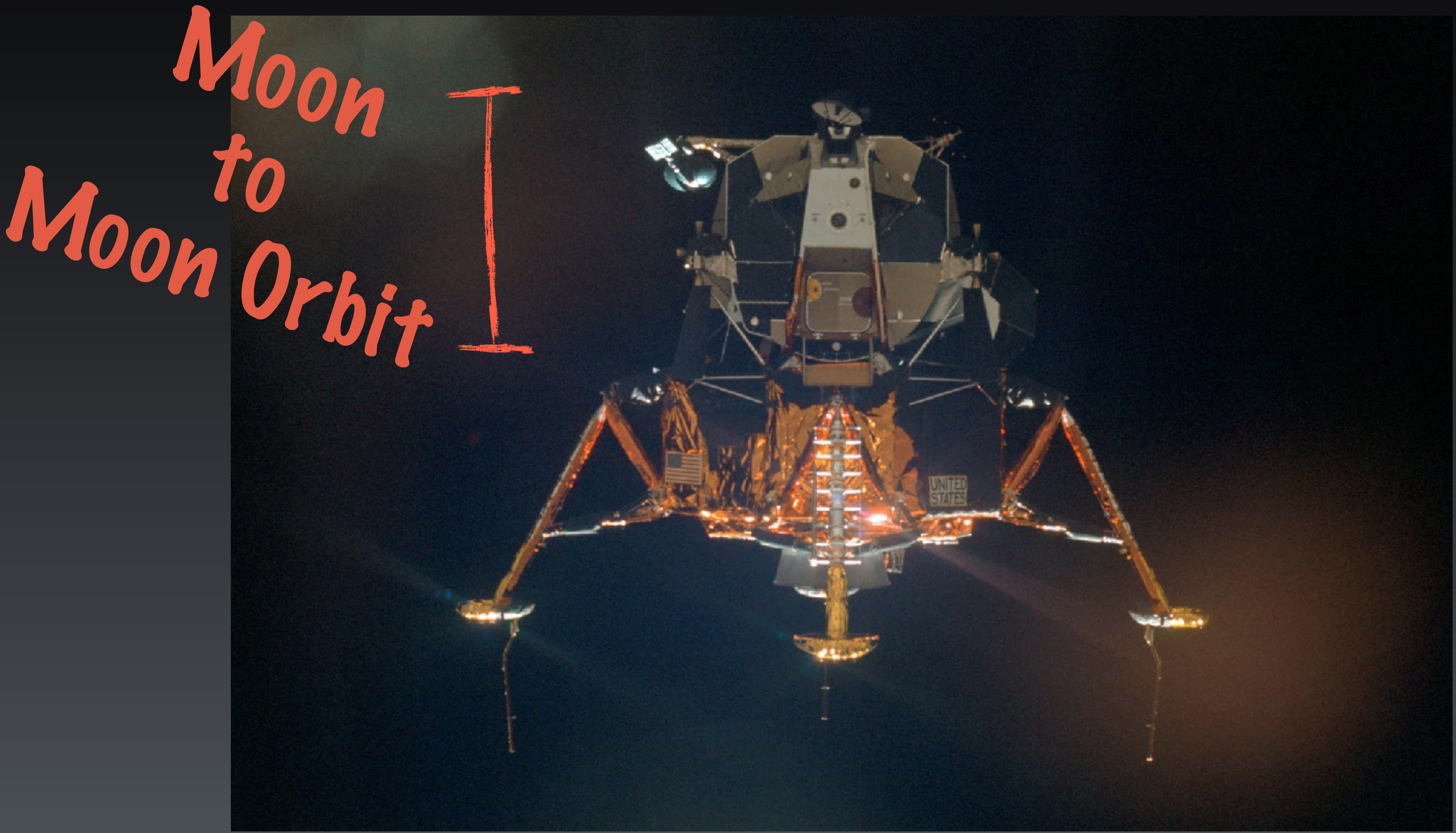
Incrementalism - Modular Systems



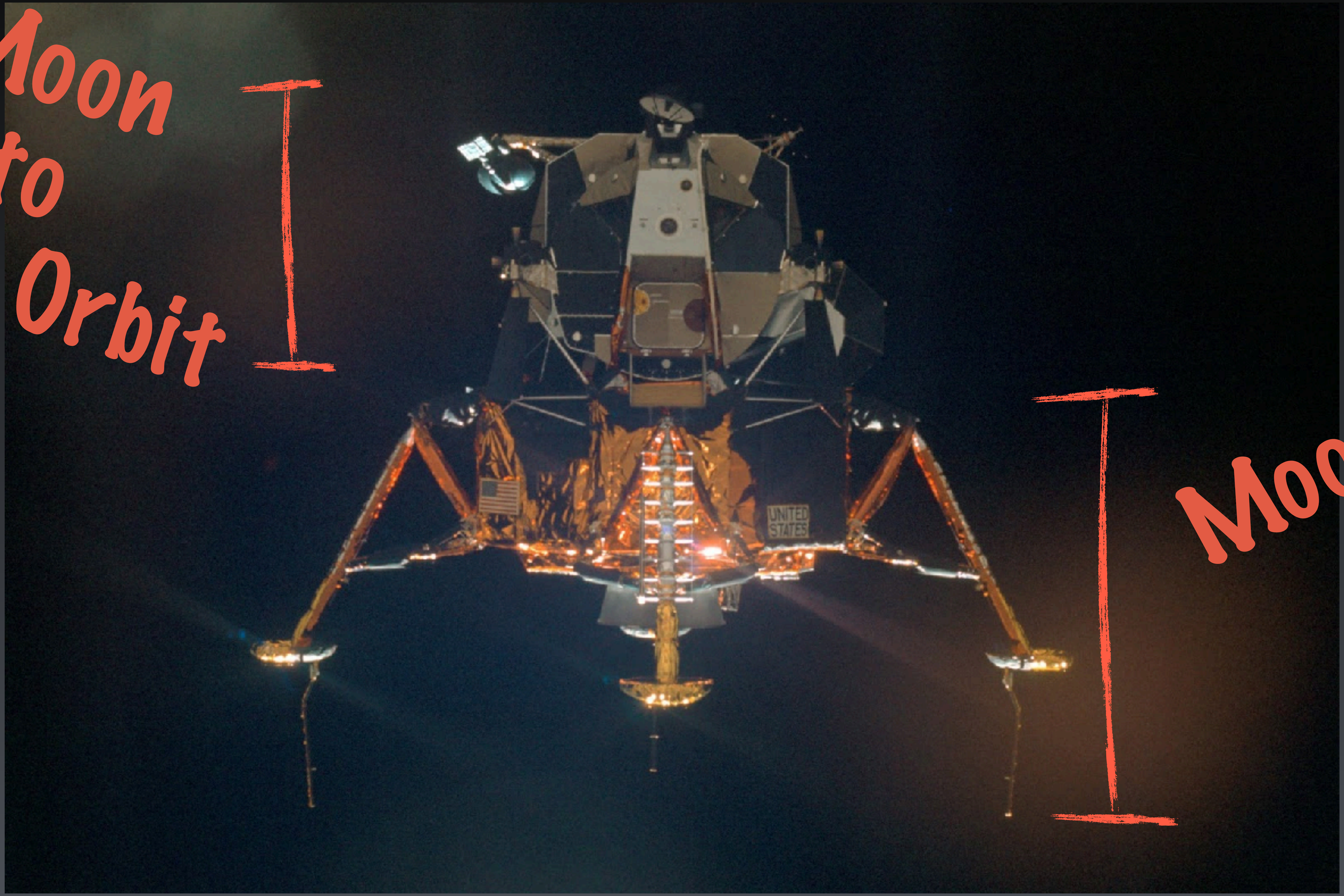
Incrementalism - Modular Systems



Incrementalism - Modular Systems



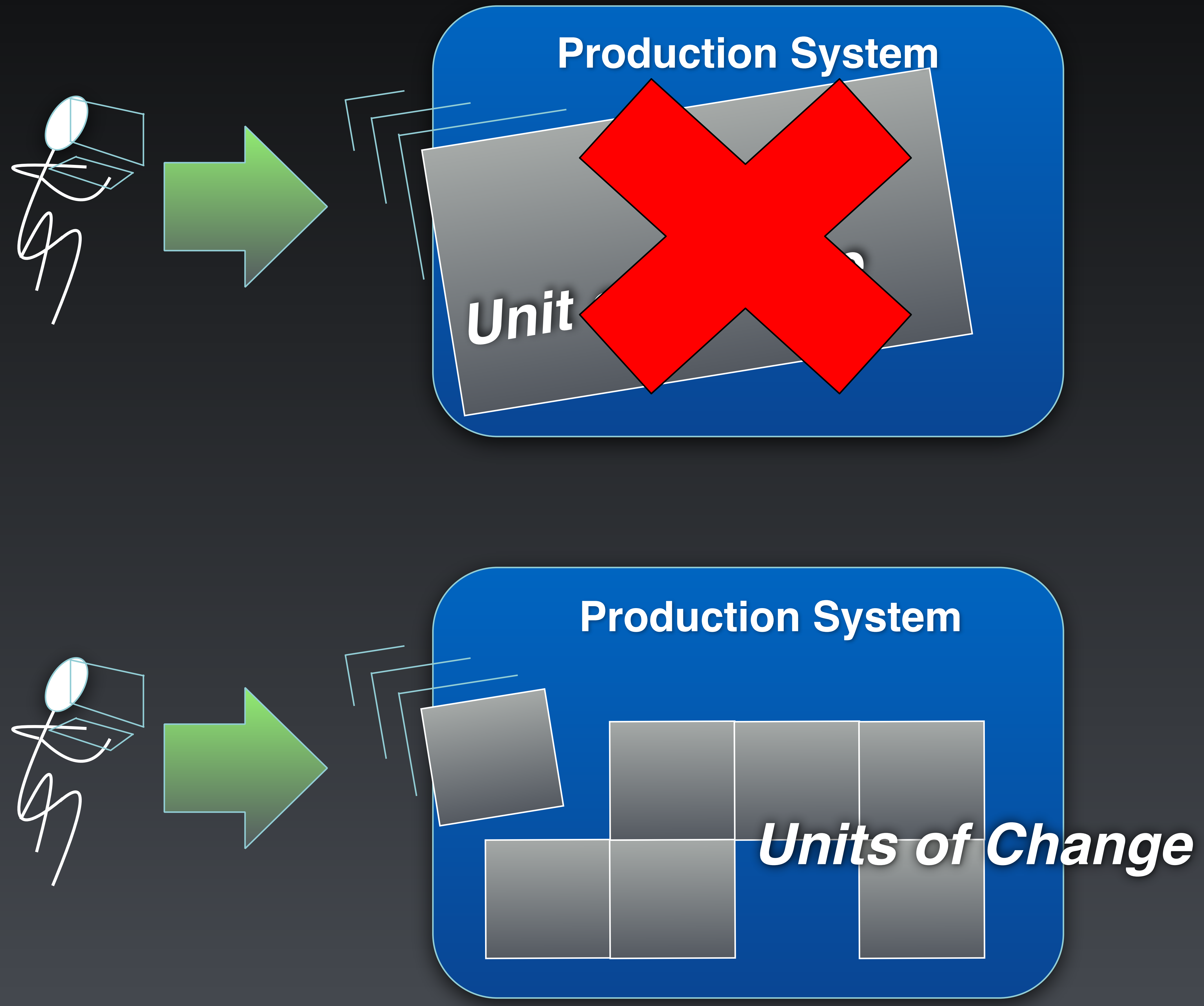
Incrementalism - Modular Systems



Moon to Moon Orbit

Moon Orbit to Moon

Small Batch-Size



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Being Incremental Reduces Risk

Total Risk

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Being Incremental Reduces Risk

Total Risk =

Being Incremental Reduces Risk

$$\text{Total Risk} = \quad R_c$$

Being Incremental Reduces Risk

$$\text{Total Risk} = \sum_{1..n} R_c$$

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Being Incremental Reduces Risk

$$\text{Total Risk} = \sum_{1..n} R_c +$$

Being Incremental Reduces Risk

$$\text{Total Risk} = \sum_{1..n} R_c + R_i$$

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Being Incremental Reduces Risk

$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{\,n}$$

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Being Incremental Reduces Risk

$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{\,n}$$

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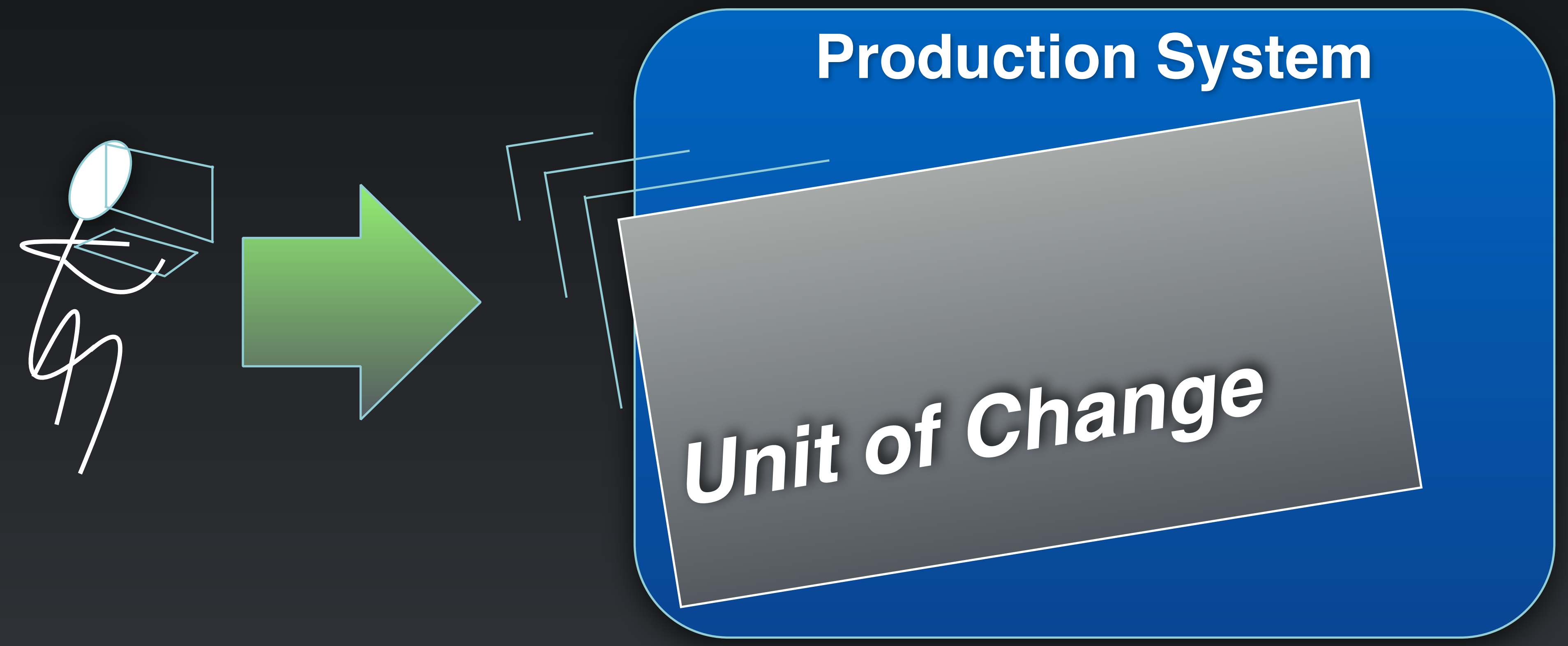
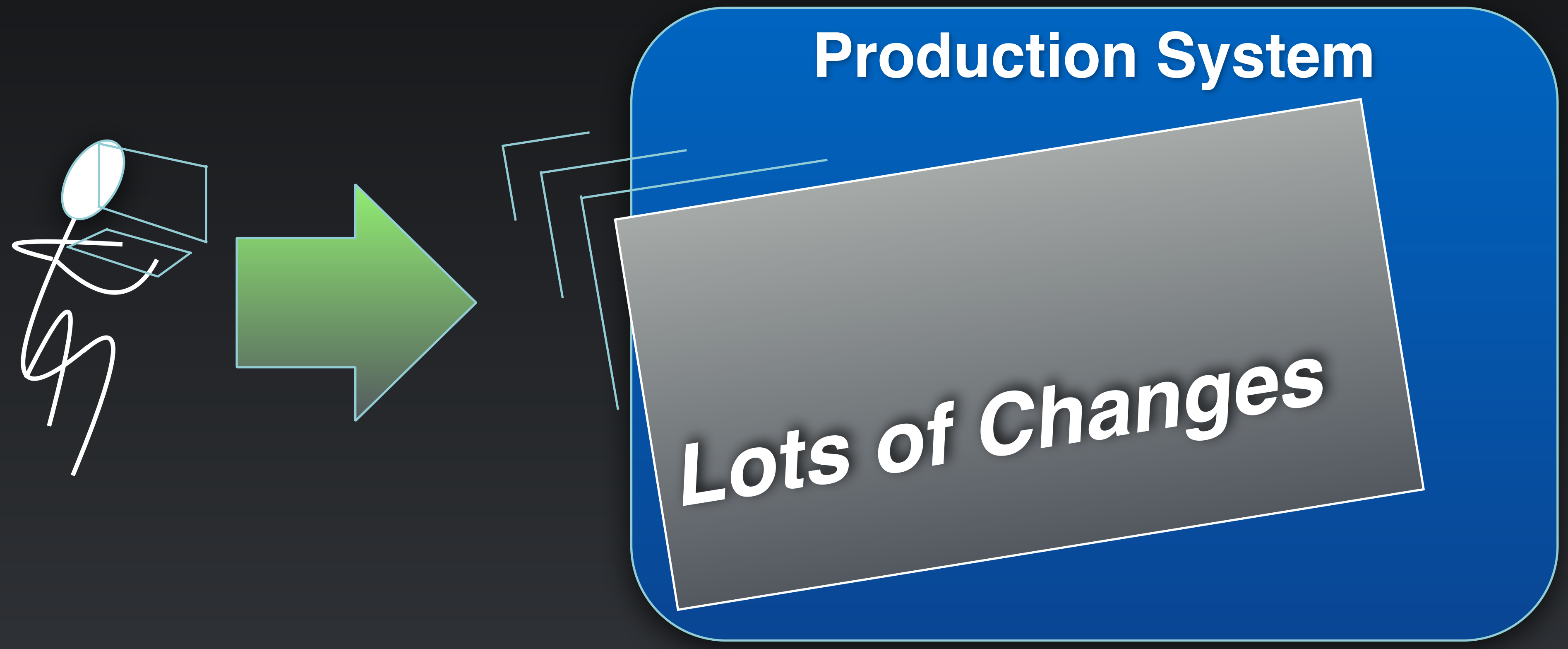
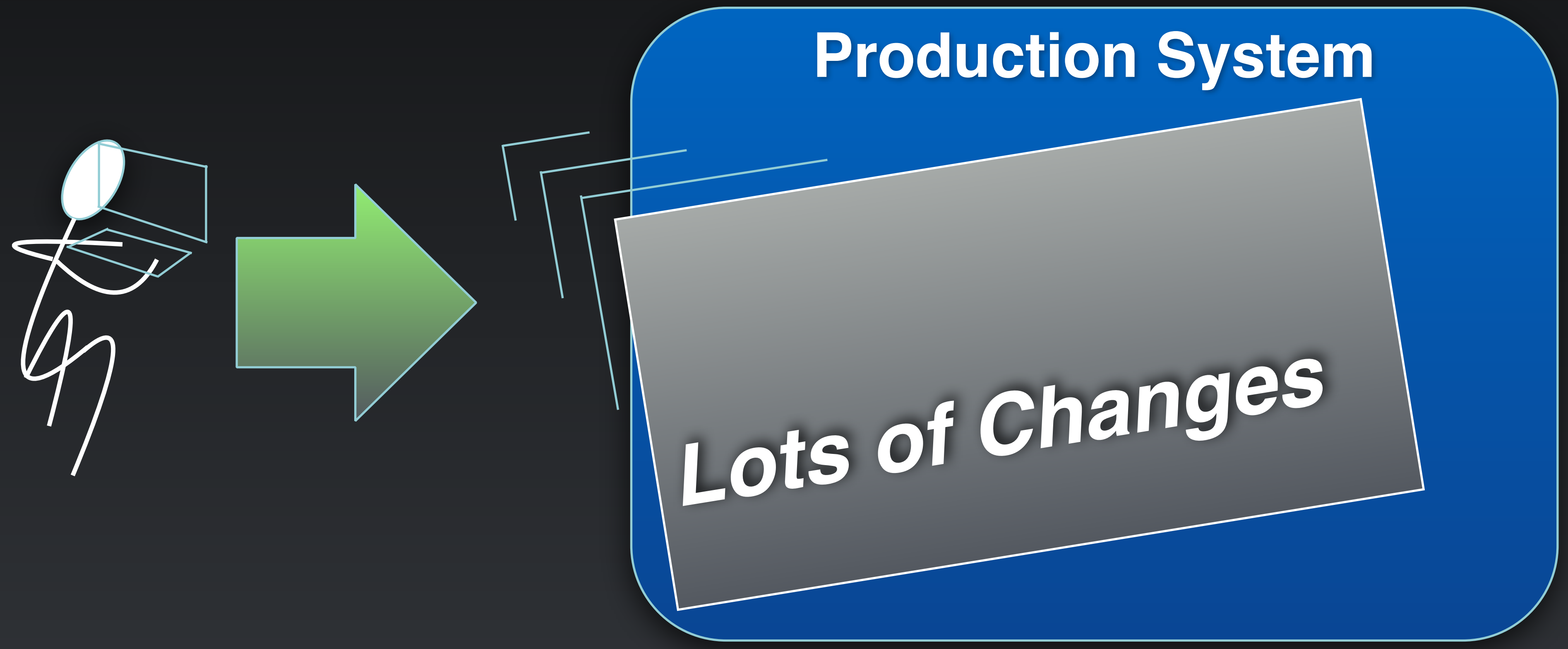
$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{\,n}$$



$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{\,n}$$



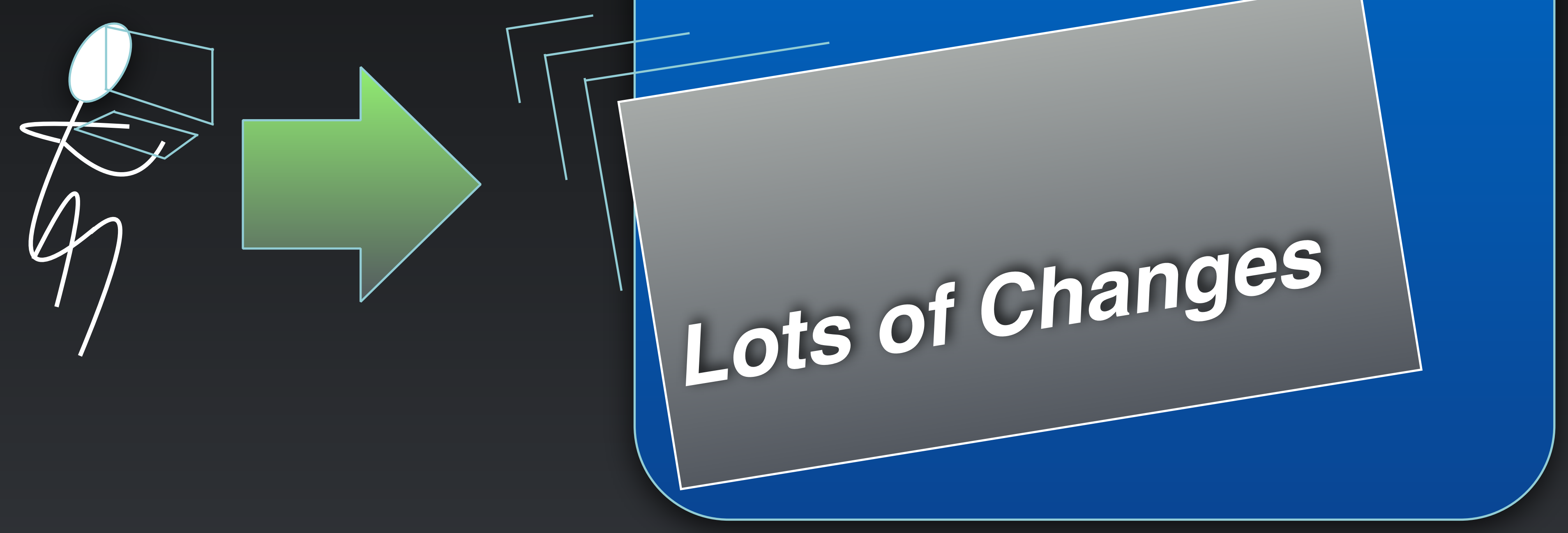
$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{\,n}$$



'n' is very large!

Continuous Delivery ltd

$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{\,n}$$



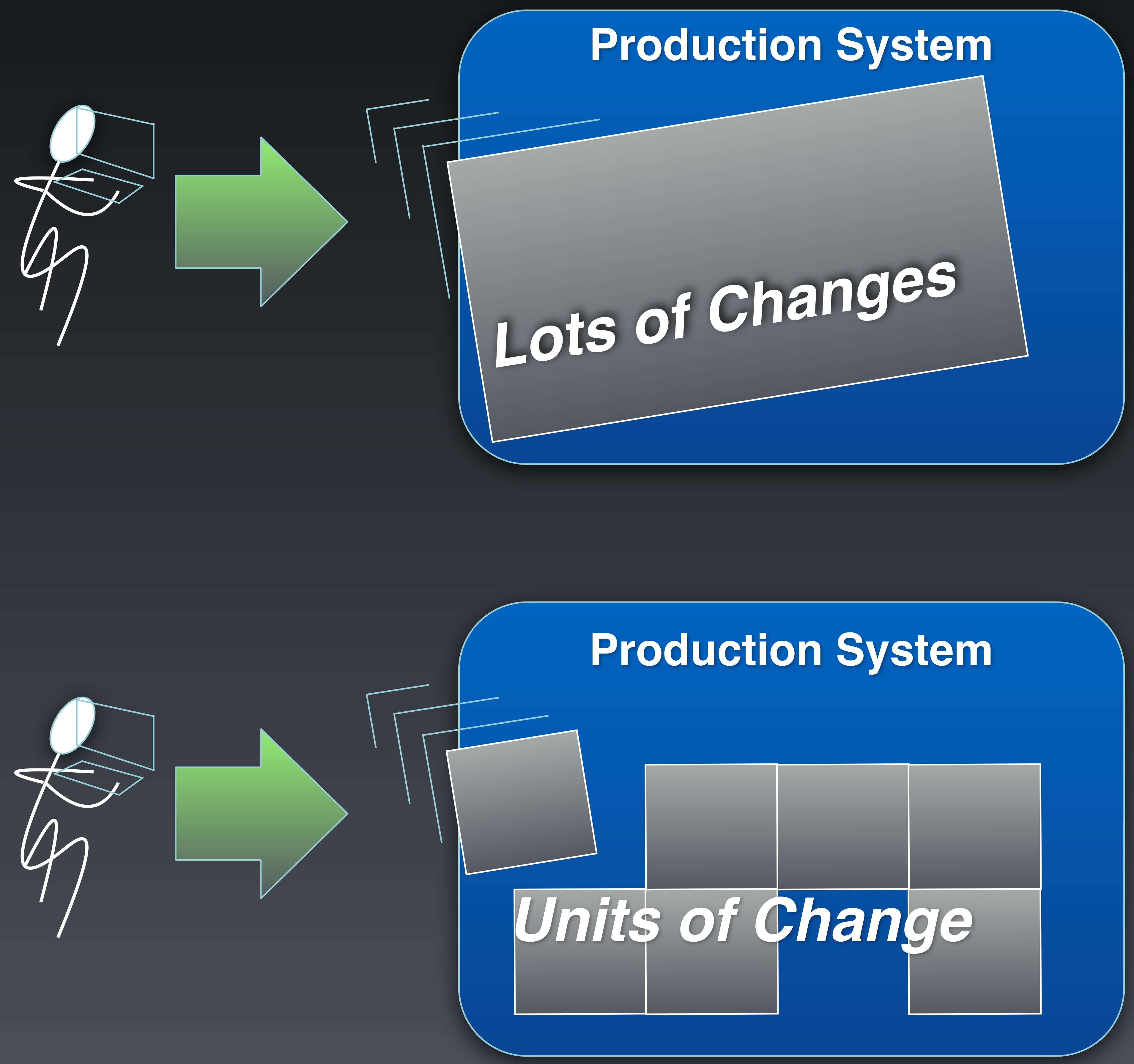
Production System

Lots of Changes

'n' is very large!

Total Risk is High

$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{n}$$



Production System

Lots of Changes

Production System

Units of Change

'n' is very large!

Total Risk is High

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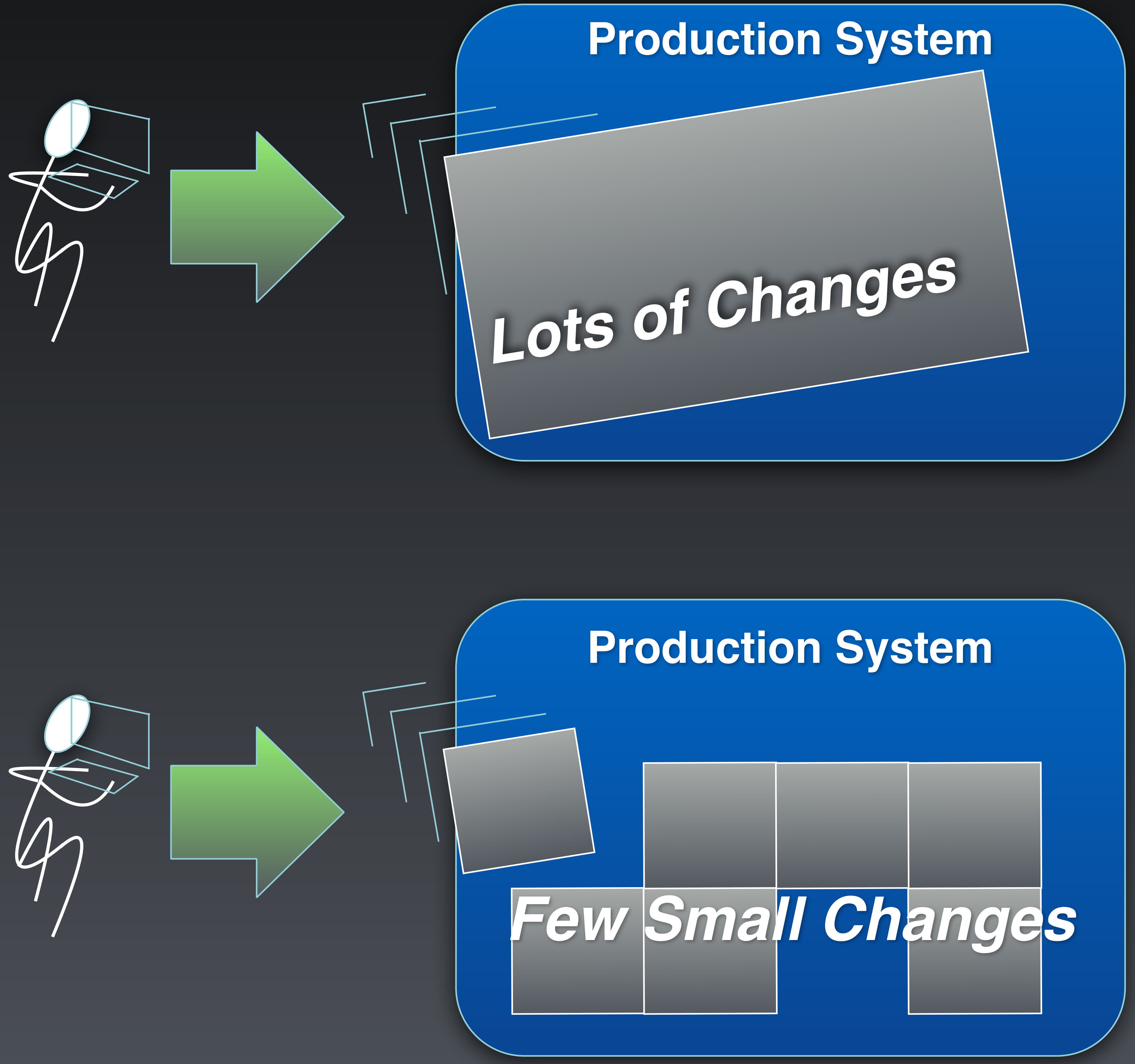
Total Risk $= \sum_{1..n} R_c + R_i^{\,n}$



'n' is very large!

Total Risk is High

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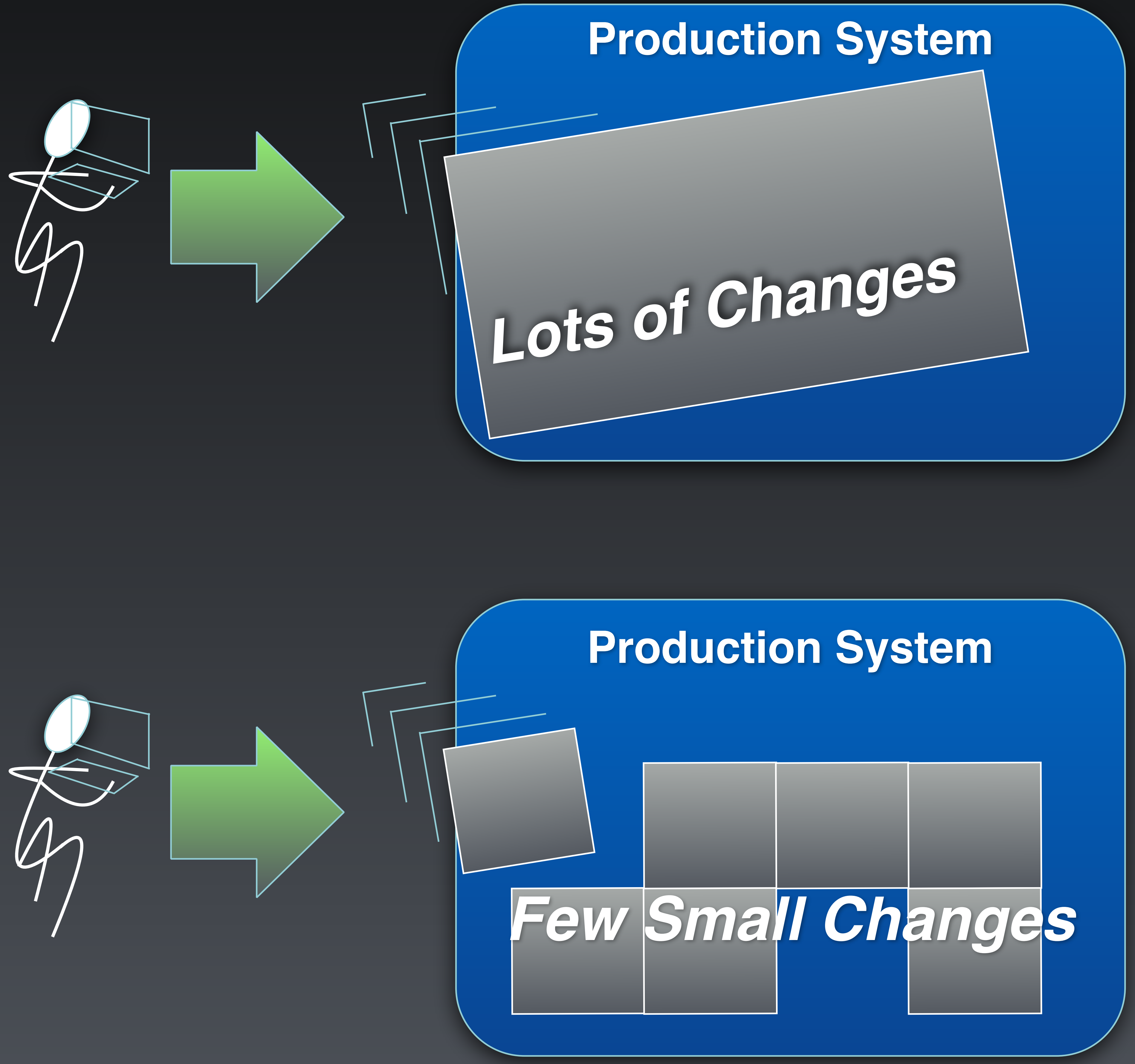
Total Risk $= \sum_{1..n} R_c + R_i^{\,n}$



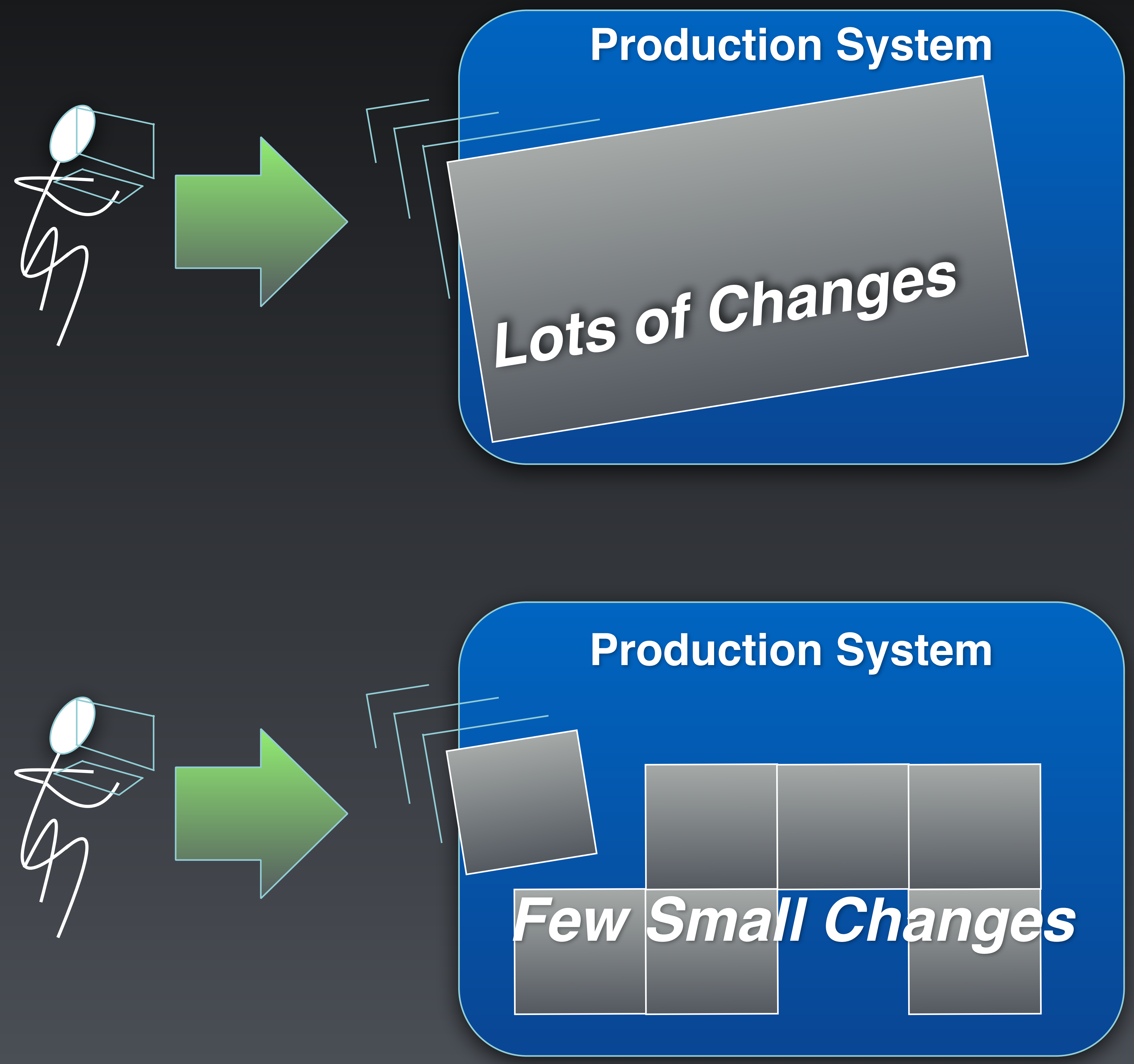
'n' is very large!

Total Risk is High

'n' is small

Continuous Delivery ltd

$$\text{Total Risk} = \sum_{1..n} R_c + R_i^{\,n}$$



Production System

Lots of Changes

Production System

Few Small Changes

'n' is very large!

Total Risk is High

'n' is small

Total Risk is Low

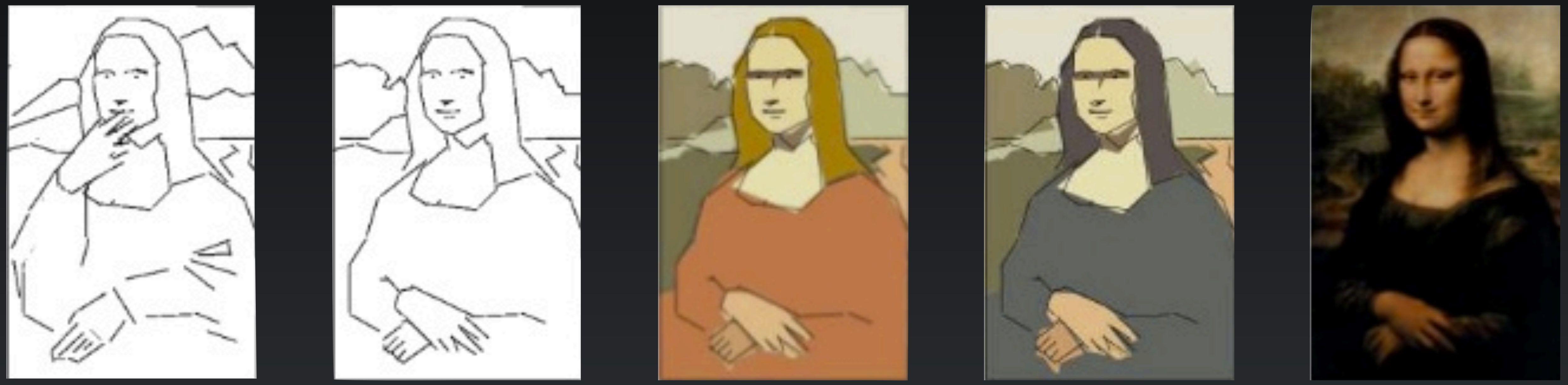
Continuous Delivery ltd

Iterative vs Incremental

Source: Jeff Patton

Iterative vs Incremental

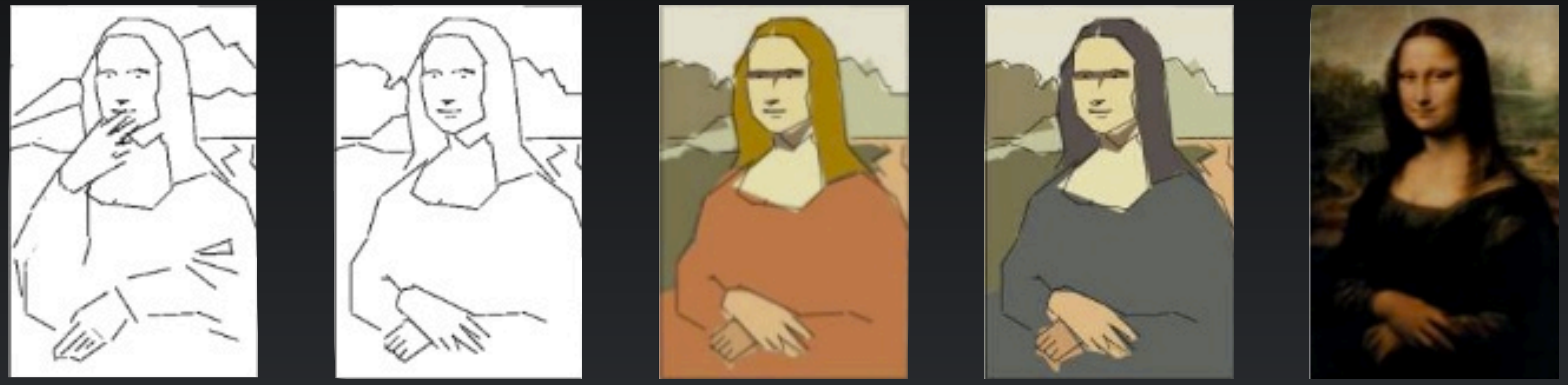
Iterative



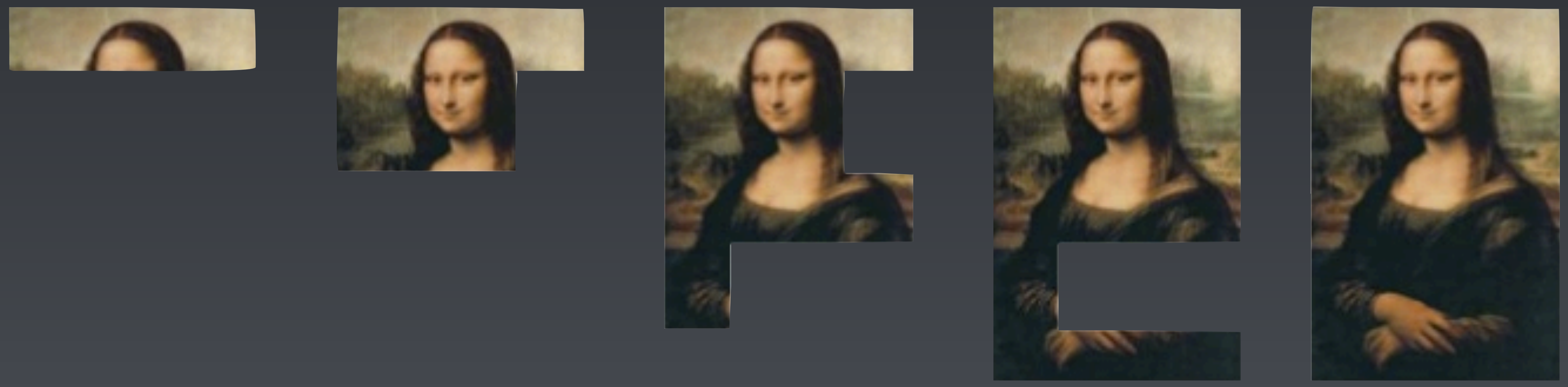
Source: Jeff Patton

Iterative vs Incremental

Iterative



Incremental



Source: Jeff Patton

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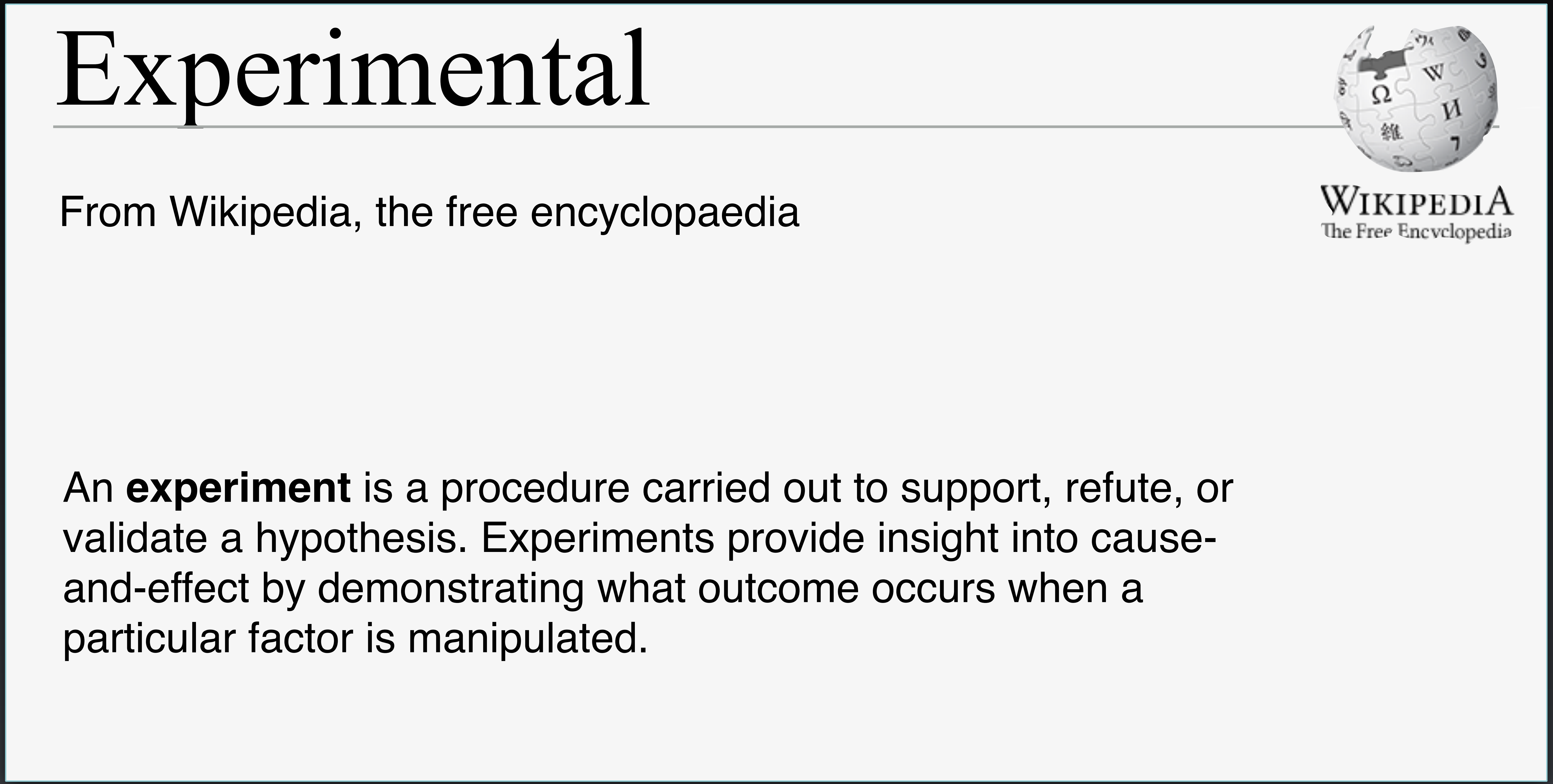
Experimental



Experimental

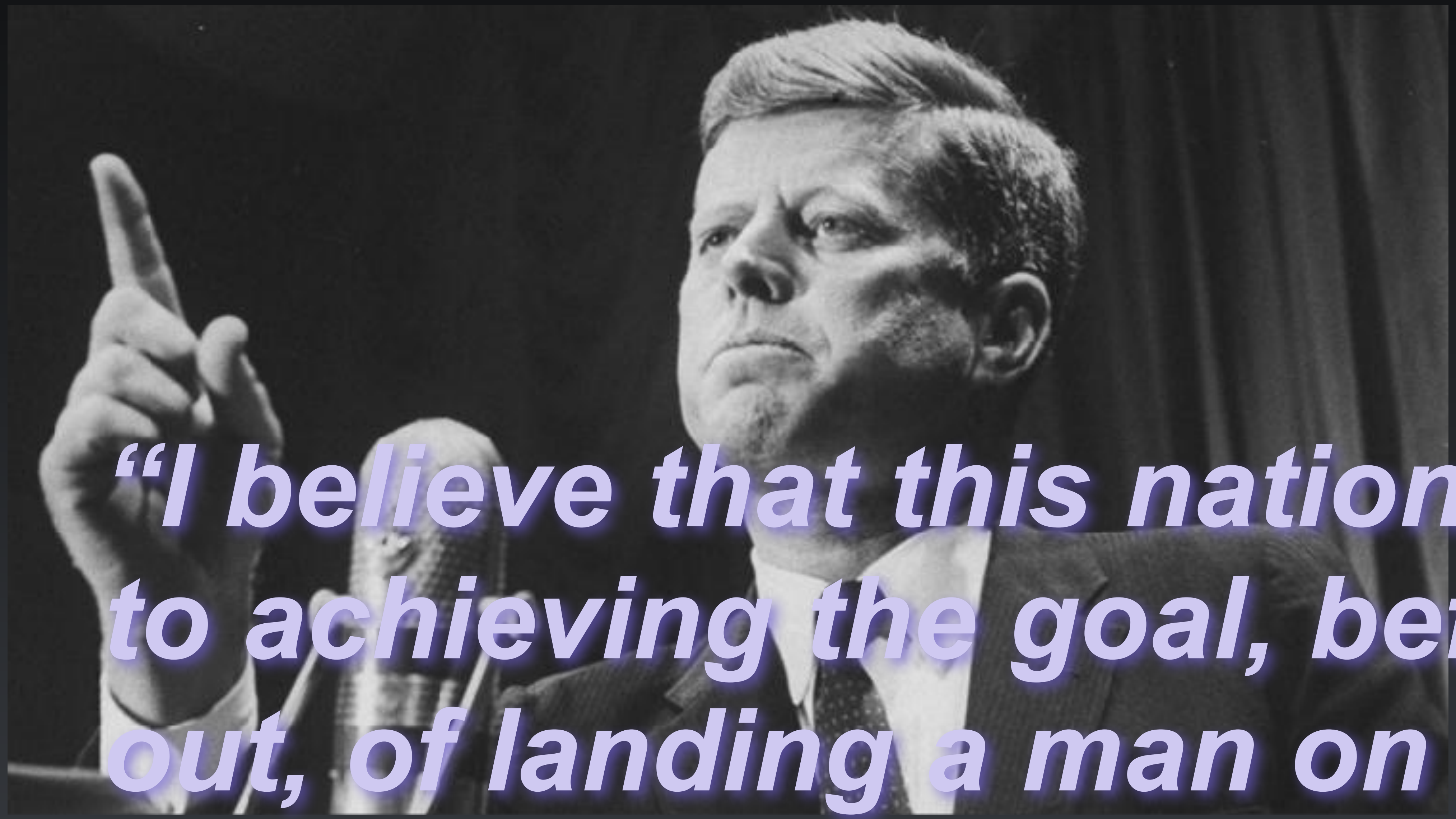
From Wikipedia, the free encyclopaedia

WIKIPEDIA
The Free Encyclopedia

An **experiment** is a procedure carried out to support, refute, or validate a hypothesis. Experiments provide insight into cause-and-effect by demonstrating what outcome occurs when a particular factor is manipulated.

Being Experimental - The Goal

Being Experimental - The Goal



"I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth"

- John F. Kennedy (1961)

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Being Experimental - The Goal

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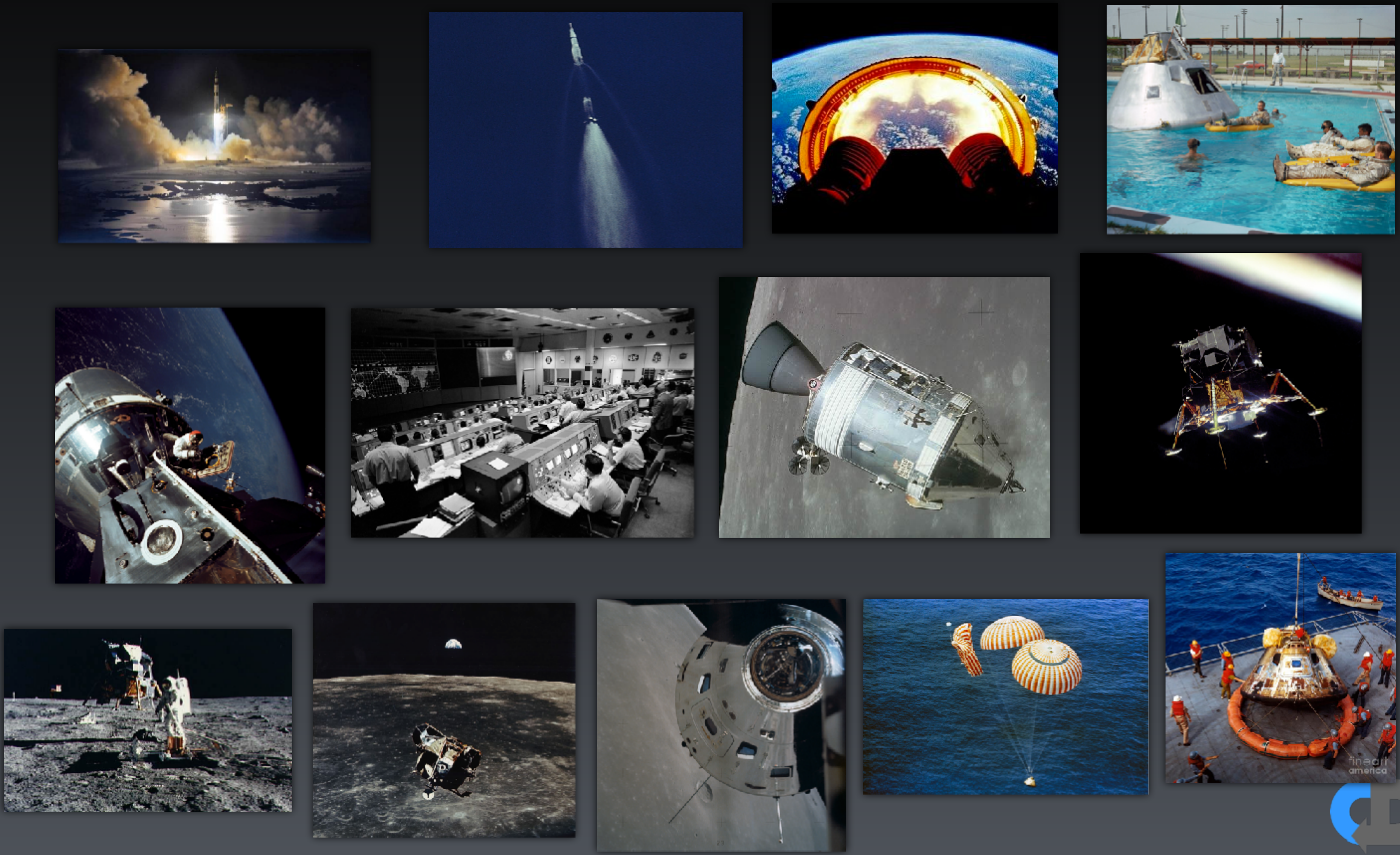
Being Experimental - The Challenge

Being Experimental - The Challenge



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The First “Software Engineer”

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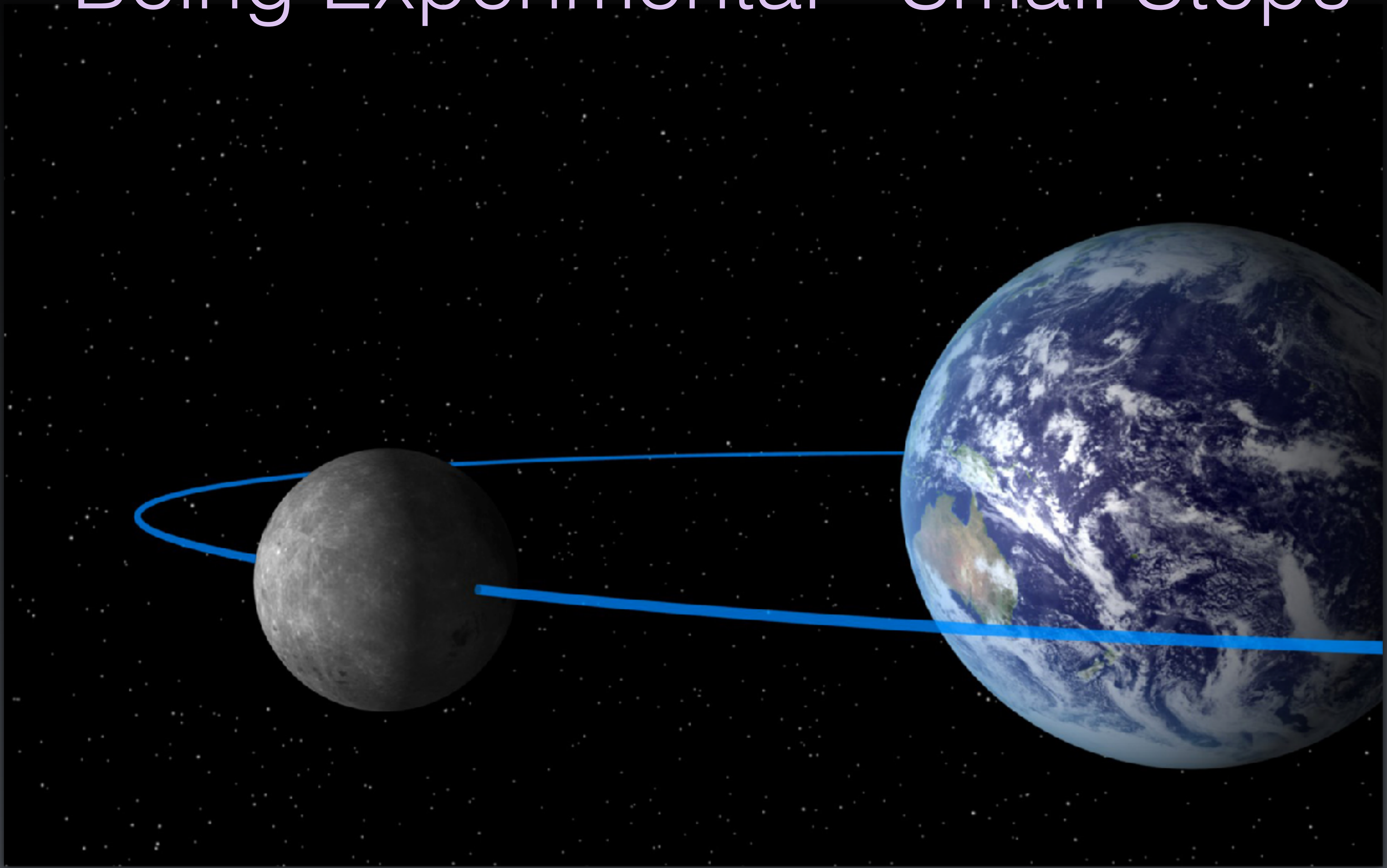
Being Experimental - Small Steps

Being Experimental - Small Steps



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Being Experimental - Giant Leaps

Being Experimental - Giant Leaps

Earth
Earth-Moon System to Scale
Moon
min: 356375 km
avg: 384400 km
max: 406720 km

Being Experimental

Being Experimental

The Ranger Programme

Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*

Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*

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Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*
- **Ranger 3** - *Missed!*

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Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*
- **Ranger 3** - *Missed!*
- **Ranger 4** - *Impact, systems failed*

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Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*
- **Ranger 3** - *Missed!*
- **Ranger 4** - *Impact, systems failed*
- **Ranger 5** - *Missed!*

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Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*
- **Ranger 3** - *Missed!*
- **Ranger 4** - *Impact, systems failed*
- **Ranger 5** - *Missed!*
- **Ranger 6** - *Impact, cameras failed*

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Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*
- **Ranger 3** - *Missed!*
- **Ranger 4** - *Impact, systems failed*
- **Ranger 5** - *Missed!*
- **Ranger 6** - *Impact, cameras failed*
- **Ranger 7** - *Success!*

Continuous Delivery ltd

Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*
- **Ranger 3** - *Missed!*
- **Ranger 4** - *Impact, systems failed*
- **Ranger 5** - *Missed!*
- **Ranger 6** - *Impact, cameras failed*
- **Ranger 7** - *Success!*
- **Ranger 8** - *Success!*

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Being Experimental

The Ranger Programme

- **Ranger 1** - *Launch Failure*
- **Ranger 2** - *Launch Failure*
- **Ranger 3** - *Missed!*
- **Ranger 4** - *Impact, systems failed*
- **Ranger 5** - *Missed!*
- **Ranger 6** - *Impact, cameras failed*
- **Ranger 7** - *Success!*
- **Ranger 8** - *Success!*
- **Ranger 9** - *Success!*

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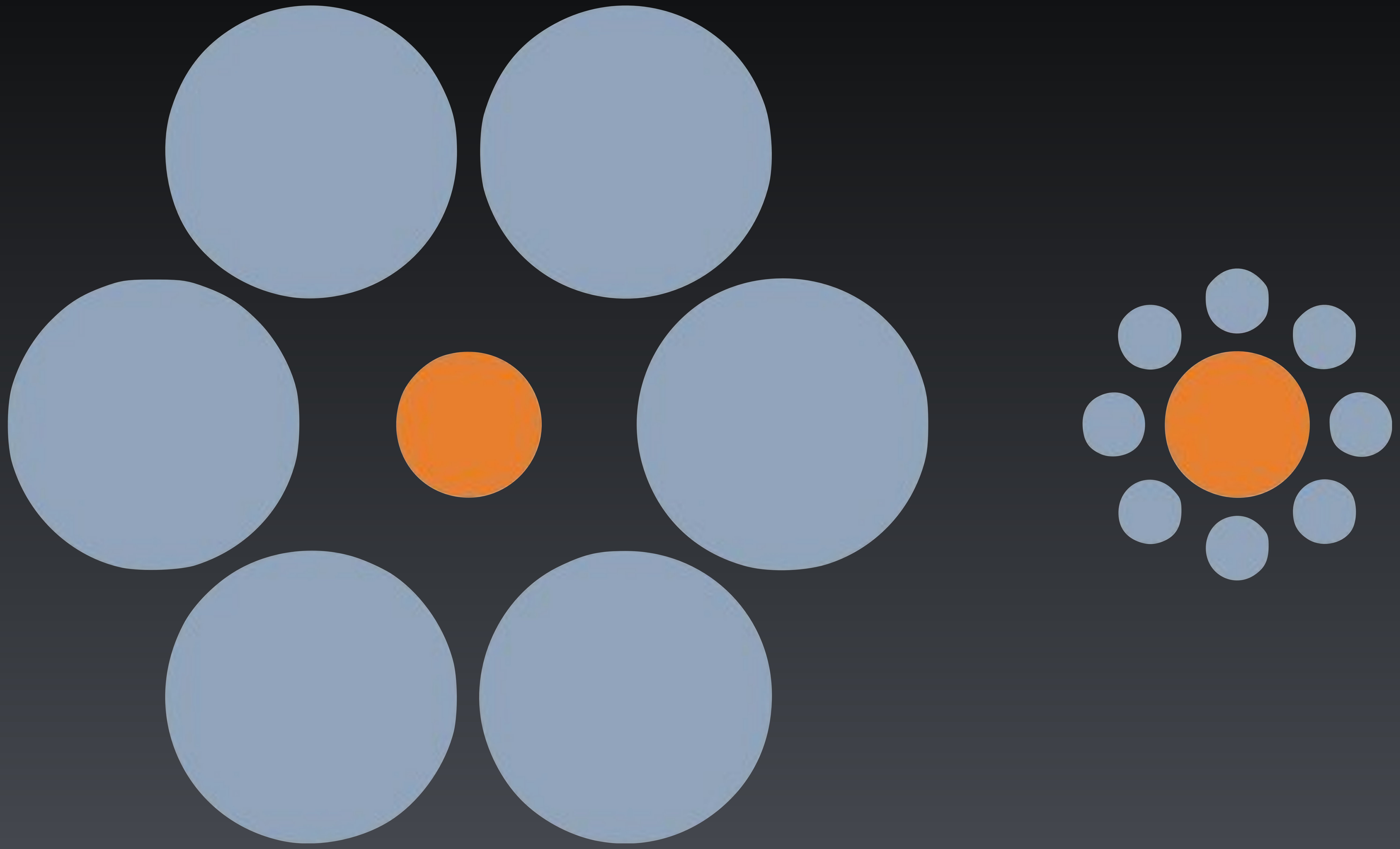
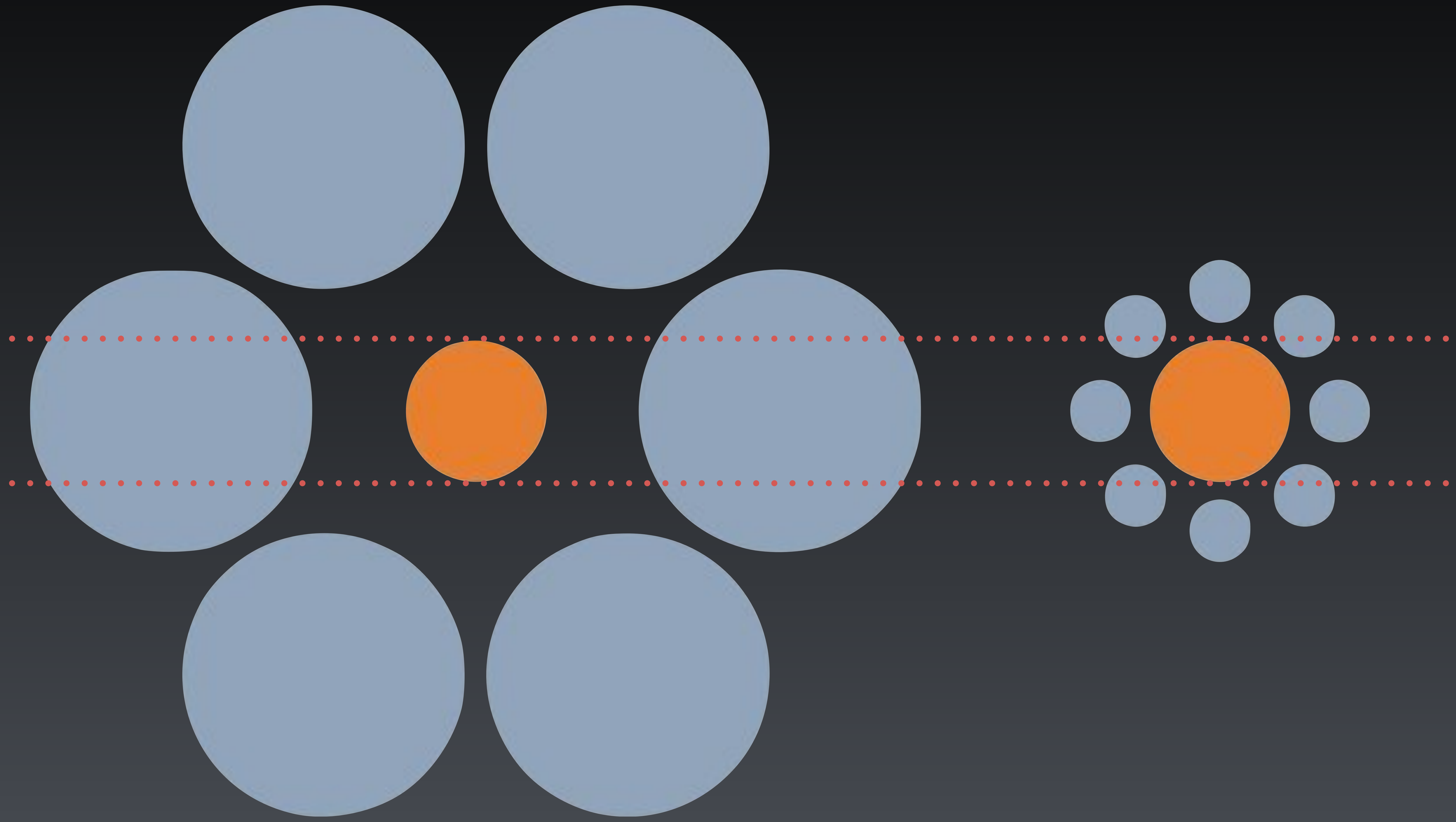
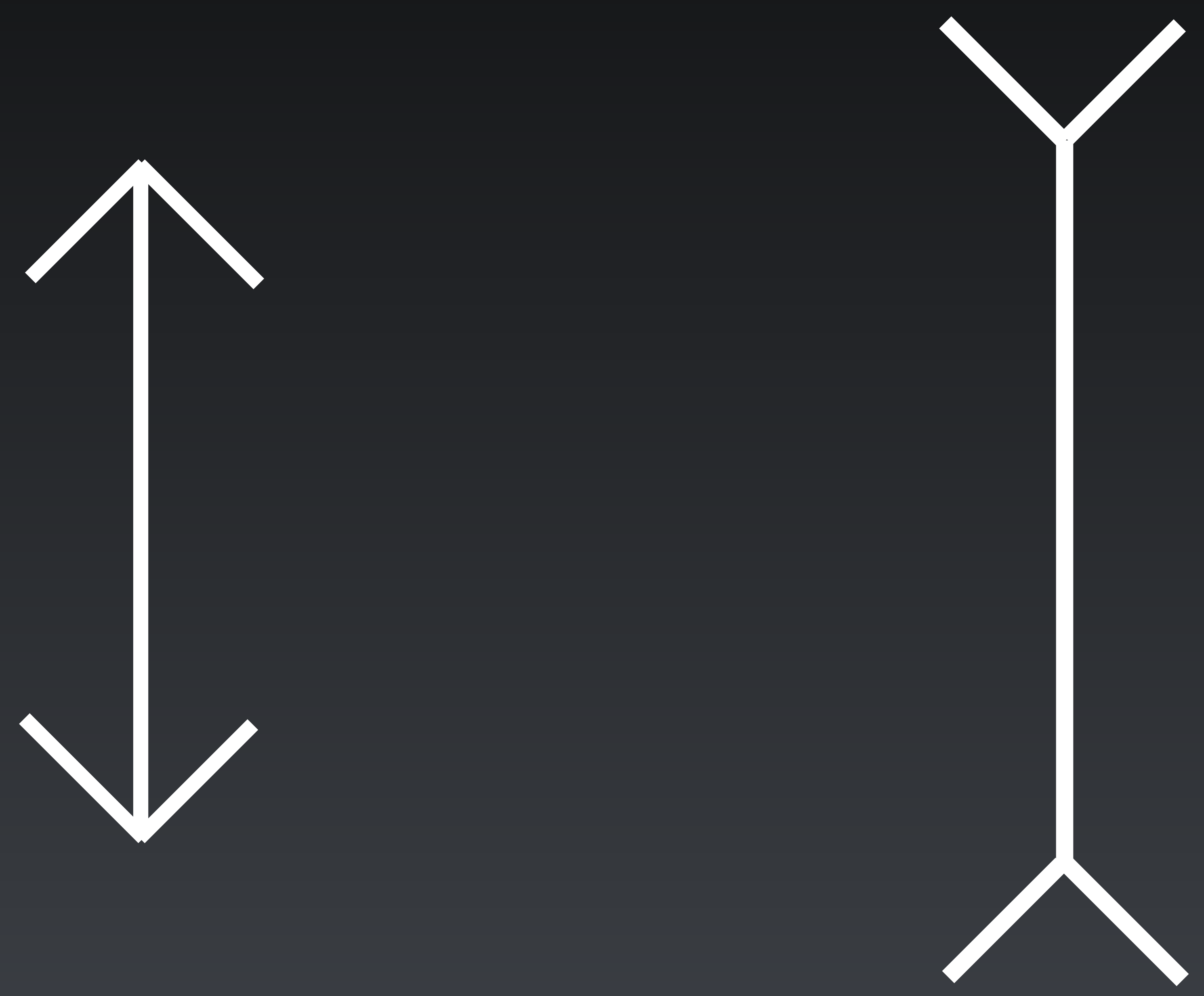
Being Experimental



Being Experimental



Being Experimental



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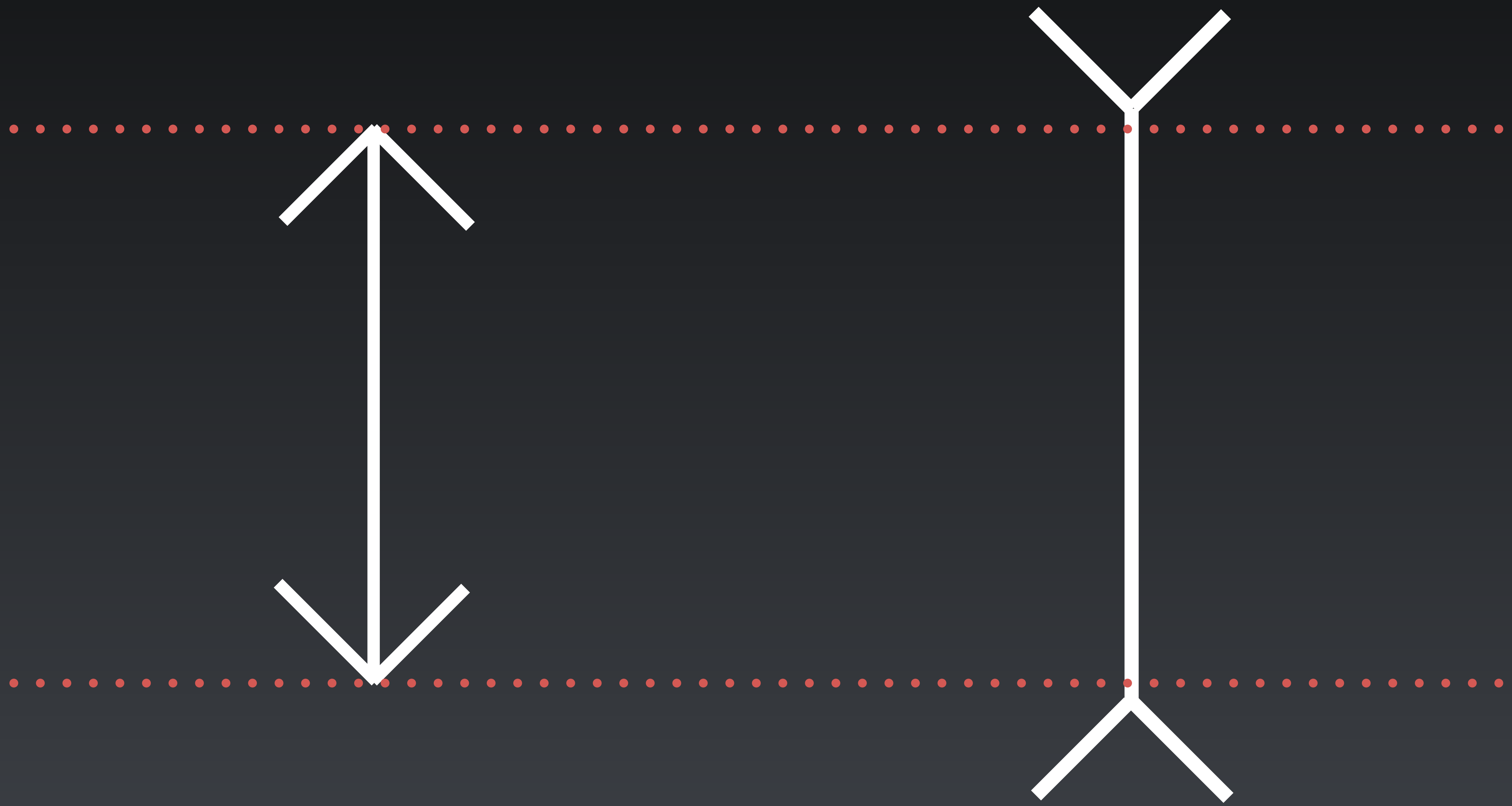
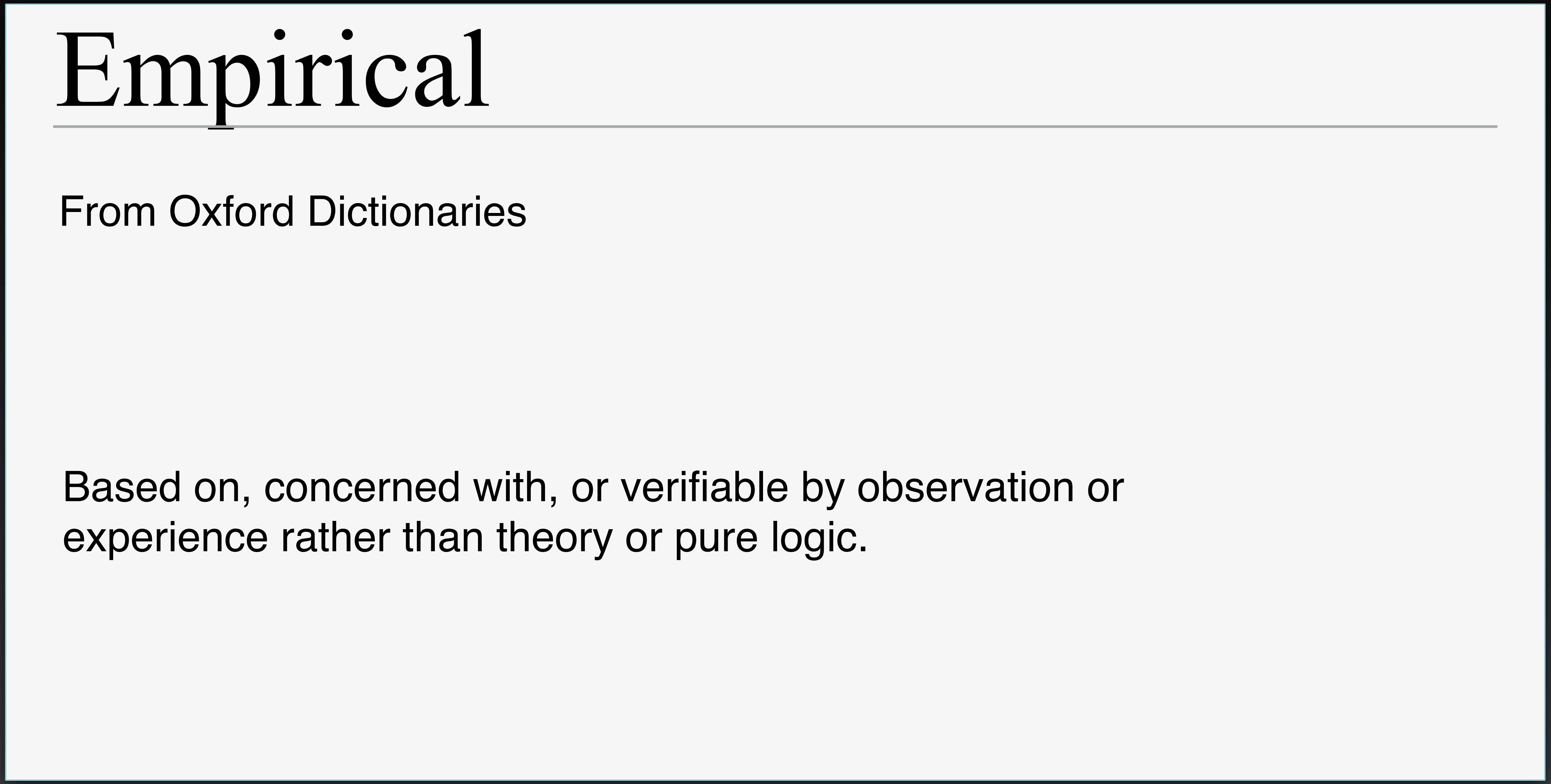
Being Experimental



Empirical

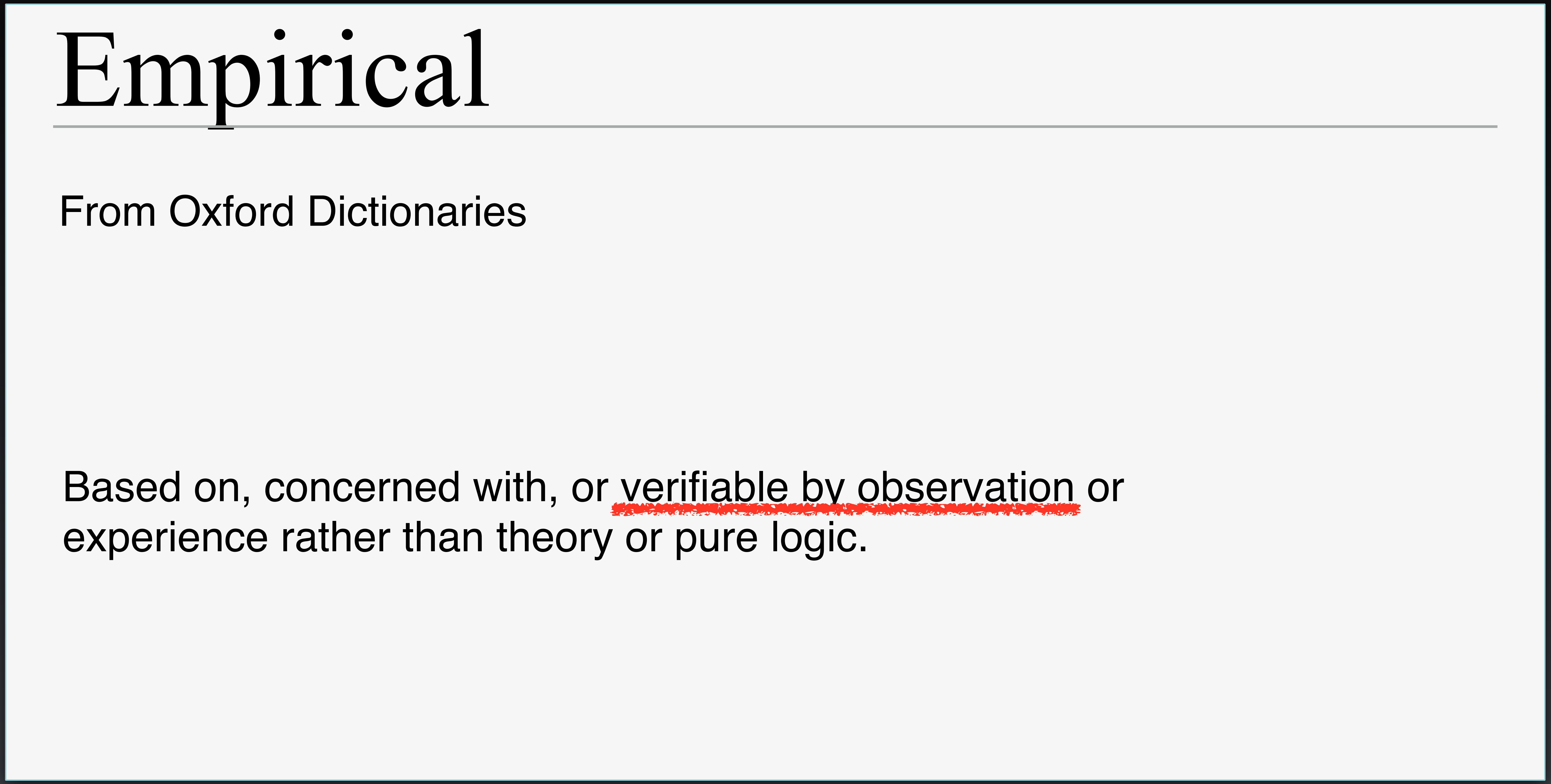


Empirical

From Oxford Dictionaries

Based on, concerned with, or verifiable by observation or experience rather than theory or pure logic.

Empirical



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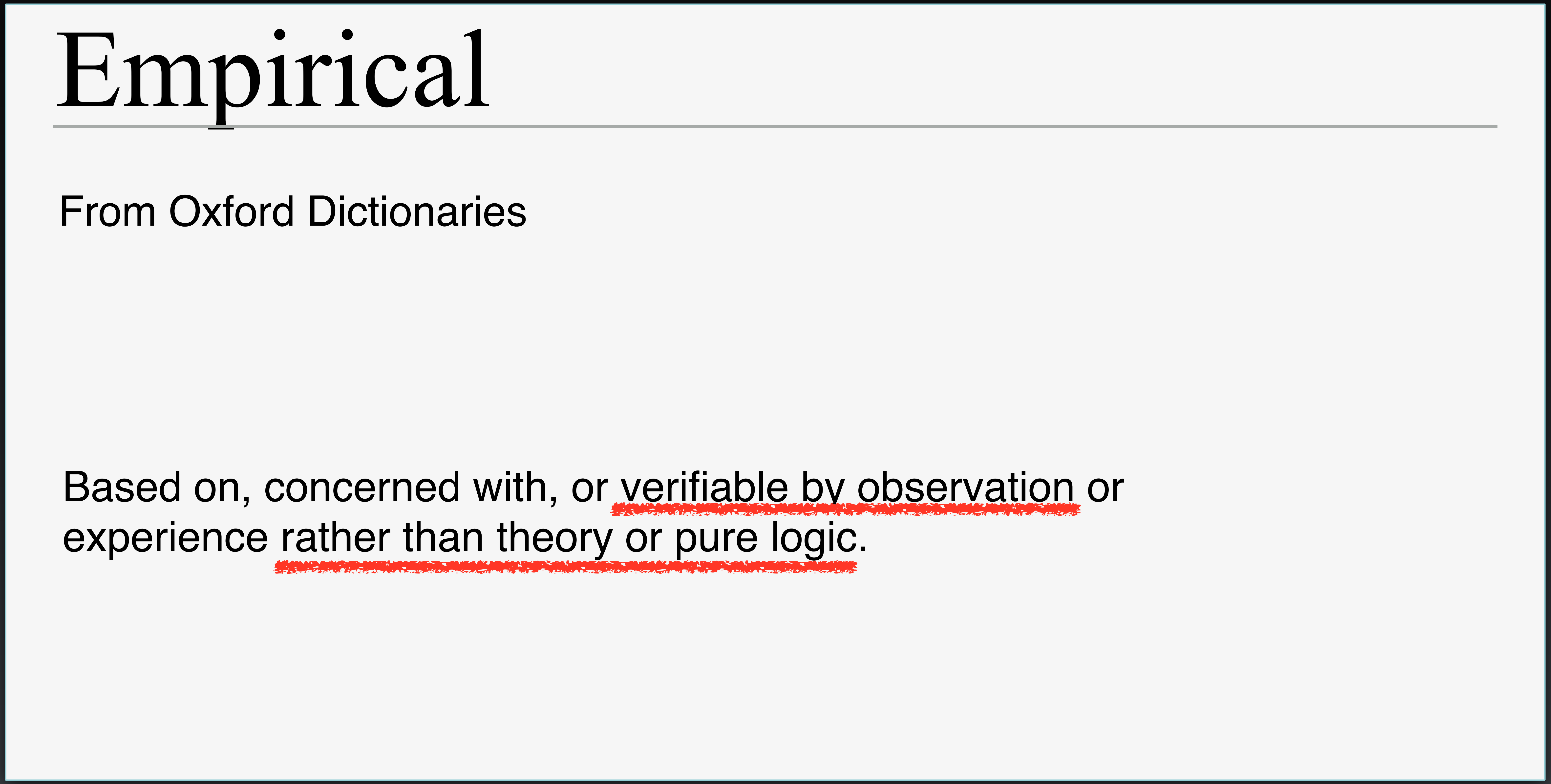

Empirical

From Oxford Dictionaries

Based on, concerned with, or verifiable by observation or experience rather than theory or pure logic.

Oxford Dictionaries

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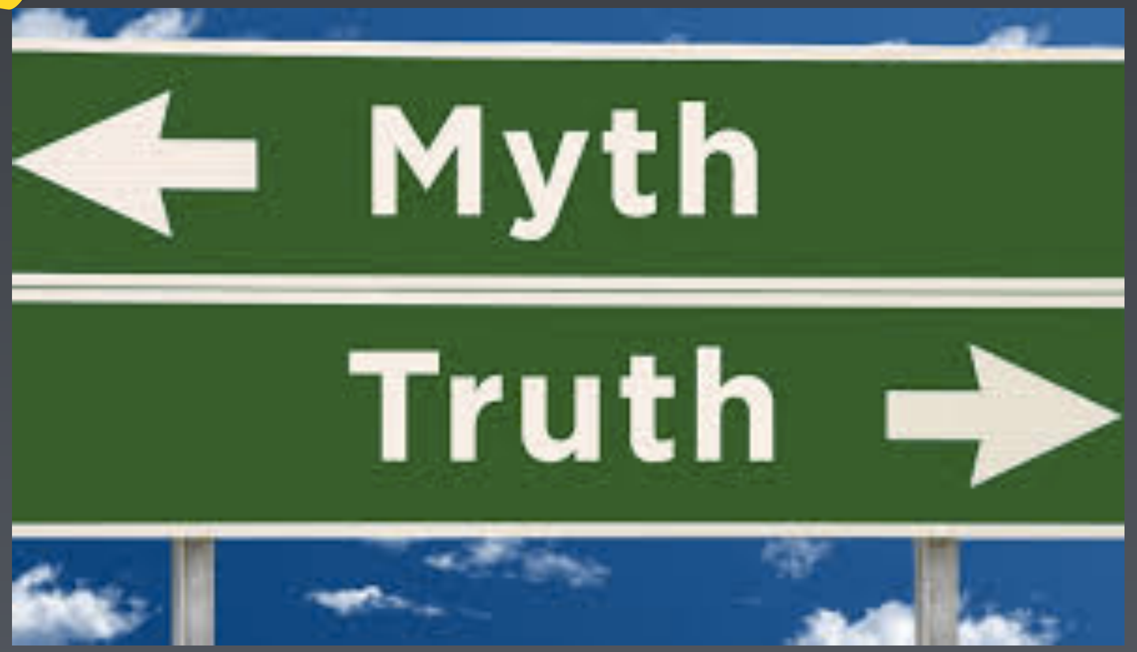
Being Empirical Matters

Means we can be evidence based and data driven

Being Empirical Matters

Means we can be evidence based and data driven

Stand Back!
We are going to try
SCIENCE!!!



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Being Empirical Matters

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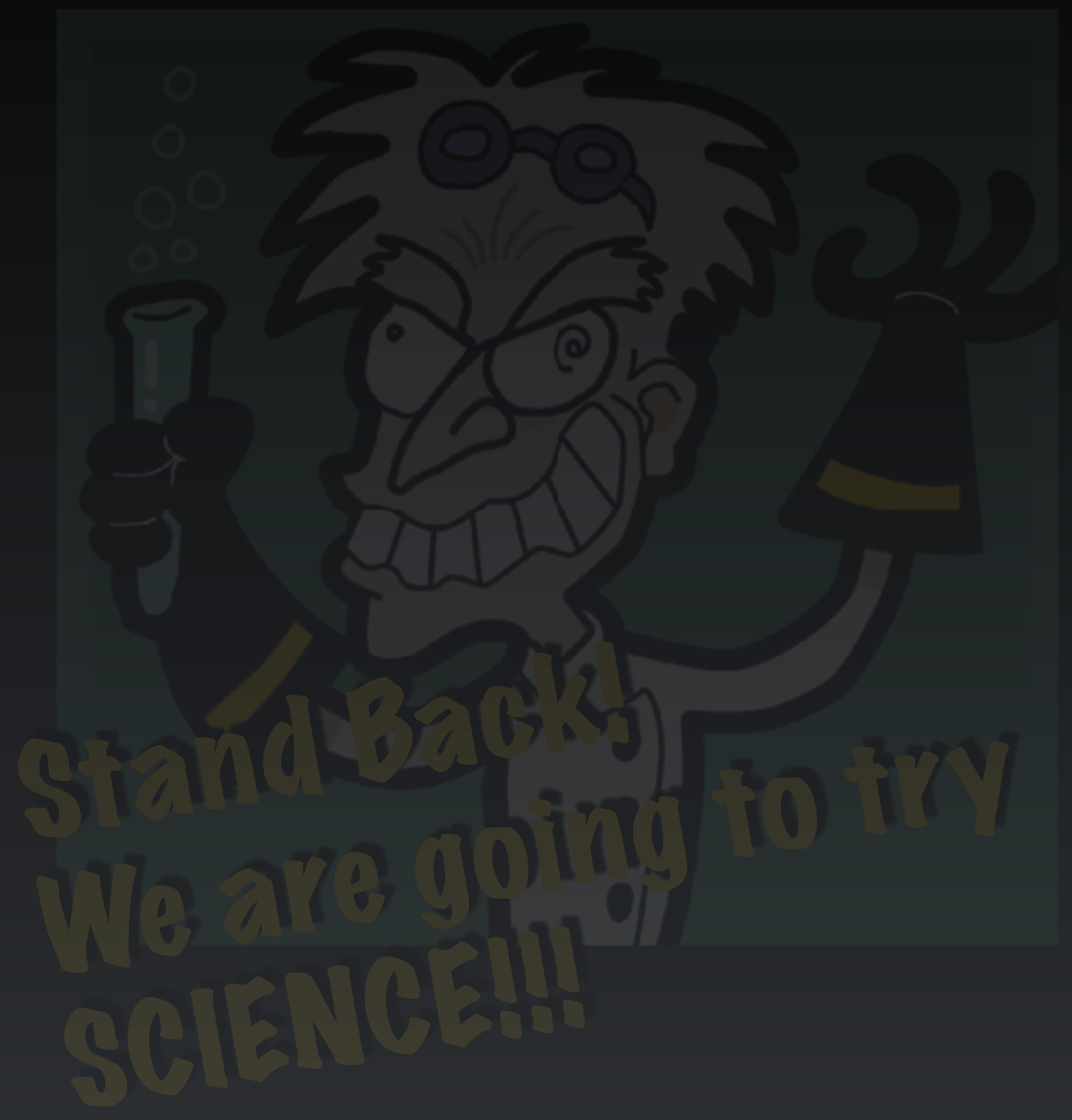
Being Empirical Matters

- We can never be certain of success

Being Empirical Matters

- We can never be certain of success
- Progress only comes when we risk failure



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Being Empirical Matters

- We can never be certain of success
- Progress only comes when we risk failure
- We learn most when reality does NOT match our predictions

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Being Empirical Matters

- We can never be certain of success
- Progress only comes when we risk failure
- We learn most when reality does NOT match our predictions
- Production will ALWAYS surprise us

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Being Empirical Matters

- We can never be certain of success
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- We learn most when reality does NOT match our predictions
- Production will ALWAYS surprise us
- …and it should!

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Being Empirical Matters

- We can never be certain of success
- Progress only comes when we risk failure
- We learn most when reality does NOT match our predictions
- Production will ALWAYS surprise us
- …and it should!
- ***All of our design choices, all of our coding efforts all of our tests are only…***

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Being Empirical Matters

- We can never be certain of success
- Progress only comes when w ri r
- W a t w e es NOT match our pr t r
- Production will ALWAYS s
- s !

All of our design choices, all of our coding efforts all of our tests are only…

“Our best theory to explain things so far”

Fundamentals of an ‘Engineering’ Approach

- Iterative
- Employs Feedback
- Incremental
- Experimental
- Empirical

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Continuous Delivery as an Engineering Discipline

- Iterative
- Employs Feedback
- Incremental
- Experimental
- Empirical

Continuous Delivery ltd

Continuous Delivery as an Engineering Discipline

- Iterative ✓
- Employs Feedback
- Incremental
- Experimental
- Empirical

Continuous Delivery as an Engineering Discipline

- Iterative ✓
- Employs Feedback ✓
- Incremental
- Experimental
- Empirical

Continuous Delivery ltd

Continuous Delivery as an Engineering Discipline

- Iterative ✓
- Employs Feedback ✓
- Incremental ✓
- Experimental
- Empirical

Continuous Delivery as an Engineering Discipline

- Iterative ✓
- Employs Feedback ✓
- Incremental ✓
- Experimental ✓
- Empirical

Continuous Delivery ltd

Continuous Delivery as an Engineering Discipline

- Iterative ✓
- Employs Feedback ✓
- Incremental ✓
- Experimental ✓
- Empirical ✓

Continuous Delivery as an Engineering Discipline

- Short Feedback Cycles
- Test Driven Development
- Automation
- Hypothesis Driven
- Tests as a Falsification Mechanism

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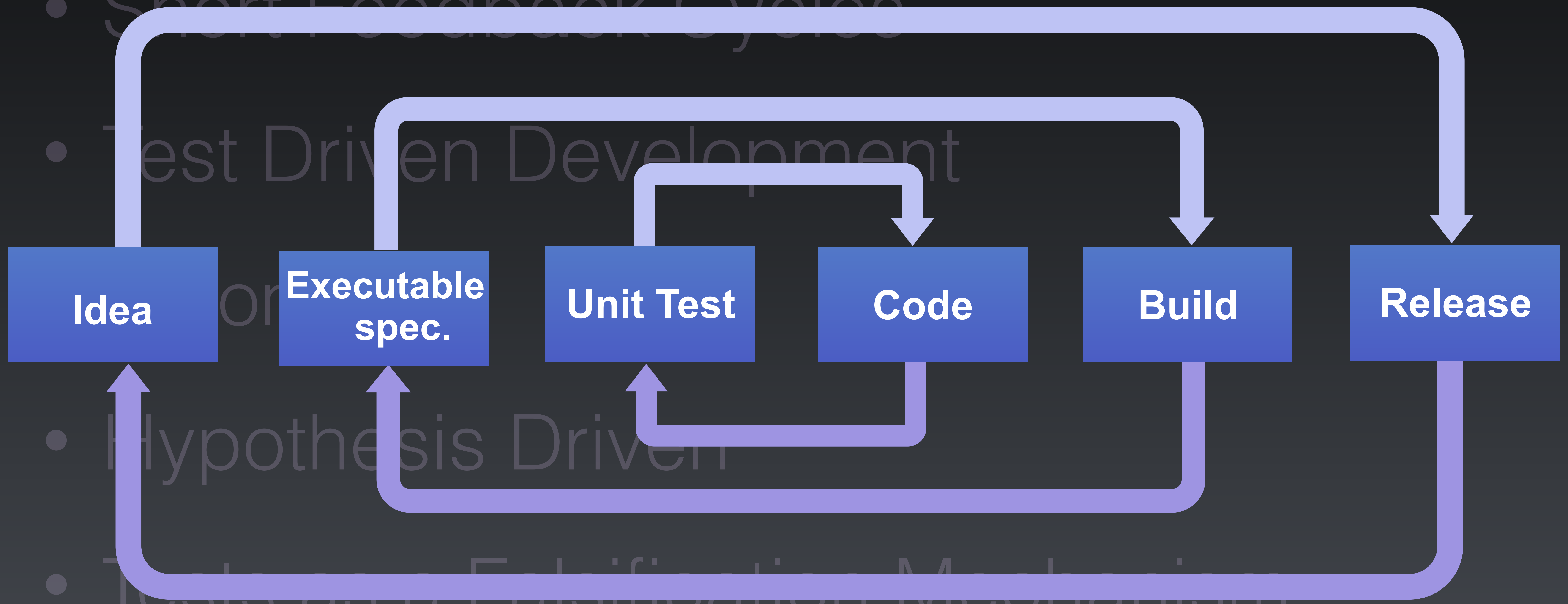
Continuous Delivery as an Engineering Discipline

- Short Feedback Cycles
- Test Driven Development
- Hypothesis Driven
- Tests as a Falsification Mechanism



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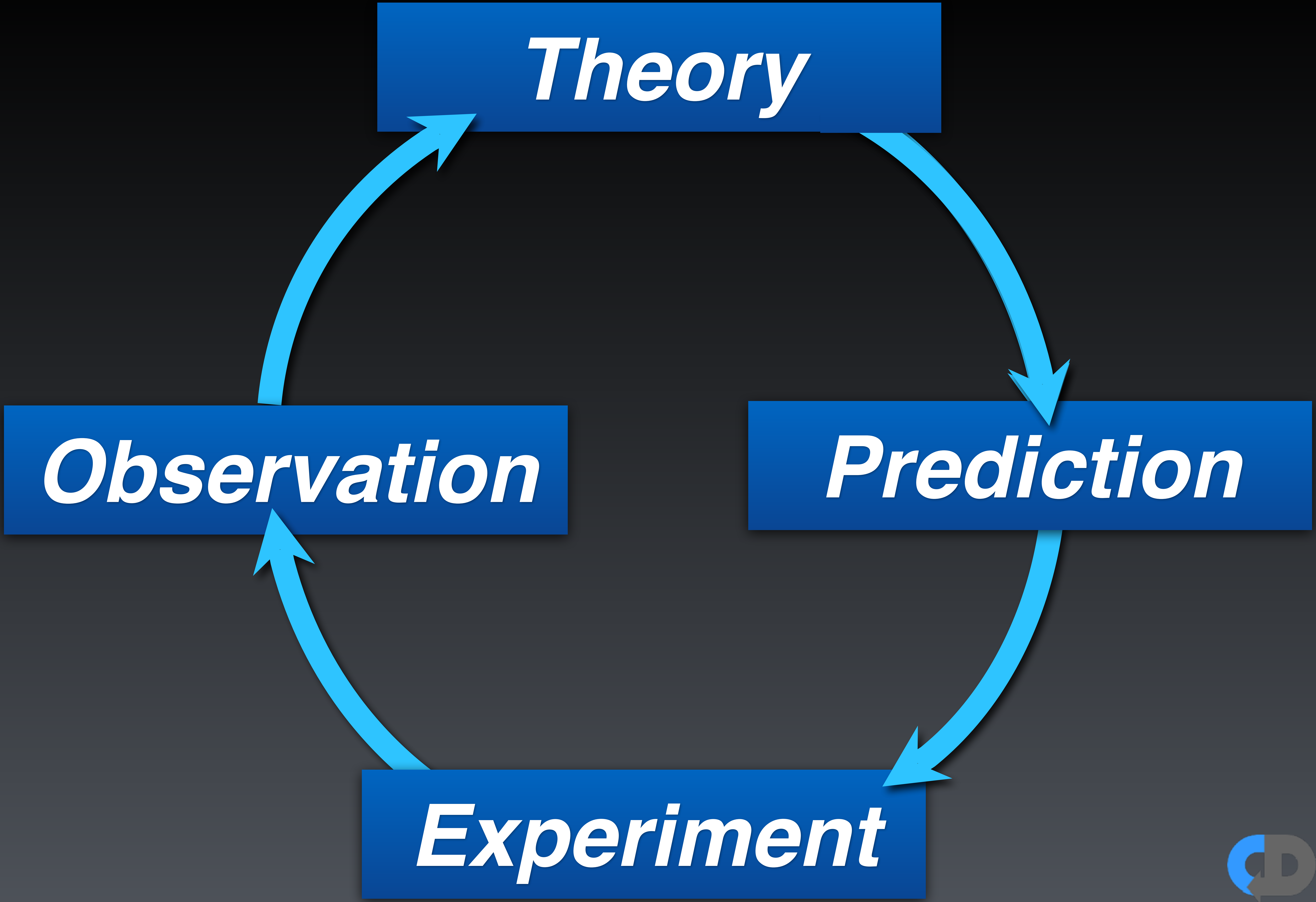

Theory
Prediction
Experiment
Observation

A Software Engineering Discipline

Design

Develop

Test

Release

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A Software Engineering Discipline

Design

Develop

Test

Release

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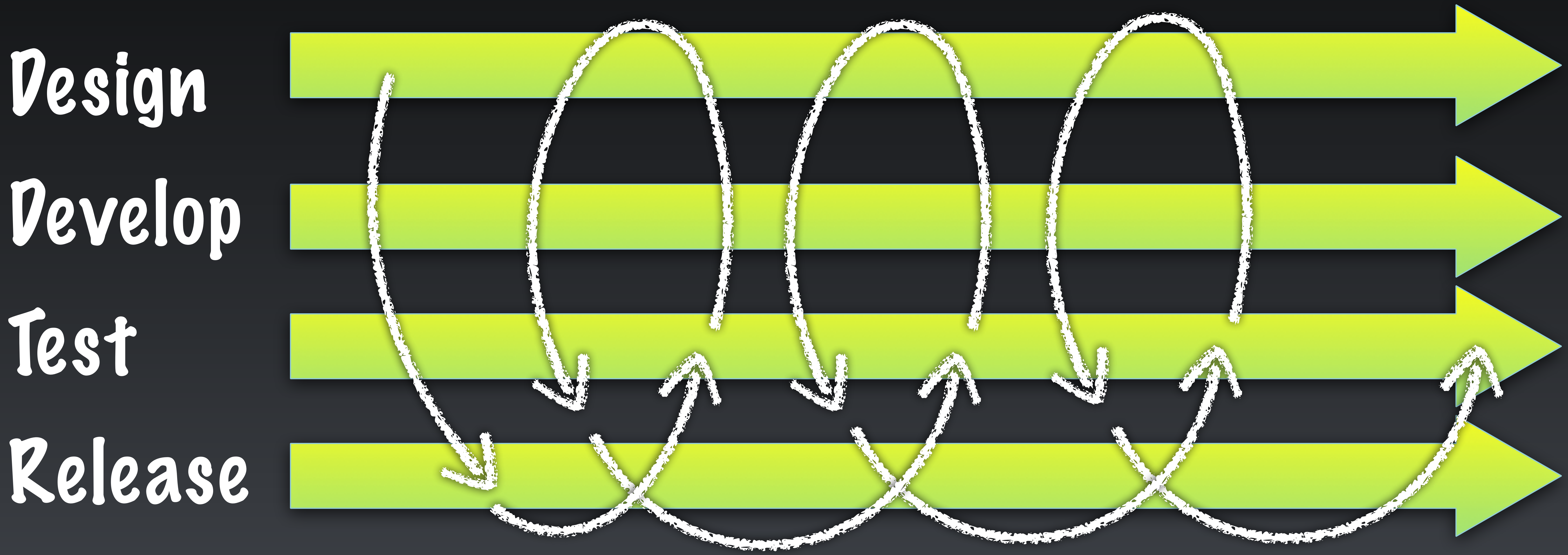

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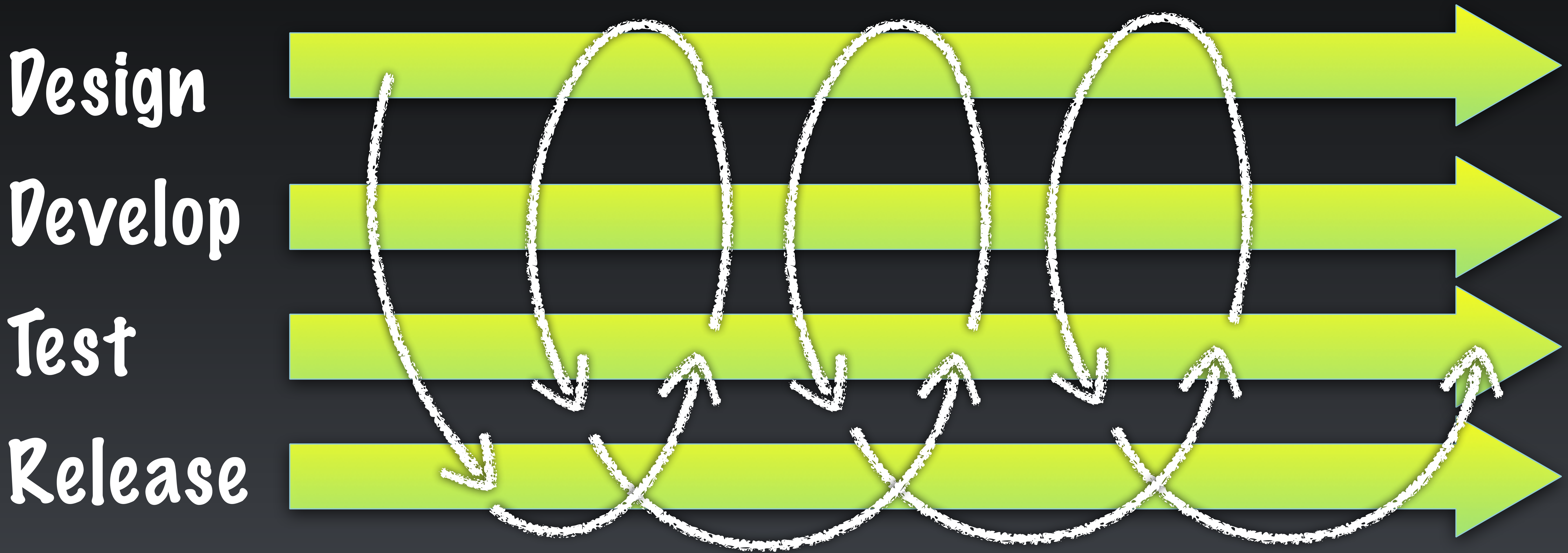

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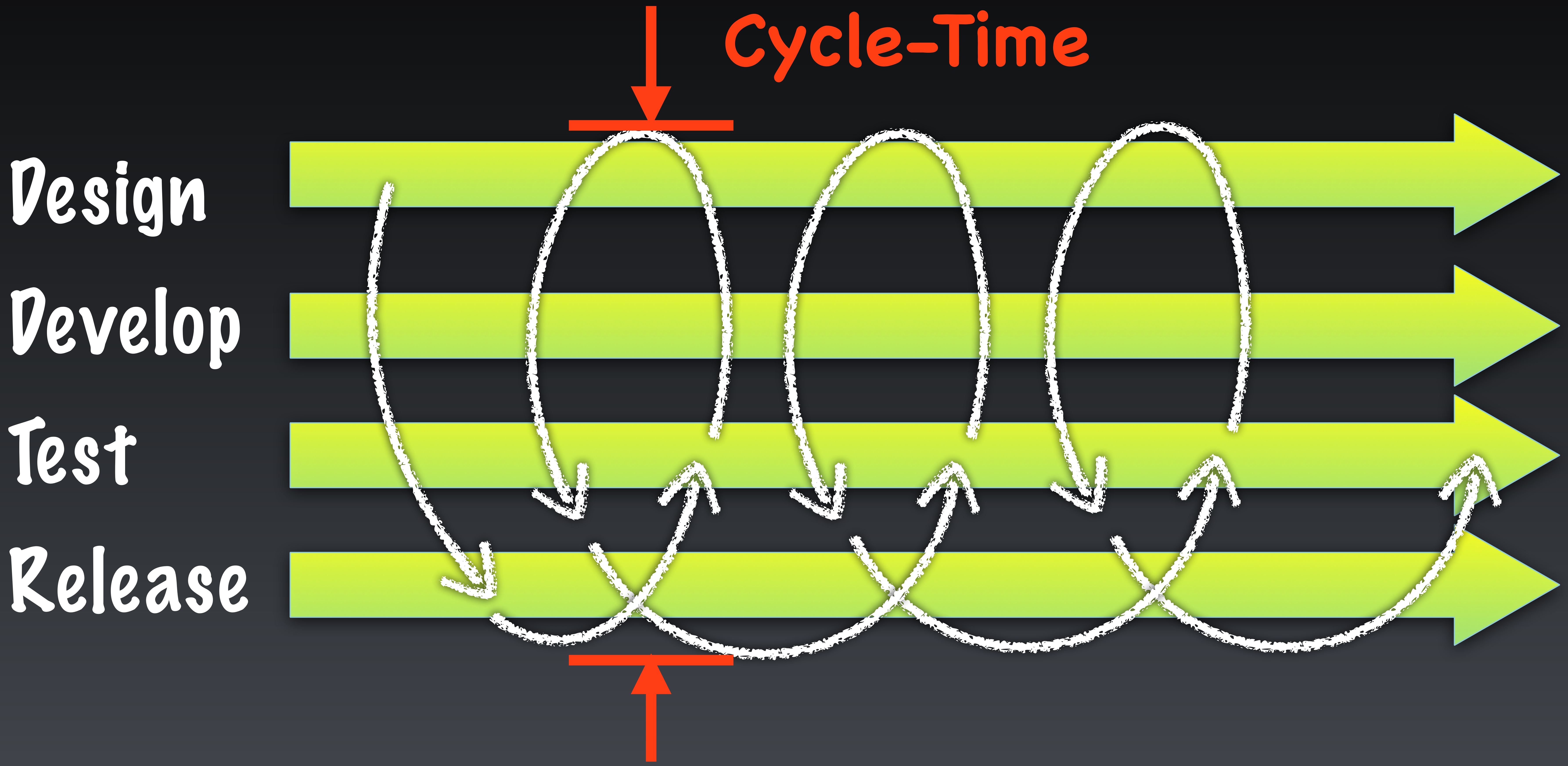

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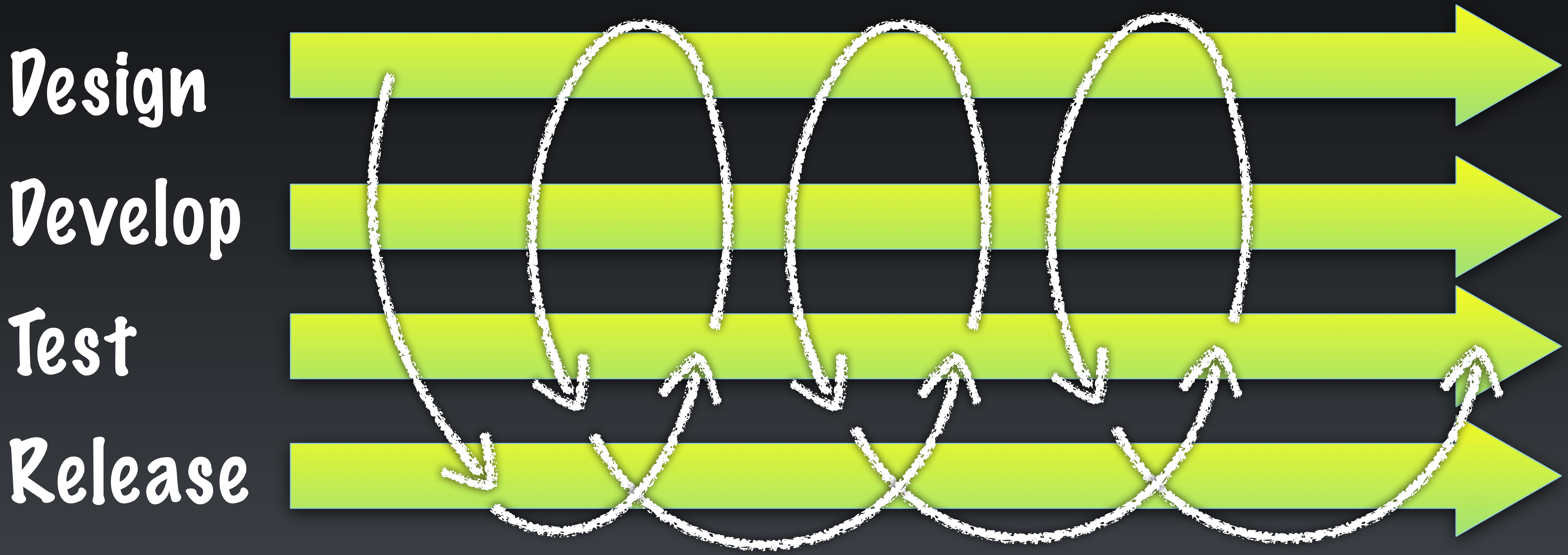

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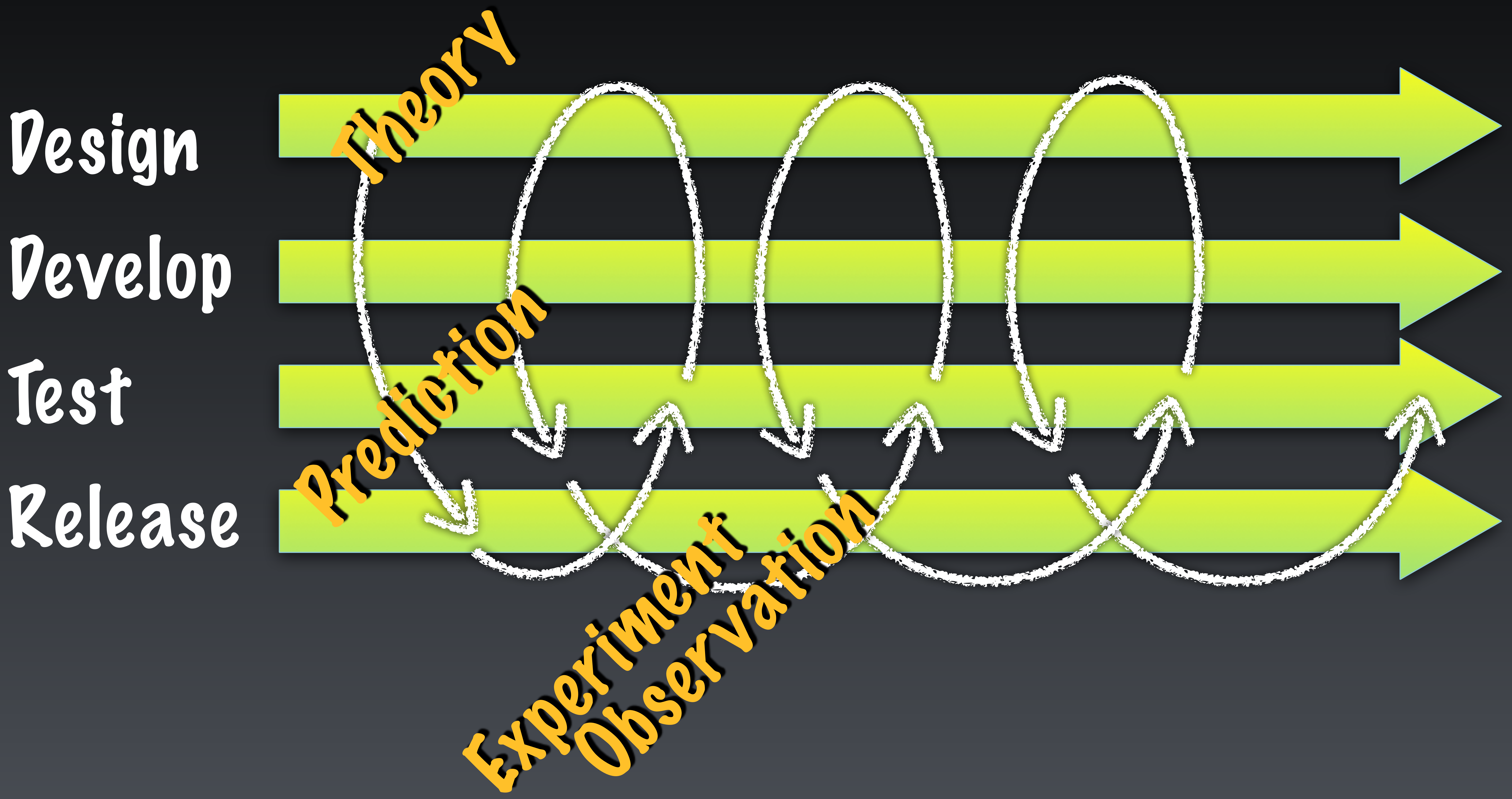

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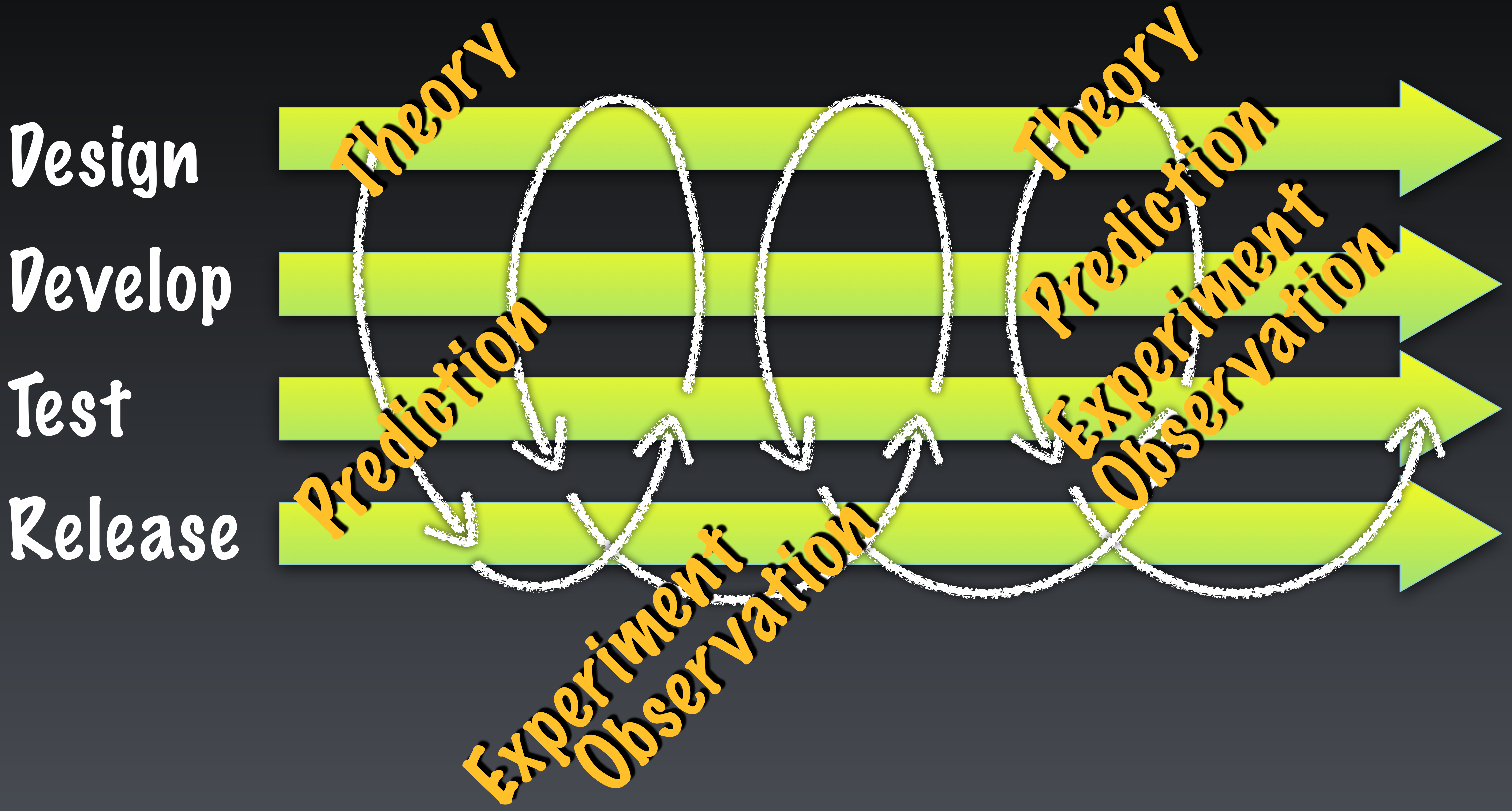

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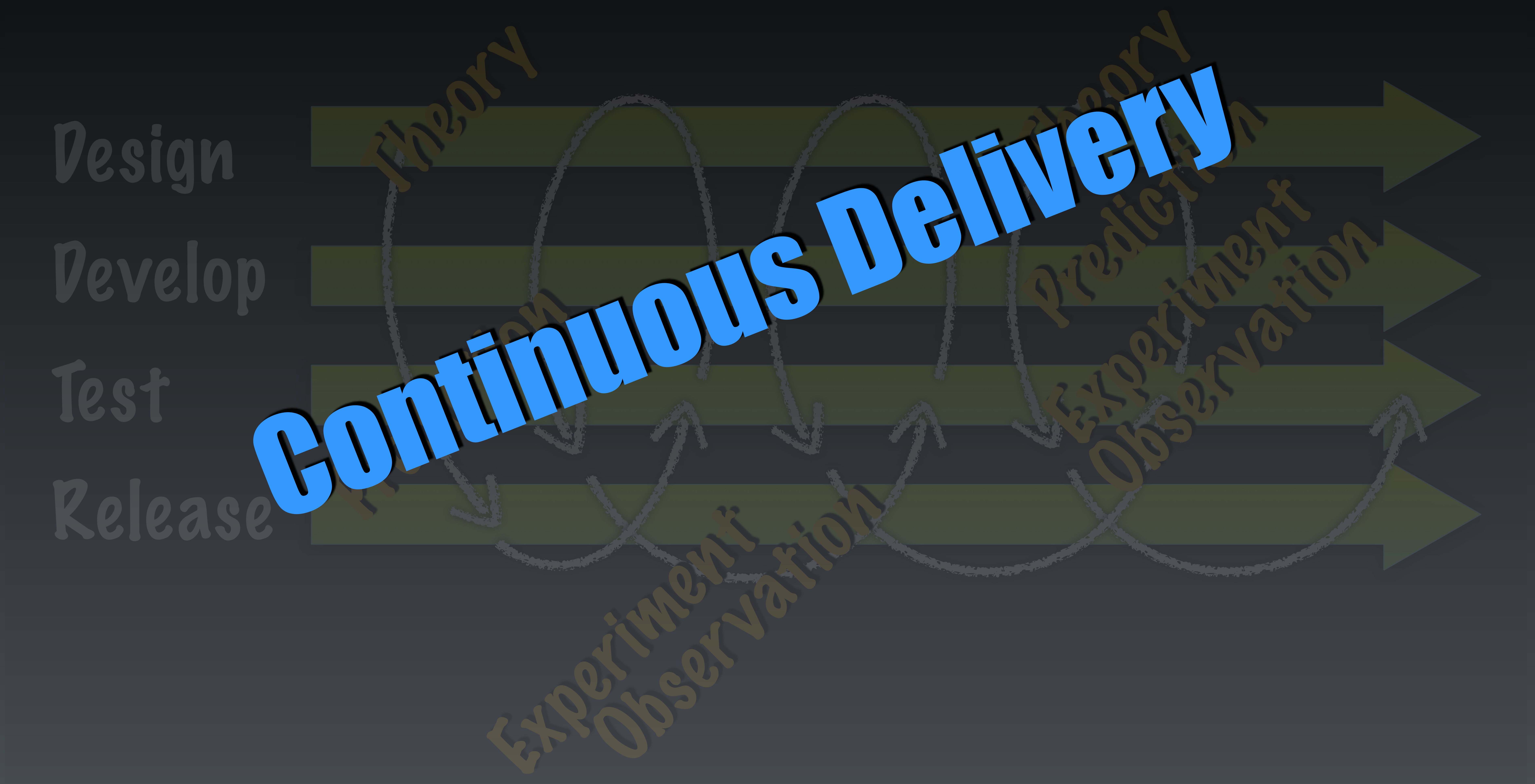

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Craftsmanship is a Good Thing!

- Skill
- Creativity
- Freedom to Innovate
- Apprentice Schemes

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Craftsmanship is a Good Thing!

- Skill ✓
- Creativity ✓
- Freedom to Innovate ✓
- Apprentice Schemes ✓

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Engineering is a Good Thing!

- Skill ✓
- Creativity ✓
- Freedom to Innovate ✓
- Apprentice Schemes ✓

Engineering Adds to Craft

Engineering Adds to Craft

- Improves Repeatability

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Engineering Adds to Craft

- Improves Repeatability
- Provides Guidance and Structure

Engineering Adds to Craft

- Improves Repeatability
- Provides Guidance and Structure
- Improves Quality

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Engineering Adds to Craft

- Improves Repeatability
- Provides Guidance and Structure
- Improves Quality
- Improves Efficiency

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Engineering Adds to Craft

- Improves Repeatability
- Provides Guidance and Structure
- Improves Quality
- Improves Efficiency
- Gives us an approach to solving problems when we are stuck!

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Don’t be “like” Engineers

Be Engineers!

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Q&A

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http://www.continuous-delivery.co.uk

Dave Farley

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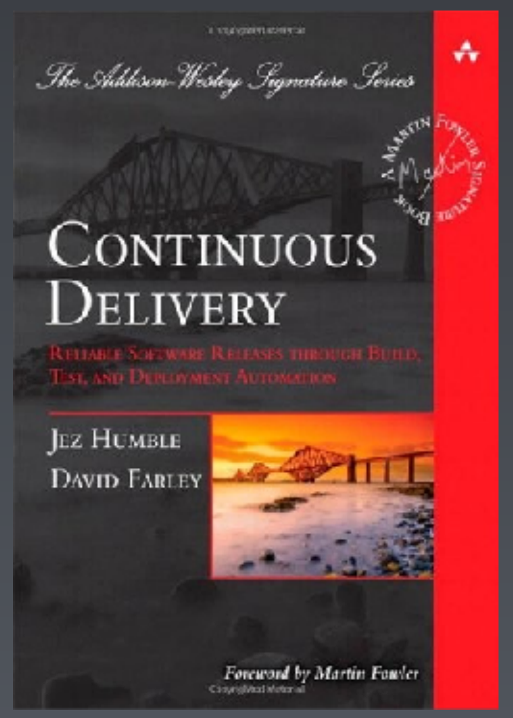
@davefarley77



The Addison-Wesley Signature Series

A Martin Fowler Signature Book

CONTINUOUS DELIVERY

RELIABLE SOFTWARE RELEASES THROUGH BUILD, TEST, AND DEPLOYMENT AUTOMATION

JEZ HUMBLE

DAVID FARLEY

Foreword by Martin Fowler

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