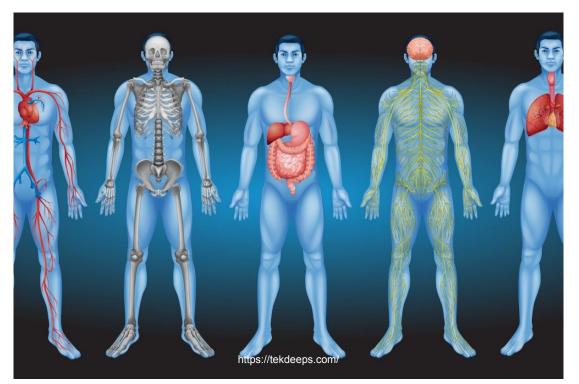# Software is a living organism

by Francesco Toscano

A Living Organism is a System of Systems
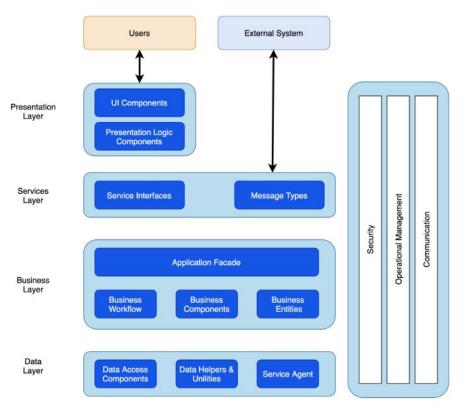
- i.e. Human "system"
    - circulatory system
    - scheletal system
    - muscolar system
    - respiratory system
    - gastrointestinal system
    - visual apparatus
    - locomotor system
    - lymphatic system
    - immune system
    - reproductive system
    - nervous system
    - ...

https://tekdeeps.com/

A Software is a System of Systems

- Design System
- Architecture System
- Persistence Layer
- Presentation Layer
- Business Logic

3

Software and Human Body Similitudes

- has a life cycle
    - birth, growth, aging, and....
- responsiveness to the environment
    - kind of intelligence
    - has behavior
- growth and change
    - supercompensation
- surprising, unpredictable
- smells
- need cares

What about us (developers)

everything is easier if
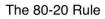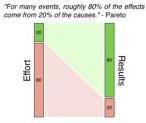we consider software a
living organism

The approach

- Smells & Object Chalistenics rules
- TDD & Refactoring strategies
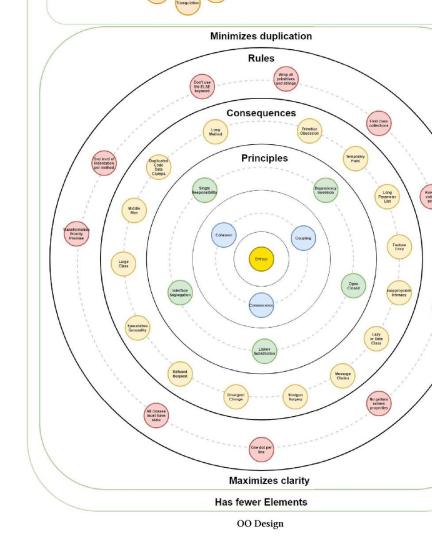- SOLID principles
- more Cohesion, less Coupling

THE PARETO PRINCIPLE

The 80-20 Rule

"For many events, roughly 80% of the effects come from 20% of the causes." - Pareto

20% of **actions** will account for **80%** of **results**.

Therefore 20% of the effort produces 80% of the results but the last 20% of the results consumes 80% of the effort.

OO Design

When the Software get sick (1)

You understands it by the **smell** it gives off.
It is a **symptom**.

You look for a **diagnosis**

You choose a **therapy**

When the Software get sick (2)

Symptom

- "Large Class" (<50 lines and 1 responsibility)
- "Long Parameter List" (<2 acceptable, 3 debatable, >3 need special justification)
- "Primitive Obsession" (don't use primitive types as substitutes for class)
- "Comments"

Diagnosis

1. Single-responsibility principle *violation*
2. Coupling violation (high degree of interdependence)
3. Connascence not optimized

When the Software get sick (the cure)

TDD is the Way

- Red, Green, Refactor it

Refactoring is the Therapy

- first **Readability**
    - rename, format, reorder, remove unnecessary
- then **Design**
    - extract method, encapsulate, remove duplication
- when it's hard use **Parallel change strategy**

THANK YOU

Resources

https://osmancelik.medium.com/software-is-a-living-organism-acb840747bd4

https://en.wikipedia.org/wiki/System

https://en.wikipedia.org/wiki/Systems_theory

Agile Technical Practices Distilled
A journey Toward Mastering Software Design
Pedro Moreira Santos, Marco Consolaro, Alessandro di Gioia

About me

Francesco Toscano, born in Bellinzona (TI - Switzerland) in 1977

15 year at [Ente Ospedaliero Cantonale](#) as software developer, then product owner and team leader.

email: ftoscano.ch@gmail.com
twitter: @frtosc