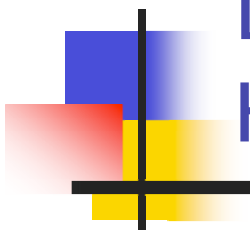
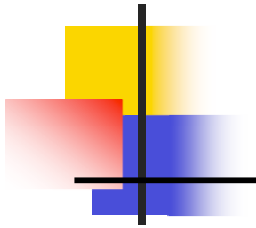


Object Orientation, Domain Driven Design, and the Honour of the Programmers' Guild

Dan Bergh Johnsson

Partner and Spokesperson

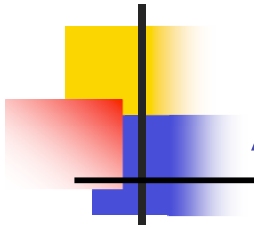
Omegapoint AB, Sweden



<soapbox>

Ingredients: thoughts(60%), ideas(25%), code(16%), hand-waving(10%), morals(4%), history(3%)

Warning: this presentation may contain traces of philosophy



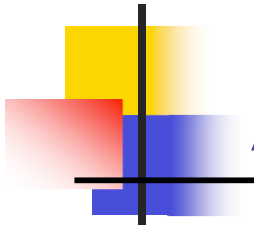
Abstract / Conclusions / Agenda

What has Happened to Object Orientation?
Object Orientation Requires Refactoring

Is Domain Driven Design any Good?
Domain Driven Design is Good

Do we have Moral Responsibility?
We Have Moral Responsibility

Is there Hope?
There is Hope



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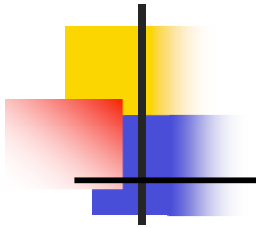
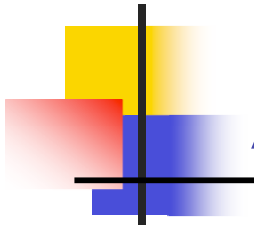
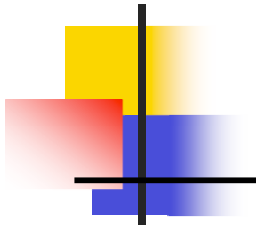


Programs as Simulations



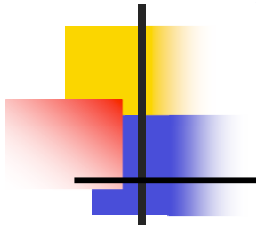
All programs are simulations

- Simulate reality
  - Aerodynamic flow
  - Diffusion processes
  - Heat conduction
- Simulate what would have happened
  - System is big black box
  - Input/output as in reality
  - Model of reality living in the box



Standard example: Bank

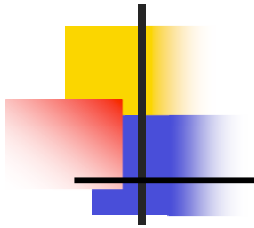
- Yore:
  - Clerk wrote in leather-bound ledger
- Now:
  - In/out registered in banking system



Simulation – Maid Milking Cow

```
class Maid {
  void milk(Cow c, Bucket b) {
    c.decreaseMilk(2);
    b.fill(2);
    c.feelAtEase();
  }
}
```

```
class Cow {
  void decreaseMilk(...) {
    ...
    }
  void feelAtEase() {
    ...
    }
}
```

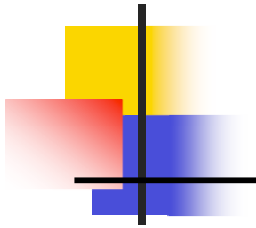


Cows Milk Themselves!

```
class Maid {
  void milk(Cow c, Bucket b) {
    c.milk(2);
    b.fill(2);
  }
}
```

```
class Cow {
  void milk(int amt) {
    decreaseMilk(amt);
    feelAtEase();
  }
  void decreaseMilk(...) { ... }
  void feelAtEase() { ... }
}
```

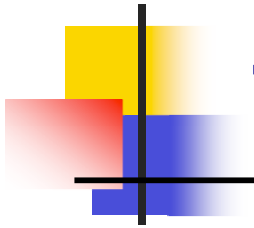
Simulation?



Simulations in Toon-World

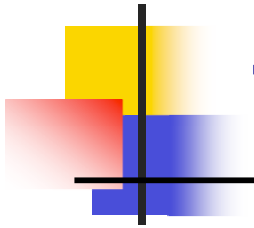
- “Inanimate” objects
- Stoves that cook
- Tables that set themselves
- Shopping carts keeping track of sum

Code & Meaning

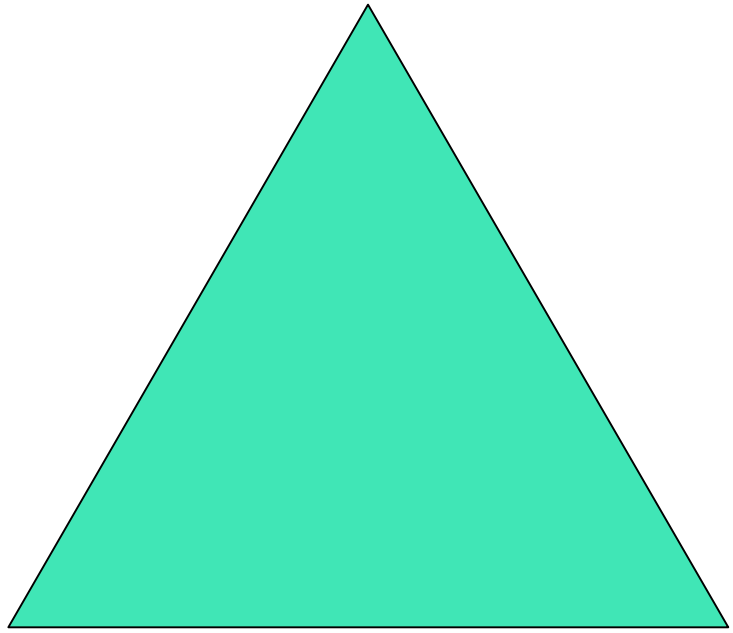


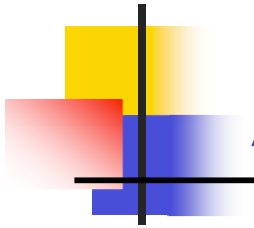
The Meaning of Code

- f(x) return x*x;
- 0: dload_1
  1: dload_1
  2: dmul
  3: dreturn
- f :(x)->x^2 in R->R
- amount of energy in two-kilo mass at given speed



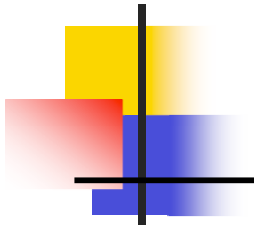
Triangle of Meaning





Abstraction = simple

- "Abstrakt" part of organ
- Abstraction
  - Select relevant properties
  - Discard irrelevant properties
  - Simplification
- Mathematical model of complicated reality
  - How to chose our abstractions?



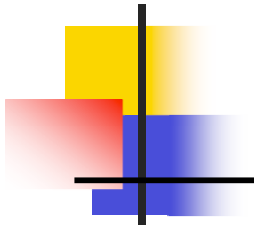
Code that: Do *vs* Mean

- Code that *do* something

```
List<Trans> translist
translist.add( ... )
for ( ... : translist)
        sum+=
```

- Code that *mean* something

```
Ledger transledger
transledger.add(...)
transledger.getTotal()

class Ledger
        List translist
        ...
```

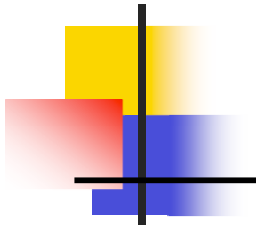


Limited value of Collection<E>

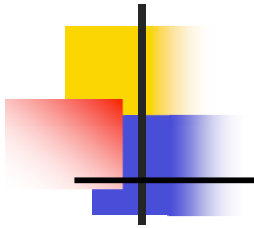
```
interface AccountingService {
  List<Transaction> monthlyCompilation(Month month);
}
for(Transaction t : accServ.monthlyCompilation(JUNE)) {
   ... // compute balance-compensated risk level
}
```

VS

```
interface AccountingService {
 Ledger monthlyCompilation(Month month);
}
Ledger juneLedger = accServ.monthlyCompilation(JUNE));
... = juneLedger.balanceCompensatedRiskLevel();
```

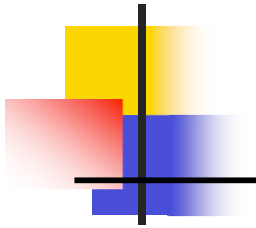


OO Failure Debrief



Object Orientation Promise

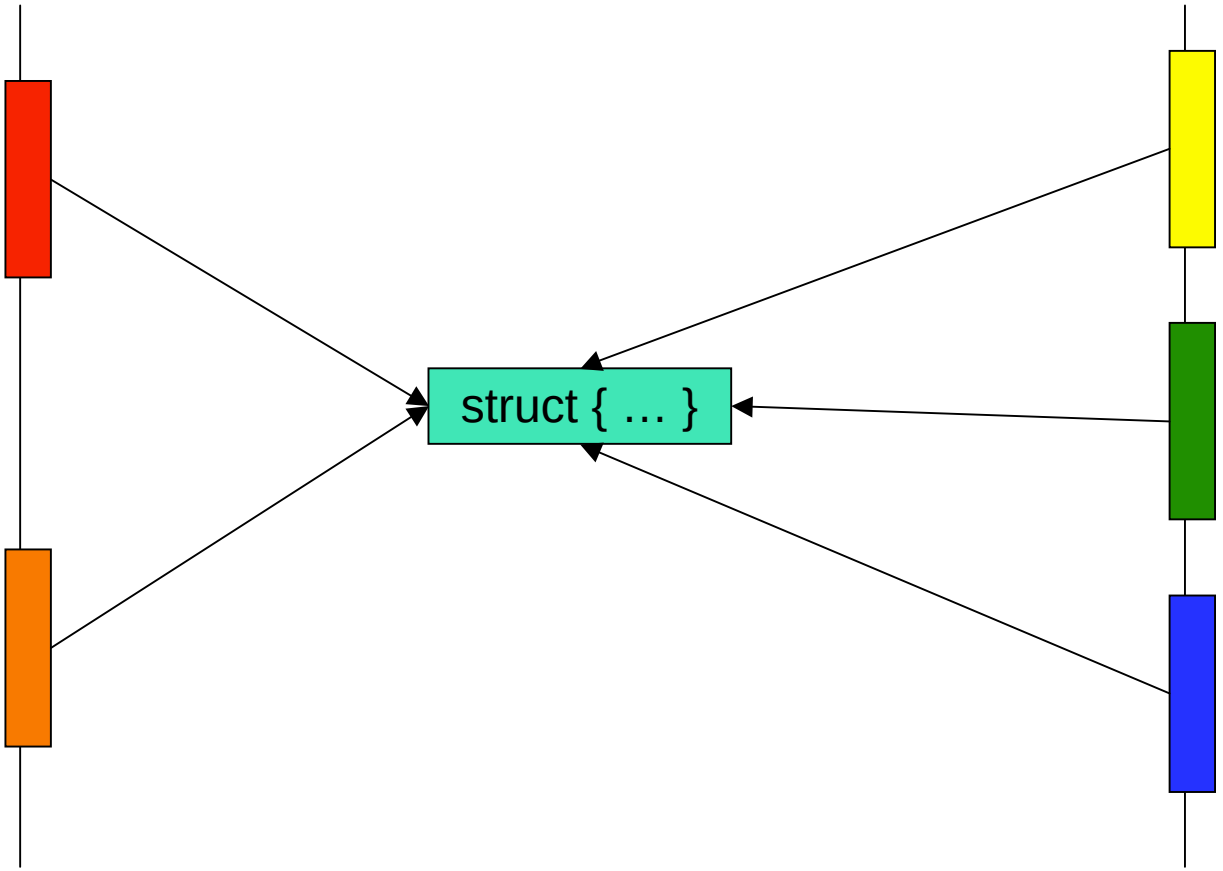
- REUSE
- Fulfilled in everyday life?
- Why this promise?



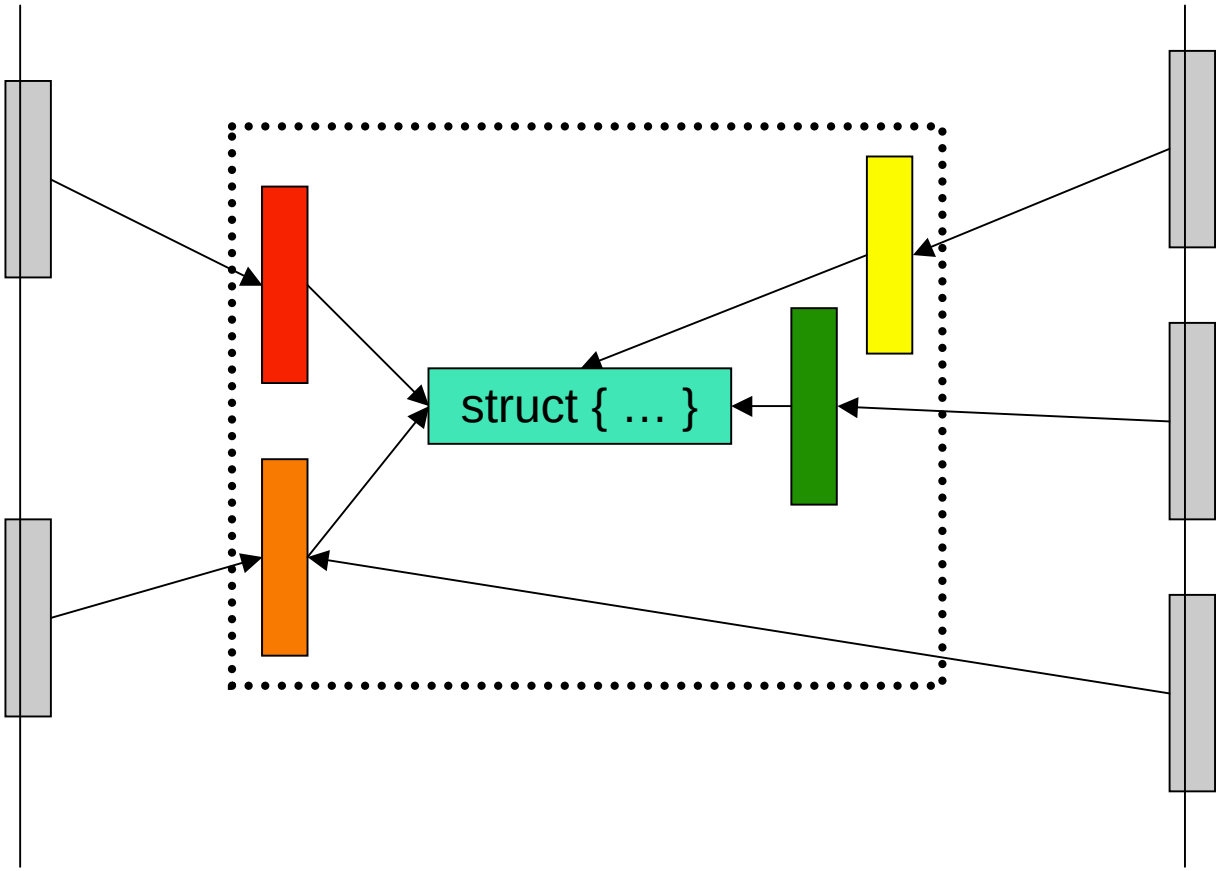
Is OO New?

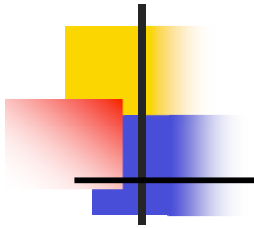
- 30 years
- Yet older ideas
- Should be well understood
- Should be well practiced
- Still not fulfilled promise

OO is Old Stuff



OO is Old Stuff

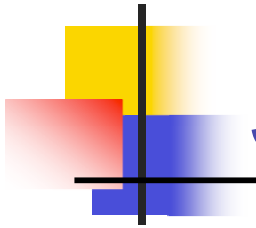




OO is Completely New

- Thomas of Aquino
- Reformed theology
- God – the puppet master
  - God guides the fox on hunt of the rabbit
- God – the clockmaker
  - God embeds the will of hunting into the fox

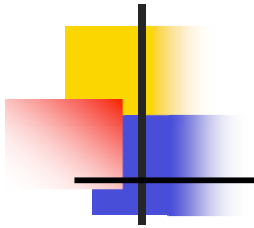
- Object Orientation is new way of thinking



Java is not Object Oriented

- Object Orientation property of Application

- How close is behaviour to data?



Encapsulate Interpretation

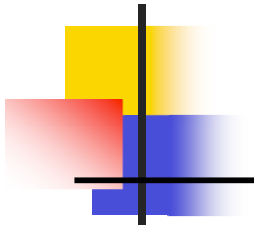
- You reuse what you encapsulate
- Encapsulating data is uninteresting
- Encapsulating interpretation is crucial
- Get/set considered harmful

```
acc.setBal(acc.getBal() - amt)
```

```
acc.bal = acc.bal - amt
```

```
void decBal(amt)
    bal = bal - amt
```

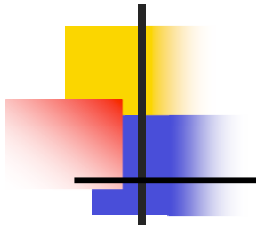
```
void decBal(amt)
    check(amt <= bal)
    bal = bal - amt
```



Encaspulate data *vs* interpretation

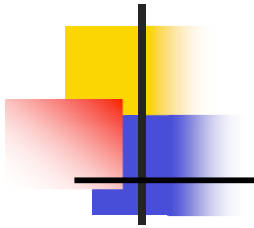
```
class Order {
    private String ordernr;
    String getOrdernr(){
        return ordernr;
    }
    void setOrdernr(String ordernr) {
        this.ordernr = ordernr;
    }

}


Order order = ...
order.setOrdernr(fromGui.getText())
```

```
class Order {
    public Ordernr ordernr;

}

class Ordernr {
    private String nr;
    OrderNr(String nr) {
        check(nr);
        this.nr = nr;
    }
}

Order order = ...
order.ordernr = new
    Ordernu(fromGui.getText());
```



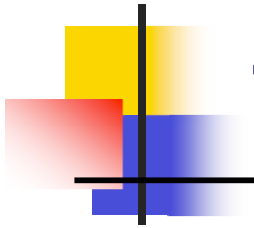
Encapsulation

- Encapsulated interpretation enforce consistency
- Consistency wrt set of interpretation rules
- Model = defined abstractions = interpretation rules



How to get to Toon-World?

- Perfect design before coding
- No code added unless design revised
- Perfect knowledge of the code base
- ...
- Yeah!



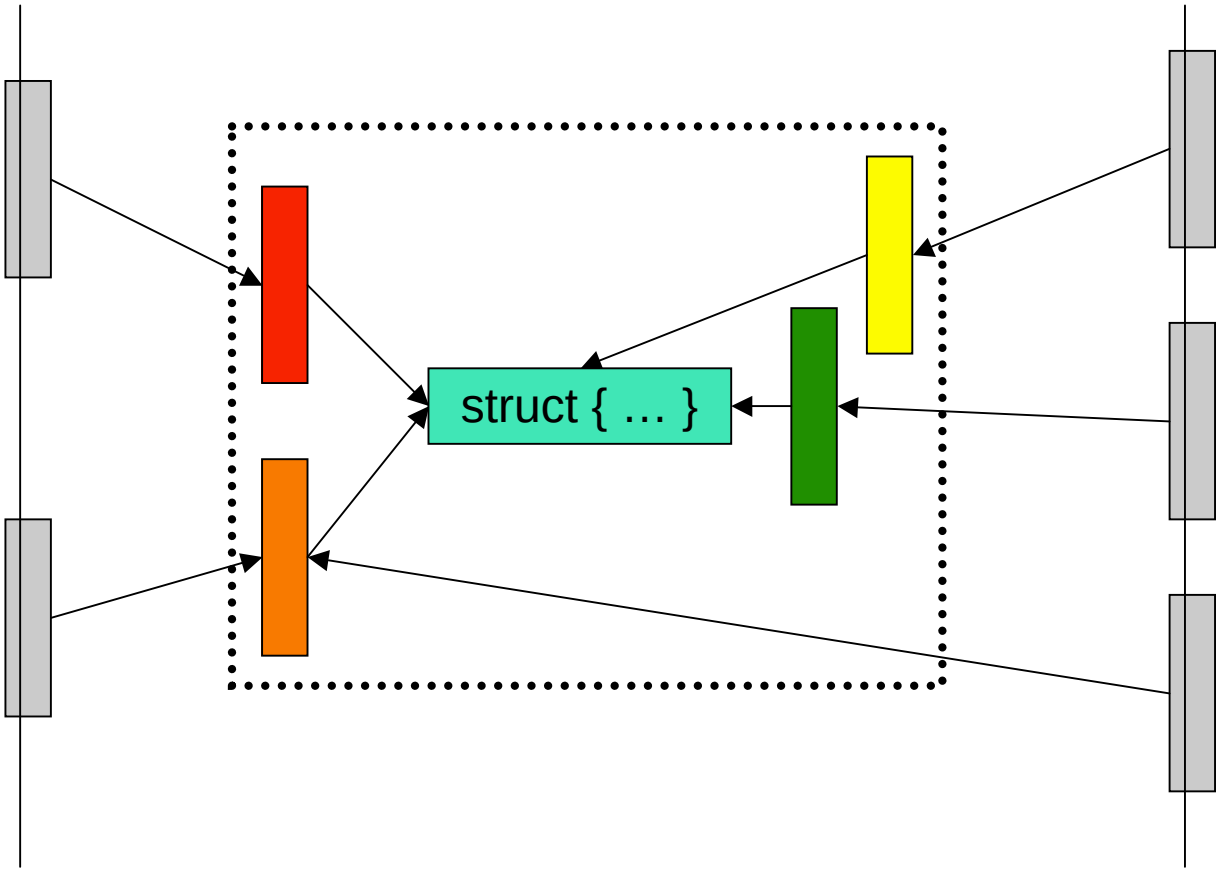
Time Factor

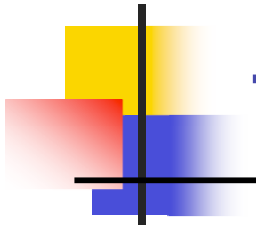
- All the code not written at same occasion

- Incremental development
- Development / maintenance
- Large code

- New code in right place?
- Cannot trust all the people all the time

Data is Gravity for Behaviour – Design “Falls” into Place

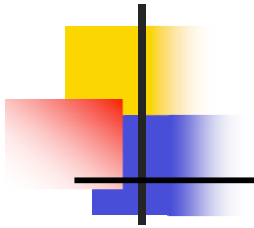




Two Waves of Development

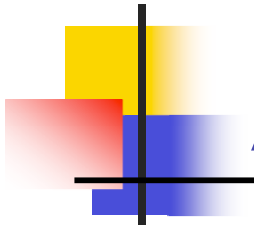
- Development wave front
- Consolidation wave front

- Too far apart – technical debt
- Too close – analysis paralysis



Role of Refactoring

- Refactoring essential to Object Orientation
- Essential =
  - Necessary condition
  - Cannot do without
  - Meaningless if missing
  - ...



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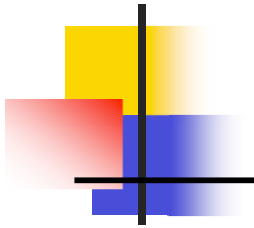
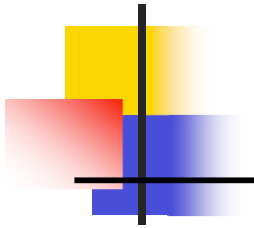
Domain Driven Design



Domain Driven Design

- OO tells us to use objects
- DDD tells us which objects to use

- Basic idea: structure the code after the domain
  - Domain examples: patient journals, packet transportation
  - **Solution expressed in the terminology of the problem**
- Realisation: classes for all concepts



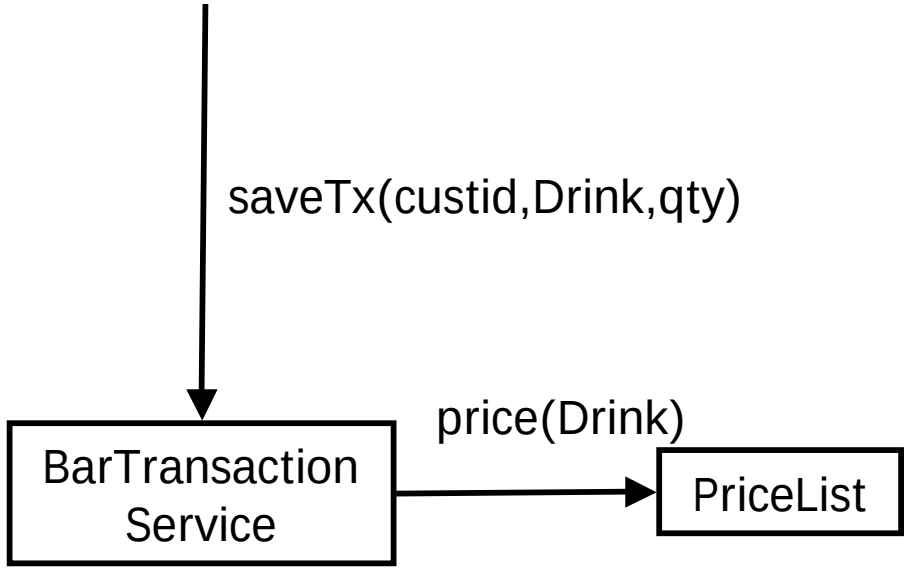
Example: Night at a Bar, functions

- open a tab
- order drinks
- drink price calculation
- credit / credit check
- paying tab

- one tab at a time

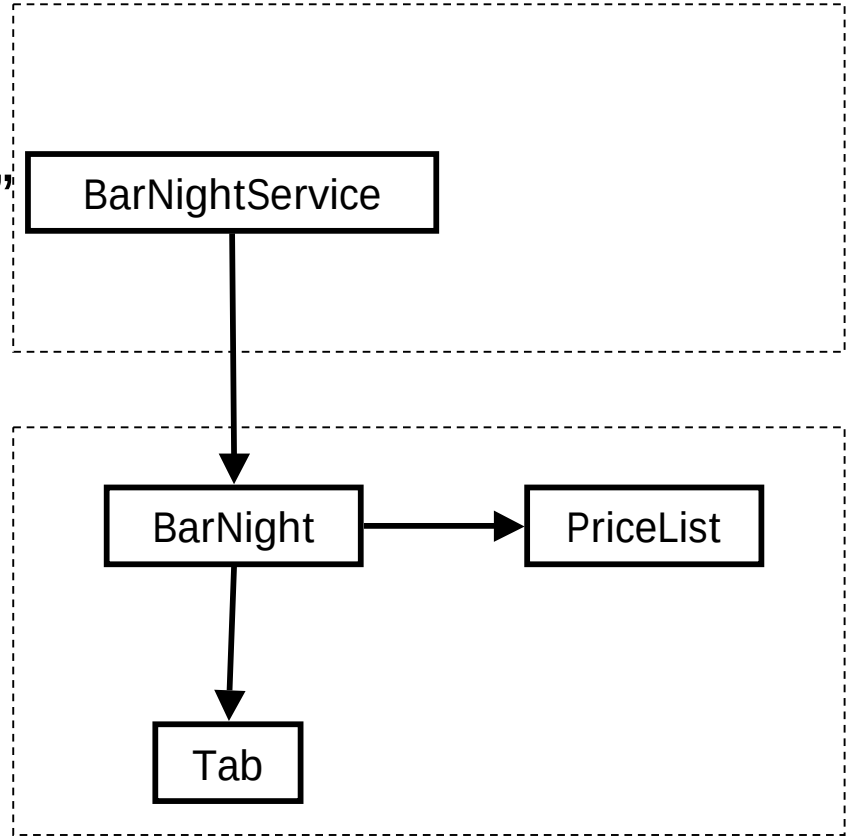
Non-DDD solution

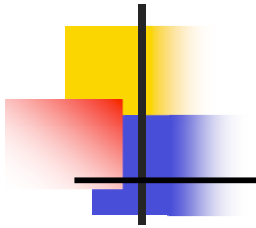
- Component for saving "bar transactions"
  1. Loads record (db/cache)
  2. Make computations
  3. Checks conditions
  4. Updates record
  5. Saves record
- Domain insight
- ***Implicit*** encoding



DDD solution

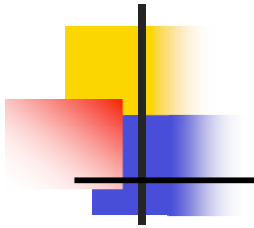
- Component representing “bar night”
  - Holds object graph
  - Delegated state
  - Delegated computation/checks
- Domain insight
- ***Explicit*** encoding





DDD advantages

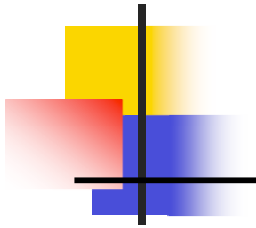
- Explicit and shared understanding
  - "Glossary on steroids"
  - Ubiquitous Language
  - Problem Domain API
  - Solution formulated in problem terminology
- High Testability
- Easy to Extend



DDD – when and where

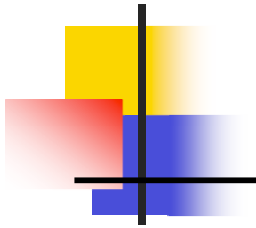
- Focus on the (enterprise) problem to solve
- Good idea if:

  Understanding the problem is the critical complexity
- Counterexamples:
  - Network router (I/O performance)
  - Mobile phone / embedded sensor (memory footprint, power consumption)



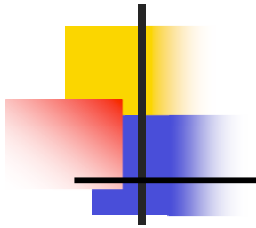
Exercise: DDD good idea?

- User registration at web site
- Transport company collects/delivers packages
- Optimising compiler



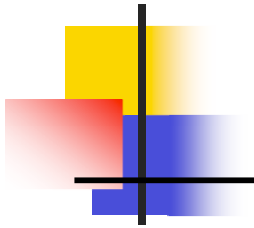
DDD is just OO?

- Modelling beyond “vanilla OO”
- Model as central communication tool
- Models judged by usability



Deep Modelling

- LOTS of focus on investigating domain
- Constant remodelling and refactorings unveils “underlying contours”



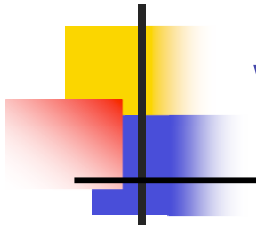
Deep Modelling and "Business Rules"

- V-deals
- H-deals
- "Good" Month

- New legislation
  - V must be matched with H
- Business Rule

- D-deals
- H-deals
- New def of "good"

- Behaviour explained *within* model

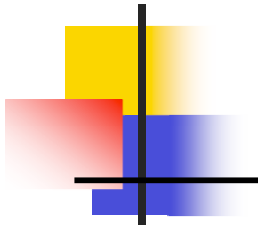


What is DDD about?

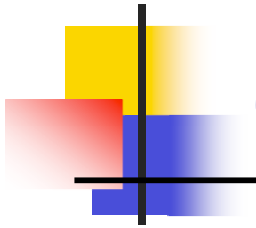
- Tips and tricks about how to structure a program

or

- How we think when programming



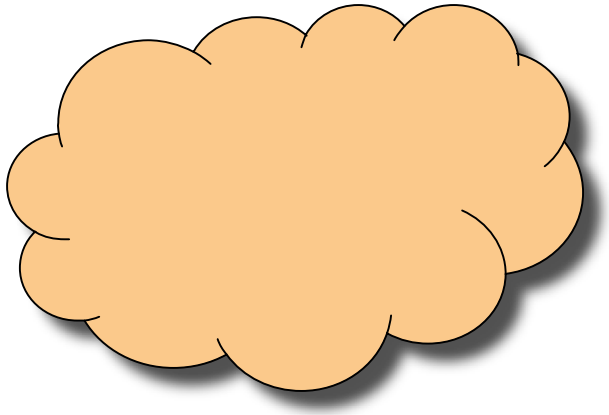
Design as Negotiation



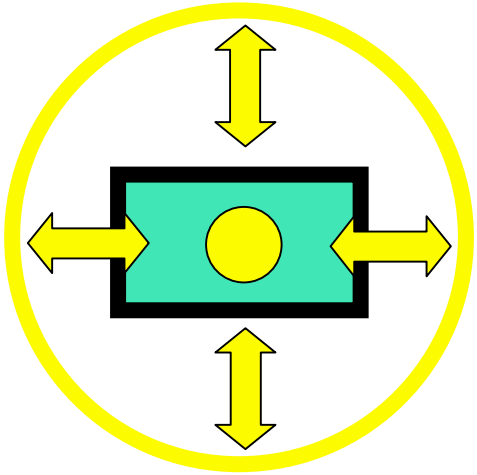
Customer

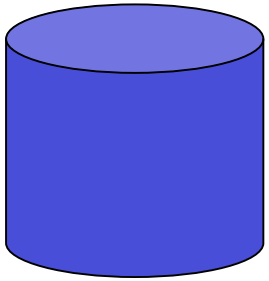
- Customer is always right
- Give the customer what they want

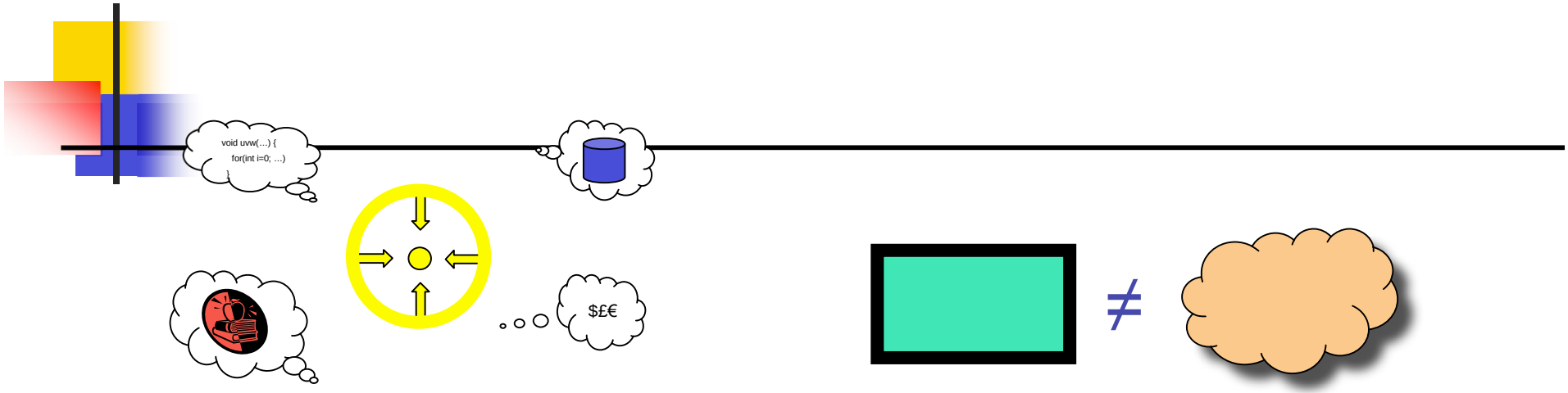
≠

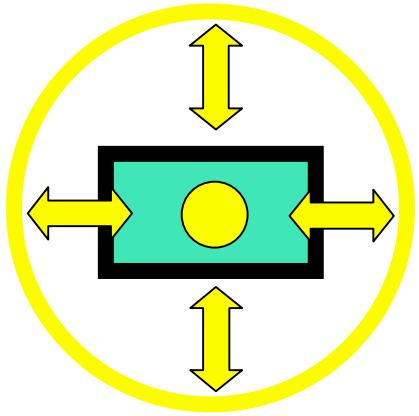


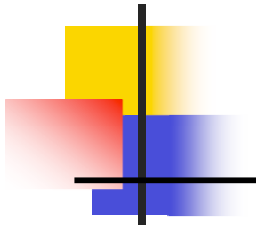
```
class Xyz {
  void uvw(…) {
    for(int i=0; …)
  }
}
```





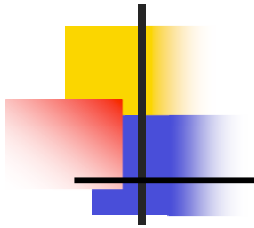






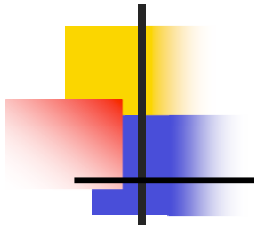
Negotiation Crash Course

- Harvard Negotiation Project
- Position based negotiations
  - *aka* “Haggling”
- Interest based negotiations
  - Identify Interests
  - Invent Options for Mutual Gain
  - Use Objective Criteria



Model is Negotiation Result

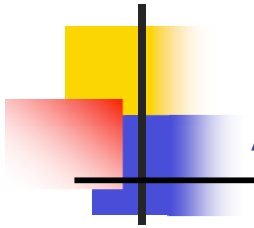
- Joint Project
- Purpose: address all interests
- Common terminology/language



DDD Litterature

- “Domain Driven Design”, Eric Evans
- “Applying DDD and Patterns”, Jimmy Nilsson
- “Domain Driven Design Quickly”, InfoQ

- domaindrivendesign.org



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Is Domain Driven Design any Good?

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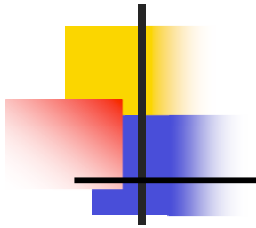
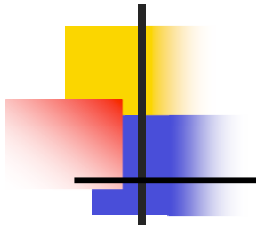
Is there Hope?

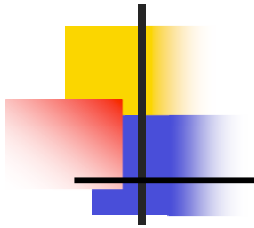


Programming and Programmers in the Great Line of History



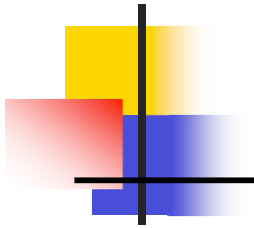
Programmer = sorcerer

- Tools make us stronger
  - Rock on stick = strong arm
- Mechanising dull work
  - Machines reduce physical routine work
- Sorcerer's dream
  - Reduce intellectual routine work
  - Conjure with magical spells
- Power was in silicon stones



Programming is Purely Intellectual

- when we have understood we are finished – only encoding remains
- “understanding the business”
- formulating our ideas unambiguous
- programming as a pedagogical trait

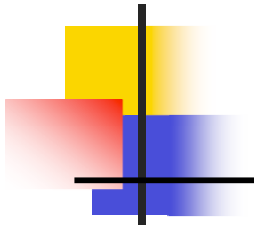


Software Ideas and Code Units

- Valid format of “order number” is ...
- Book-keeping transactions must be balanced
- Cows feel at ease when milked

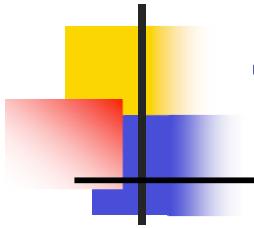
- class Uvw
- voix xyz(...)
- if (...)
- for(...)
- ... = ...

- Unit test document the capture of a software idea in a code unit



Programmer = craftsman

- Craftsmanship, with stains of science and art
- We build machines
  - mechanising intellectual routine work



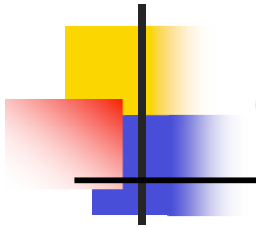
Tricks of the Craft

Large level – slow heartbeat

- Architecture
- Processes

Small level – fast heartbeat

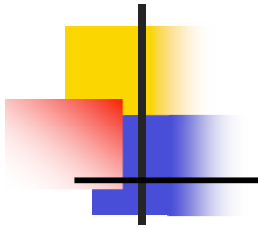
- Test Driven Development
  - red/green/refactor
  - psychology of testing
- Knowing Next Commit
- Speculative and Productive Programming



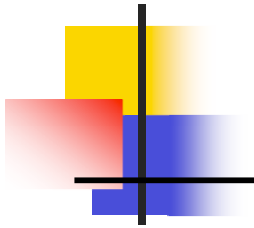
Craftsmanship Honour

Craftsmen

- proud, honourable chaps?
- cheating wranglers?



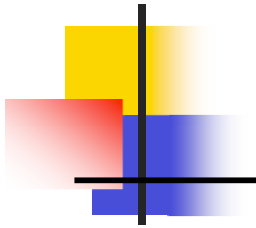
Moral Responsibility



My PL won't let me Refactor

- Argue
- Subvert
- Quit

- ABAQUS (HKS Inc) was created when Dave Hibbit was not allowed to refactor MARC

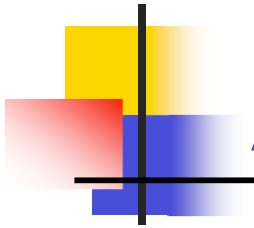


It is not my fault

- Do we believe in what we say?
- Do we do what we say we believe in

- “I just deliver what has been ordered”
- “I must do what I am told”
- “I can get fired”

- Nürnberg on soldiers and officers



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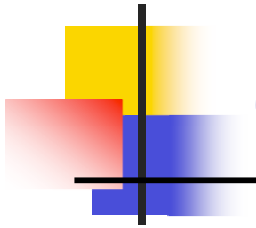
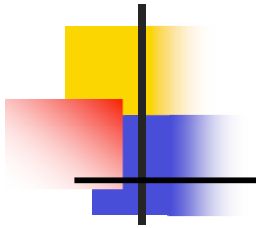
Craftsmanship



Craftsmanship Honour

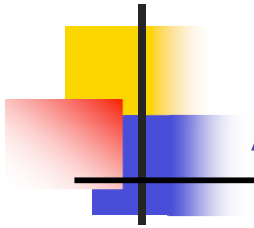
Do we laugh at Uppsala Cathedral?

Will future laugh at our systems?



Stone cutters' guild

We, who cut mere stone,
must always envision cathedrals



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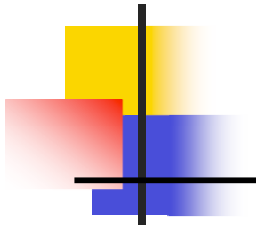

</soapbox>

</ Object Orientation, Domain Driven Design, and the Honour of the Programmers' Guild>

Thanks for your attention

afterthoughts:

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