Is there life after code?
What is code?
Why do we code?
We want to change the world!
Of course, cars are not without problems!
Also, planes have their own problems, too.
Accidental vs Essential
Some people, when confronted with a problem, think "I know, I'll use regular expressions." Now they have two problems.
Coding in 80s & 90s

```c
/* vi:set ts=8 sts=4 sw=4:
 * VIM - Vi IMproved by Bram Moolenaar
 * Do "help uganda" in Vim to read copying and usage conditions.
 * Do "help credits" in Vim to see a list of people who contributed.
 */

#define EXTERN
#include "vim.h"

#ifndef SPAWNO
 # include <spawno.h>          /* special MSDOS swapping library */
#endif

static void mainerrARGINARGS((int, char_u *));
static void usageARGINARGS(void);
static int get_number_argARGINARGS((char_u *p, int *idx, int def));

/*
 * Type of error message. These must match with errors[] in mainerr().
 */
#define ME_UNKNOWN_OPTION 0
```
Coding today
Hardware skyrocketed...
But software, not so much...
stop coding

*(phrasal verb)*

a mystical action that would stop all kinds of programming errors at once and for good.
Between 1976-1981

- Development: 33%
- Postdelivery Maintenance: 67%

Between 1992-1998

- Development: 25%
- Postdelivery Maintenance: 75%

Software aging...
Signs are saying us something...
We have options.
```javascript
var Count;
Count = 1;
while (Count <= 3) {
    window.alert('Hello World!');
    Count = Count + 1;
}
```
Rentals By Customer

Expr
First(GroupName)
Expr [Email]
Expr [CellPhone]
Expr [DriverLicense]

LastRental: First(EndDate)
Expr
[Total]
First(Description)
Expr [ColorLabel]
Expr [FuelTypeLabel]
Expr [License]
[SumVehicleRental]
Expr [RateTotal]

Source Groups
عاش車

DriverLicense: 0
What is beyond code?
Accomplishing its intended purpose successfully!
Can be useless according to the domain!
The right tool for this domain...
Time to think
SELECT EmployeeID, FirstName, LastName, HireDate FROM Employees
WHERE HireDate BETWEEN '1-june-2012' AND '15-dec-2012'

SELECT EmployeeID, FirstName, LastName, HireDate, City FROM Employees
WHERE City IN ('Seattle', 'Tacoma', 'Redmond')

SELECT EmployeeID, FirstName, LastName, HireDate FROM Employees
WHERE HireDate NOT BETWEEN '1-june-2012' AND '15-dec-2012'
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">

<html>
<head>
<title>Untitled Page</title>
<meta http-equiv="content-type" content="text/html; charset=iso-8859-1">
<meta http-equiv="content-type" content="text/html; charset=utf-8">
</head>

<body onload="onLoadFunction()">
<div class="outerDiv">
</div>
</body>
</html>
To build a bridge...

We first build models.
Why do we model?
Wouldn’t it be nice?
And end up with the original product?
Software has the property that allows us to directly evolve models into full-fledged implementations without changing the engineering medium, tools, or methods!

Bran Selic
How does this help?

Give me a modeling environment with resistors, capacitors, transistors, wires...
Give me a PACMAN environment with a pacman, dots (foods), ghosts, walls...
Design how they look like
Your game environment is ready...
Behavior using model transformation...
A generic modeling environment...
Again, how does this help?
They know their domain better than any developer!
CONCLUSIONS

A.

Accidental

vs

ESSENTIAL

B.

C.
CS 439/539: Model-Driven Design (pending approval for Spring 2019)