

# Distributed Software Development



13-12-04



1

MÄLARDALENS HÖGSKOLA



The Development Group



# Real-Time Bridge Monitoring Status Report 2



# Overview



- Team Organization
- Project Status
- New Requirements
- Mockups
- Beta Prototype
- Meetings
- Experiences

# Team Organization



- The Development Group



Andrea Bottoli (PoliMi)



Lorenzo Pagliari (PoliMi)



Marko Brčić (FER)



Dzana Kujan (MDH)



Jörn Tillmanns (MDH)



Miraldi Fifo (MDH)



Nikola Radisavljevic (MDH)

# Team Organization



- Roles

| Name                  | Initials  | Responsibility (roles) |
|-----------------------|-----------|------------------------|
| <b>Andrea Bottoli</b> | <b>AB</b> | <b>Project Manager</b> |
| <b>Dzana Kujan</b>    | <b>DK</b> | <b>Team Leader</b>     |
| Marco Brčić           | MB        | Documentation Manager  |
| Lorenzo Pagliari      | LP        | Design Manager         |
| Miraldi Fifo          | MF        | Testing Manager        |
| Jörn Tillmanns        | JT        | Database Manager       |
| Nikola Radisavljevic  | NR        | Integration Manager    |

# Project Status

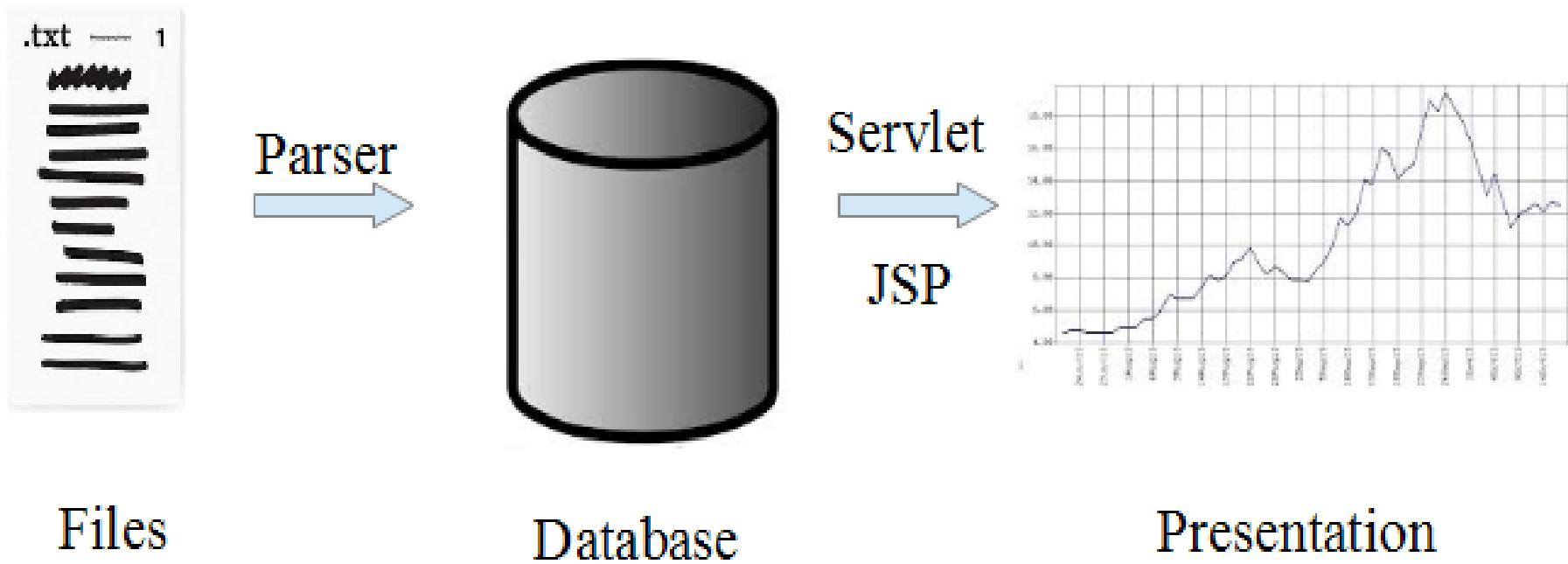


- Project Plan
    - Where we are and what we have to do

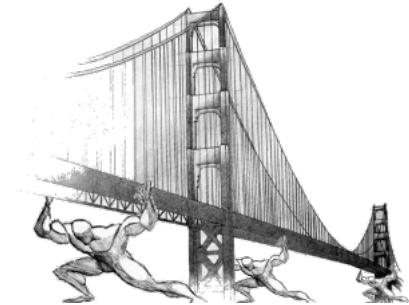
# Project Status



- Alpha Prototype



# New Requirements

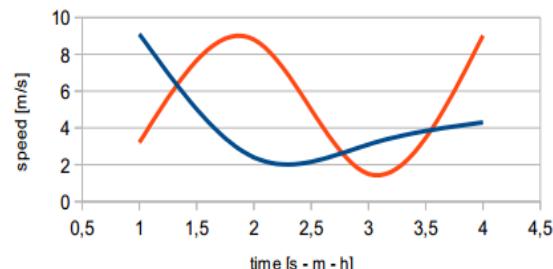


- Conform to NTC 08 & EU 305/11
  - Technical Standards for Constructions conformed to the European Directive EU 305/2011
  - Part of European Directive 86/106/CEE
  - Defines a standard domain in which every component of a structure can be without nor severe changes on its state from a static point of view
- We have to do “reverse engineering”: no one did something like this before

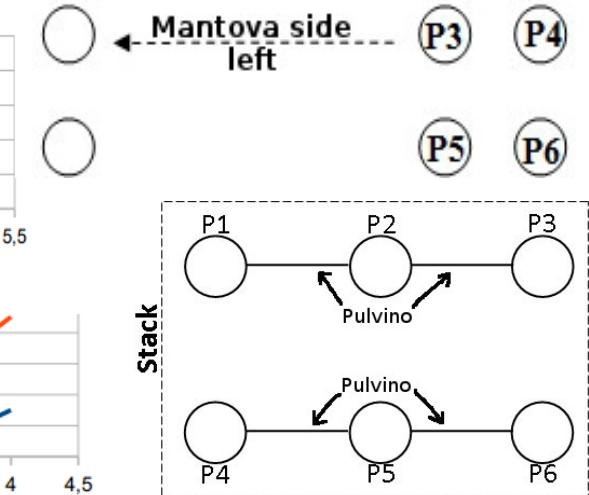
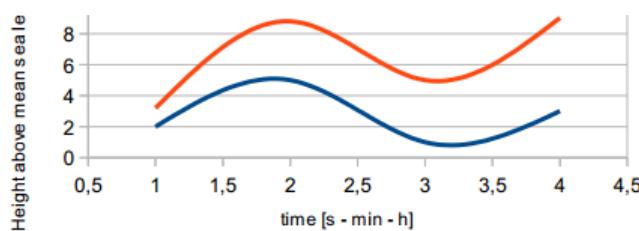
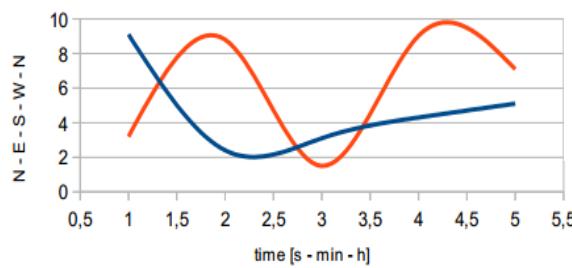
# New Requirements



- External User: new graphs and pictures



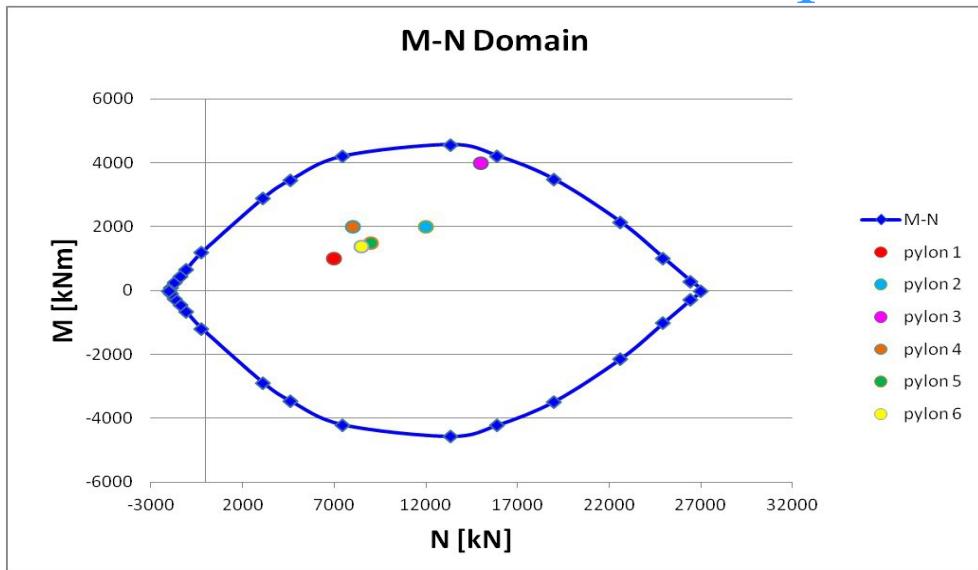
Stack 31



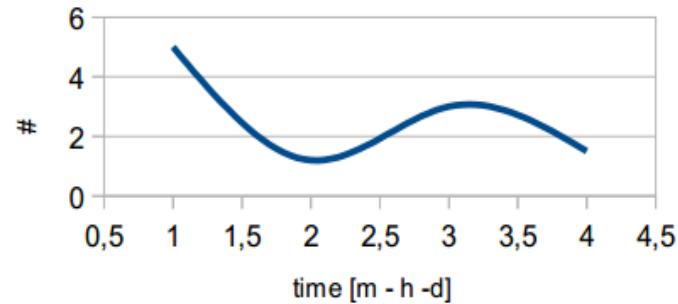
# New Requirements



- Operator
  - Current state: M-N plus Pylon table



| #pylon   | Worst CS | Combination number/label | N | M | Tx | Ty | Mx | My |
|----------|----------|--------------------------|---|---|----|----|----|----|
| Pylon #1 |          |                          |   |   |    |    |    |    |
| Pylon #2 |          |                          |   |   |    |    |    |    |
| Pylon #3 |          |                          |   |   |    |    |    |    |
| Pylon #4 |          |                          |   |   |    |    |    |    |
| Pylon #5 |          |                          |   |   |    |    |    |    |
| Pylon #6 |          |                          |   |   |    |    |    |    |



- History diagrams
- CS trend: *Coefficiente di Sicurezza / Safety Factor*

# New Requirements



- Engineer
  - Change ALL parameters
- Administrator
  - Add/Edit/Delete User
  - See the user list

# New Requirements



- Changed the representation of the alarm
  - The operator launches the alarm
- Some changes in the database

worst\_case\_00 / worst\_case\_01 / worst\_case\_10 / worst\_case\_11

| Field        | Type      | Null | Key | Default           | Extra                       |
|--------------|-----------|------|-----|-------------------|-----------------------------|
| ID           | int(10)   | NO   | PRI | NULL              |                             |
| pylon_number | int       | NO   |     | NULL              |                             |
| N            | float     | NO   |     | NULL              |                             |
| Tx           | float     | NO   |     | NULL              |                             |
| Ty           | float     | NO   |     | NULL              |                             |
| Mx           | float     | NO   |     | NULL              |                             |
| My           | float     | NO   |     | NULL              |                             |
| M            | float     | NO   |     | NULL              |                             |
| cs           | float     | NO   |     | NULL              |                             |
| comb_number  | float     | NO   |     | NULL              |                             |
| timestamp    | timestamp | NO   |     | CURRENT_TIMESTAMP | on update CURRENT_TIMESTAMP |

# New Requirements



- Changed the representation of the alarm
  - The operator launches the alarm
- Some changes in the database

| sensor_data_10_min /sensor_data_1_hour /sensor_data_1_day |           |      |     |                   |                             |
|-----------------------------------------------------------|-----------|------|-----|-------------------|-----------------------------|
| Field                                                     | Type      | Null | Key | Default           | Extra                       |
| ID                                                        | int(10)   | NO   | PRI | NULL              | auto_increment              |
| wind_speed                                                | float     | NO   |     | NULL              |                             |
| wind_direction                                            | float     | NO   |     | NULL              |                             |
| wind_speed_max                                            | float     | NO   |     | NULL              |                             |
| wind_direction_max                                        | float     | NO   |     | NULL              |                             |
| hydrometer                                                | float     | NO   |     | NULL              |                             |
| hydrometer_variance                                       | float     | NO   |     | NULL              |                             |
| sonar                                                     | float     | NO   |     | NULL              |                             |
| sonar_variance                                            | float     | NO   |     | NULL              |                             |
| sonar_perc_correct                                        | float     | NO   |     | NULL              |                             |
| sonar_perc_wrong                                          | float     | NO   |     | NULL              |                             |
| sonar_perc_outOfWater                                     | float     | NO   |     | NULL              |                             |
| sonar_perc_error                                          | float     | NO   |     | NULL              |                             |
| sonar_perc_uncertain                                      | float     | NO   |     | NULL              |                             |
| safety_factor_00                                          | float     | NO   |     | NULL              |                             |
| stressed_pylon_00                                         | int       | NO   |     | NULL              |                             |
| safety_factor_01                                          | float     | NO   |     | NULL              |                             |
| stressed_pylon_01                                         | int       | NO   |     | NULL              |                             |
| safety_factor_10                                          | float     | NO   |     | NULL              |                             |
| stressed_pylon_10                                         | int       | NO   |     | NULL              |                             |
| safety_factor_11                                          | float     | NO   |     | NULL              |                             |
| stressed_pylon_11                                         | int       | NO   |     | NULL              |                             |
| water_speed                                               | float     | NO   |     | NULL              |                             |
| water_flow_rate                                           | float     | NO   |     | NULL              |                             |
| timestamp                                                 | timestamp | NO   |     | CURRENT_TIMESTAMP | on update CURRENT_TIMESTAMP |

# Mockups



- External User

Web Page <http://bridgemonitoring.it/Current>

Home Current state www.forecast.it Login

Current sensor values:

|                   |                       |
|-------------------|-----------------------|
| flow rate:        | 520 m <sup>3</sup> /s |
| water level:      | 17 m                  |
| water speed:      | 1 m/s                 |
| wind speed:       | 3 m/s                 |
| wind direction:   | 32°                   |
| river bed height: | 10 m                  |

left side right side

(a) (a)

Current day trend:

Wind Speed Wind Speed Max

time [s · min · h] Height above mean sea level [m]

river bed height water level

direction max direction

time [s · min · h]

Stack 31 Stack 30 Stack 29

P1 P2 P3 P1 P2 P3 P4 P5 P6

Fulvio Mantova side left Modena side left

time: 04.12.2013 16:12:47

# Mockups



- Operator (Current State)

**Web Page** <http://bridgemonitoring.it/Current>

[Home](#) [Current state](#) [Parameters](#) [History diagrams](#) [www.forecast.it](#) [Logout](#)

**Current sensor values:**

|                   |                       |
|-------------------|-----------------------|
| flow rate:        | 520 m <sup>3</sup> /s |
| water level:      | 17 m                  |
| water speed:      | 1 m/s                 |
| wind speed:       | 3 m/s                 |
| wind direction:   | 32°                   |
| river bed height: | 10 m                  |

T  D

**Send Alarm**

**left side**

**right side**

**Current day trend:**

Wind Speed: Wind Speed Max

Height above mean sea level [m]: river bed height

N-E-S-W-N: direction max direction

**M-N Domain**

#pylon Worst CS Combination number/label N M Tx Ty Mx My

| #pylon   | Worst CS | Combination number/label | N | M | Tx | Ty | Mx | My |
|----------|----------|--------------------------|---|---|----|----|----|----|
| Pylon #1 |          |                          |   |   |    |    |    |    |
| Pylon #2 |          |                          |   |   |    |    |    |    |
| Pylon #3 |          |                          |   |   |    |    |    |    |
| Pylon #4 |          |                          |   |   |    |    |    |    |
| Pylon #5 |          |                          |   |   |    |    |    |    |
| Pylon #6 |          |                          |   |   |    |    |    |    |

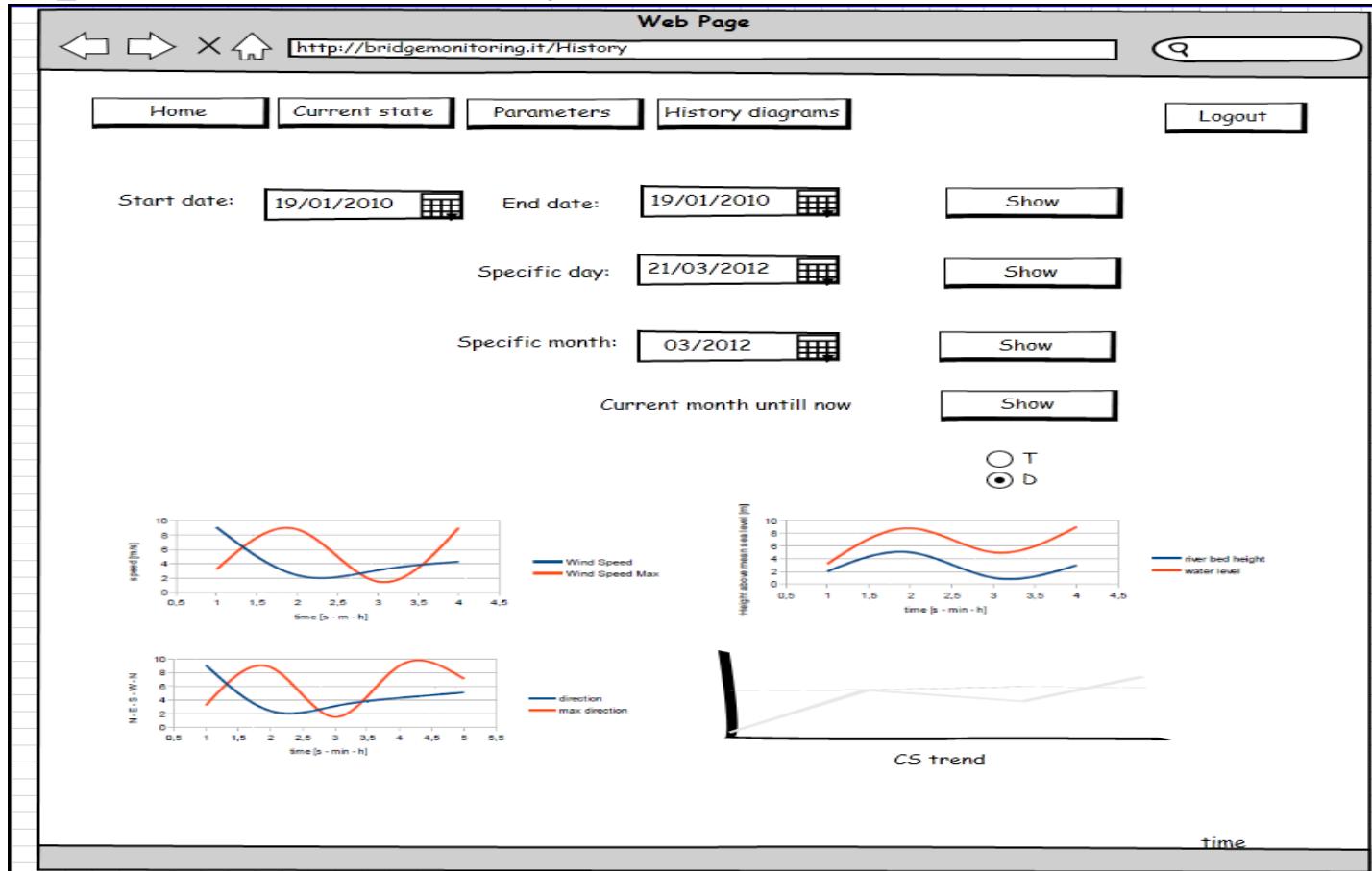
time: 04.12.2013 16:12:47

Stack 31: P1 P2  
Mantova side left P3 P4  
Modena side left P5 P6

# Mockups



- Operator (History)



# Mockups



- Engineer (which is also an operator)

Web Page

<http://bridgemonitoring.it/Parameters>

Home Current state Parameters History diagrams [www.forecast.it](http://www.forecast.it) Logout

| GEOMETRY OF THE STACK N.30 |        |                   |                                                                         |
|----------------------------|--------|-------------------|-------------------------------------------------------------------------|
| D <sub>pylon</sub>         | 1.5    | m                 | Diameter of the pylon                                                   |
| C <sub>span</sub>          | 9.5    | m                 | Distance between two line of pylon                                      |
| h <sub>beam</sub>          | 17.5   | m                 | Height of the lower beam                                                |
| bottom_ref                 | 10     | m                 | Height of the reference of the bottom of the river                      |
| h <sub>1</sub>             | 7.3    | m                 | Distance between the pulvino and the inferior beam                      |
| h <sub>2</sub>             | 7.5    | m                 | Distance between the inferior beam and the bottom_ref                   |
| (h <sub>1</sub> )/2        | 3.65   | m                 | Mean value of h <sub>1</sub>                                            |
| k                          | 0      | m                 | Sinking of the joints over the ground                                   |
| d                          | 8.5    | m                 | Width of the chassis                                                    |
| R <sub>pylon</sub>         | 0      | m                 | Internal radius                                                         |
| numb_id_bar                | 12     | -                 | Number of identical bars                                                |
| D <sub>bar</sub>           | 0.024  | m                 | Bars diameter                                                           |
| C <sub>cc</sub>            | 0.042  | m                 | Barycentric concrete cover                                              |
| Steel_class                | Fv44K  | -                 | Steel class                                                             |
| Concrete_class             | C25/30 | -                 | Concrete class                                                          |
| WIND THRUST                |        |                   |                                                                         |
| $\alpha$                   | 6      | *                 | Planimetric anticlockwise inclination of the bridge form the north      |
| C <sub>owl</sub>           | 2      | -                 | "Drag planking" coefficient                                             |
| P <sub>air</sub>           | 1.2    | Kg/m <sup>3</sup> | Air density                                                             |
| A <sub>attack</sub>        | 168    | m <sup>2</sup>    | Planking area exposed to the wind pressure                              |
| A <sub>ref</sub>           | 177    | m <sup>2</sup>    | Surface of traffic exposed to the wind pressure                         |
| $\beta_1$                  | 1      | -                 | Coefficient of reduction for A1 and A2 traffic scenarios                |
| $\beta_2$                  | 0.5    | -                 | Coefficient of reduction for A3 traffic scenario                        |
| r                          | 2.25   | m                 | Thrust center due to longitudinal asymmetry, only of S <sub>plank</sub> |
| $c_{plank}$                | 1.91   | m                 | "arm" for bending moment of S <sub>plank</sub>                          |
| $c_{ref}$                  | 3.41   | m                 | "arm" for bending moment of S <sub>ref</sub>                            |
| HYDRODYNAMIC THRUST        |        |                   |                                                                         |
| C <sub>oww</sub>           | 2.4    | -                 | "Drag planking" coefficient (D=0)                                       |
| C <sub>owt</sub>           | 2      | -                 | "Drag planking" coefficient (D=1)                                       |

# Mockups



- Admin

Web Page

← → X ↗ http://bridgemonitoring.it/Admin

| User name | First name | Last name | email        | role     |
|-----------|------------|-----------|--------------|----------|
| User1     | Jon        | Lajoie    | jl@gmail.com | operator |
| User1     | Itan       | Belan     | ib@gmail.com | engineer |

**ADD NEW USER**

**Edit** **Delete** **Edit** **Delete**

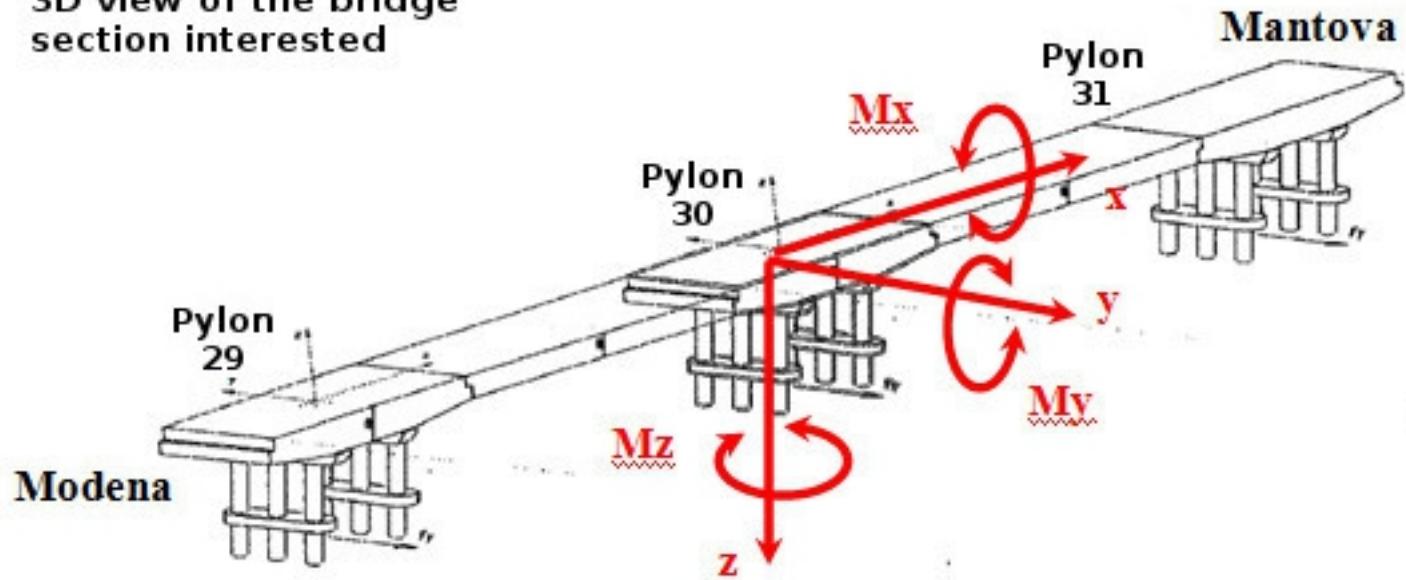
**Save**

# Beta Prototype



- Calculations

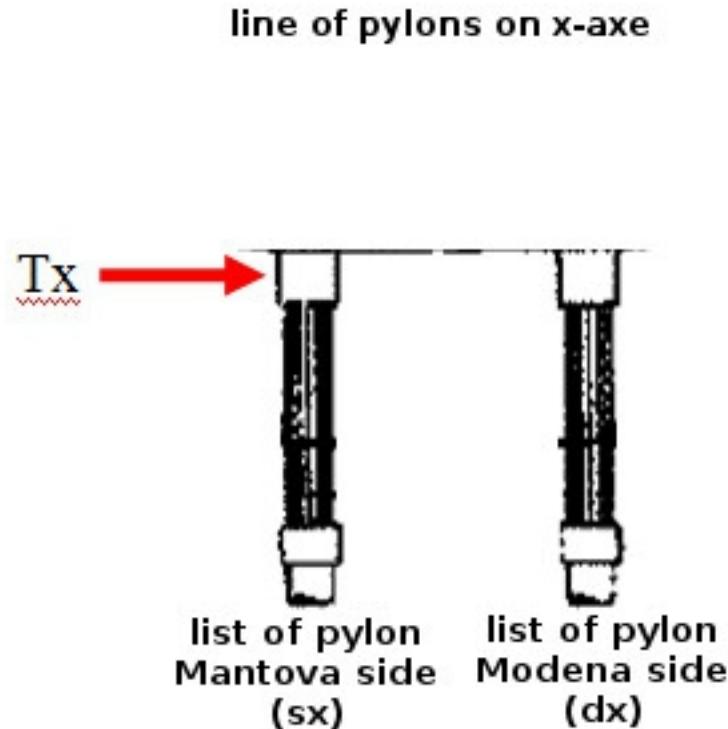
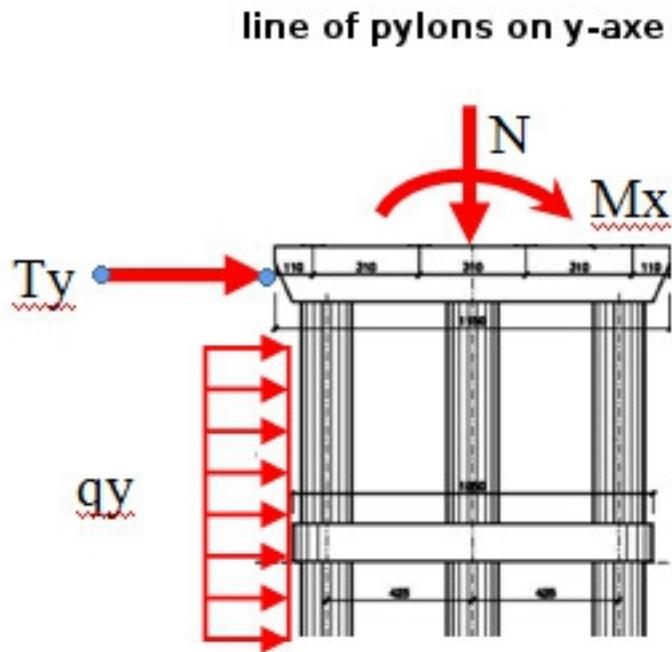
3D view of the bridge section interested



# Beta Prototype



- Calculations



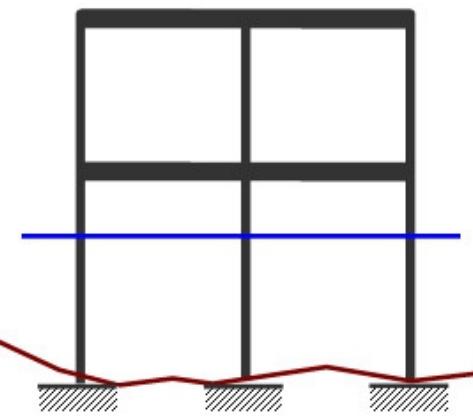
# Beta Prototype



- Calculations



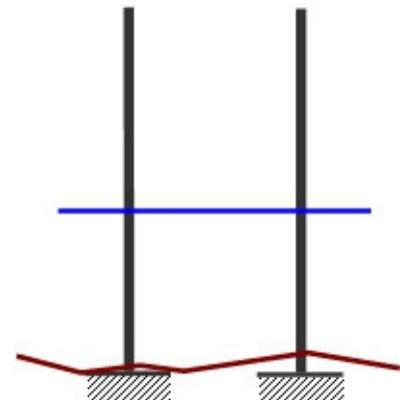
Stack 31



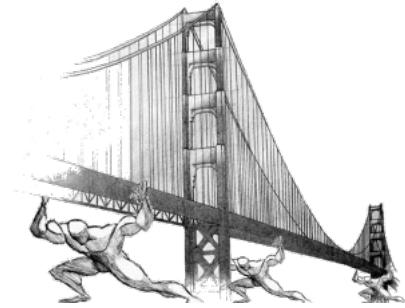
Stack 30



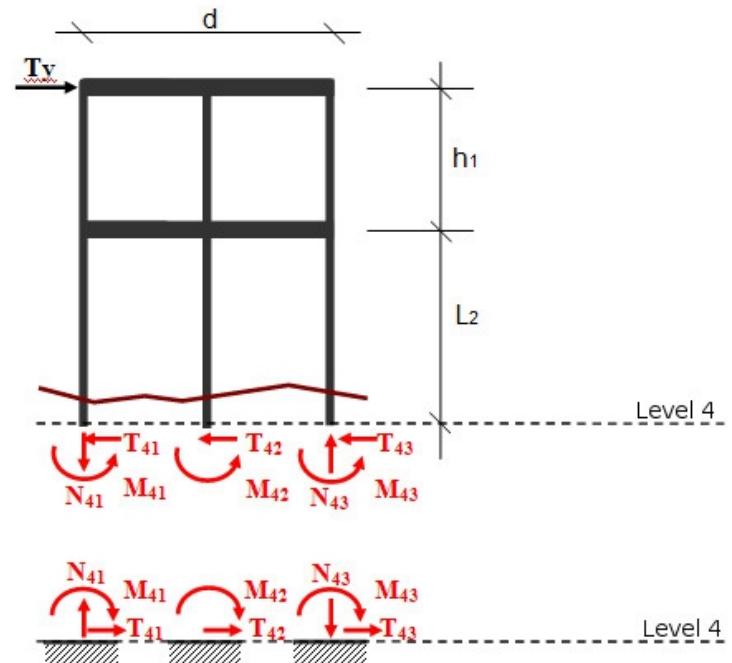
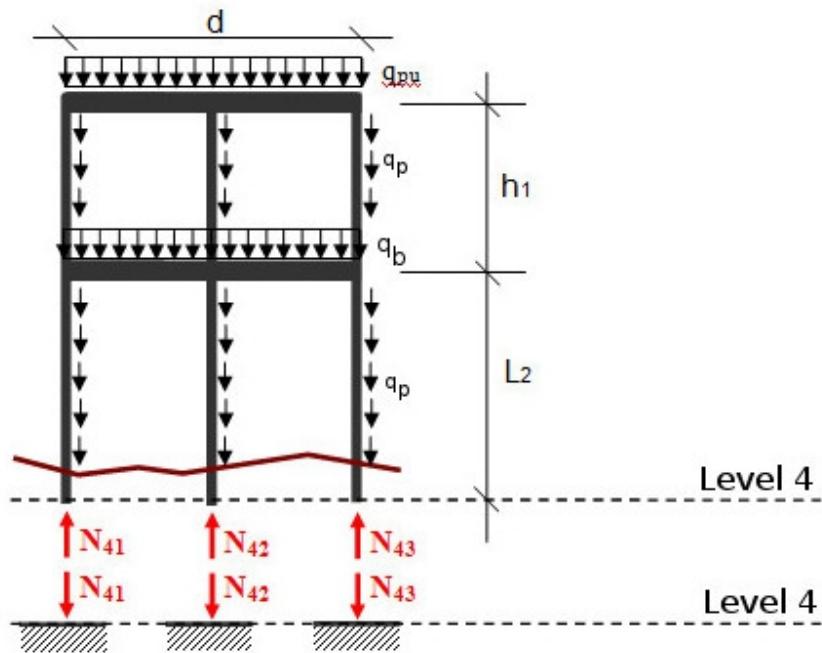
Stack 29



# Beta Prototype



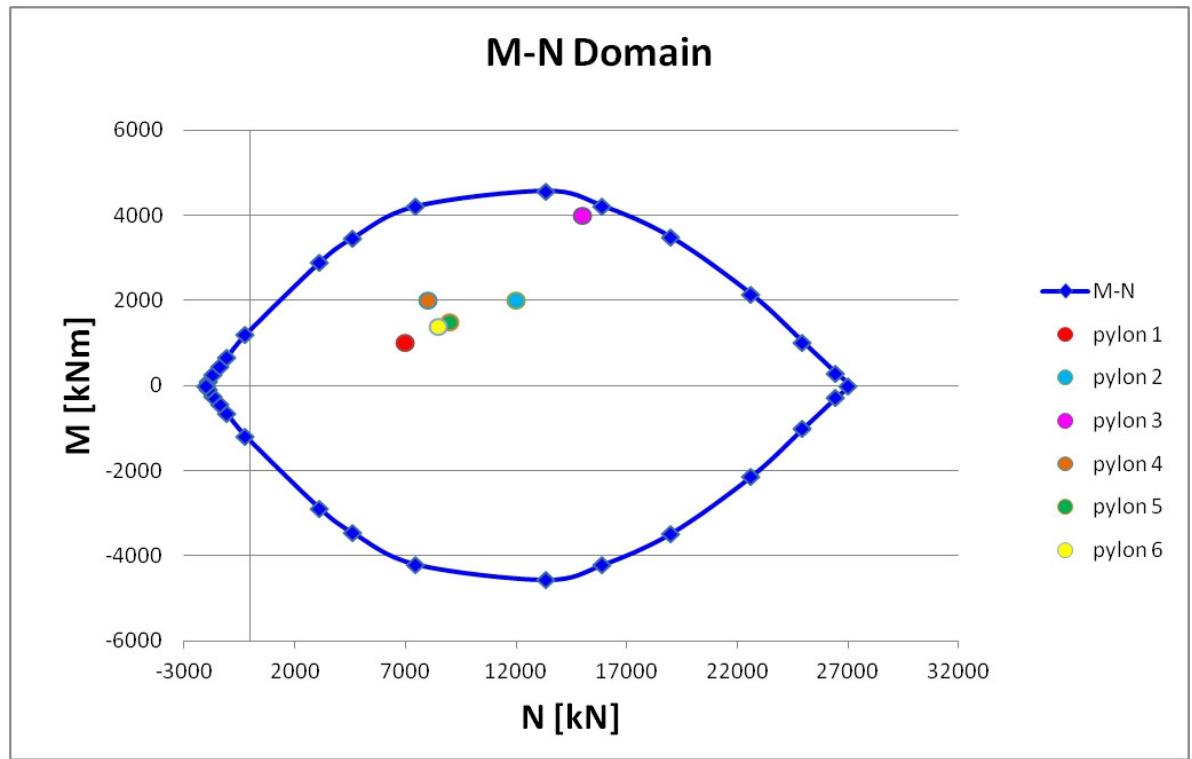
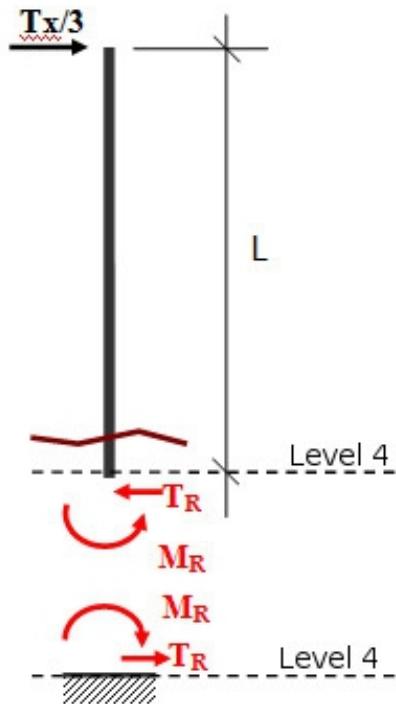
- Calculations



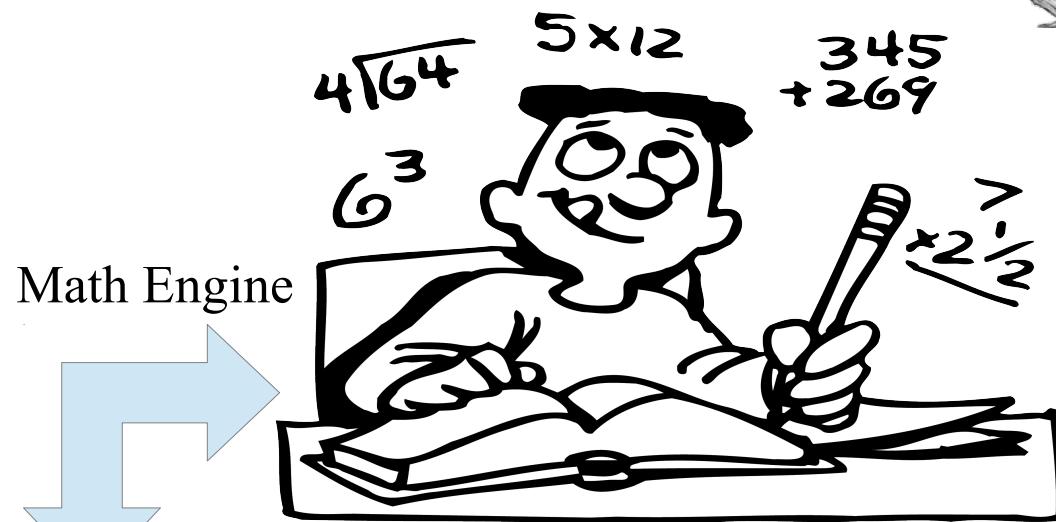
# Beta Prototype



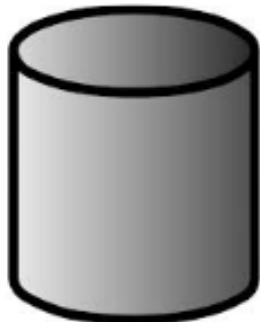
- Calculations



# Beta Prototype



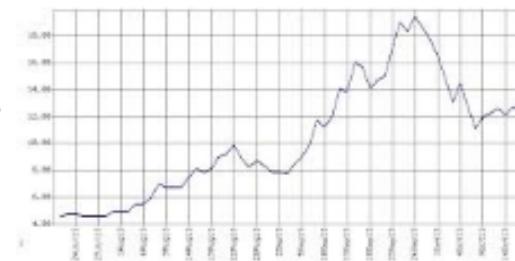
Parser



Servlet



JSP



Files



13-12-04

Database



Presentation



24

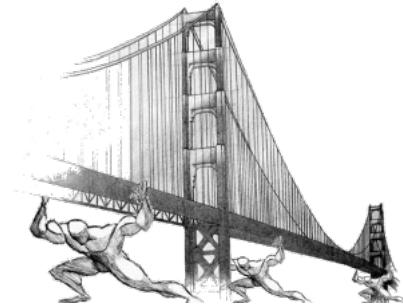
MÄLARDALENS HÖGSKOLA

# Meetings

- Both chat & video
- Group Meetings
  - Face to face meetings
  - Formally scheduled every Monday and Thursday
  - Chat used everyday by each member of the group
- Project Leader & Team Leader Meetings
  - About every day (during the week)
  - Formally scheduled every Tuesday



# Meetings



- Customers Meetings
  - One every week
    - Project status
    - Customers desires
    - Requirements
  - First one with both customers
    - Ing. Francesco Ballio
    - Ing. Gianluca Crotti
  - The others with ing. Crotti

# Meetings



- Supervisors Meetings
  - One every week
  - Inform about
    - Project status
    - Group status & managing
    - Report about customer meetings
  - Gather advices, suggestions and proposals
  - Report problems

# Experiences



- Effort

| Member               | W42       | W43        | W44        | W45        | W46        | W47        | W48        | Total       |
|----------------------|-----------|------------|------------|------------|------------|------------|------------|-------------|
| Andrea Bottoli       | 11        | 40         | 50         | 45         | 47         | 68         | 40         | 301         |
| Lorenzo Pagliari     | 10        | 37         | 53         | 51         | 46         | 57         | 37         | 291         |
| Dzana Kujan          | 9         | 36         | 43         | 36         | 27         | 36         | 27         | 214         |
| Marko Brcic          | 11        | 40         | 54         | 60         | 28         | 36         | 26         | 255         |
| Jorn Tillmanns       | 9         | 37         | 51         | 43         | 20         | 13         | 39         | 212         |
| Nikola Radisavljevic | 9         | 37         | 45         | 36         | 26         | 35         | 26         | 214         |
| Miraldi Fifo         | 9         | 38         | 45         | 35         | 16         | 28         | 14         | 185         |
| Ghazaleh Shojaee     | -         | -          | 53         | 13         | 32         | 26         | -          | 124         |
| <b>Total</b>         | <b>68</b> | <b>265</b> | <b>394</b> | <b>319</b> | <b>242</b> | <b>299</b> | <b>209</b> | <b>1796</b> |

# Experiences

- Changes in documentation
  - Requirement document
  - Design document
  - Input and Conversions document



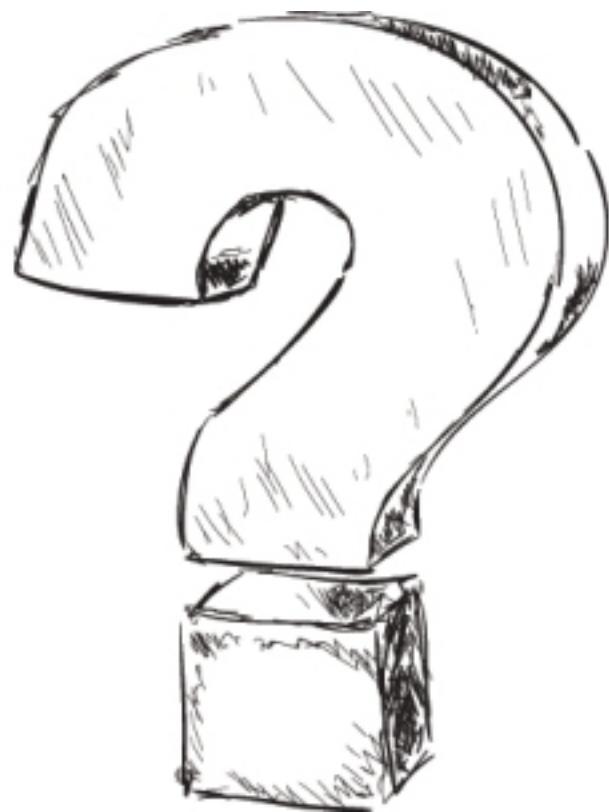
| Date       | Version | Description                                                   | Date       | Version | Description                                                                                                                                    |
|------------|---------|---------------------------------------------------------------|------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 2013-10-31 | 0.1     | Initial Draft                                                 | 2013-11-06 | 1.0     | Initial Version                                                                                                                                |
| 2013-11-04 | 1.0     | First version of Design                                       | 2013-11-07 | 1.1     | Changed the structure of requirements definitions and edited text for requirements<br>Improved the text<br>Captions for illustrations added    |
| 2013-11-17 | 1.1     | Fixed Introduction<br>Fixed 2.1 Section<br>Fixed some formats | 2013-11-07 | 1.2     | Section 3 – changed requirements definition from must to should<br>Section 3.1. - added abbreviations for all requirements<br>Updated Appendix |
| 2013-11-18 | 1.2     | Fixed Sections 2.2, 2.3<br>Fixed Chapter 3                    |            |         |                                                                                                                                                |
| 2013-11-19 | 1.3     | Fixed User Interfaces Section                                 |            |         |                                                                                                                                                |
| 2013-12-03 | 1.4     | Added Class Diagrams                                          |            |         |                                                                                                                                                |

# Experiences



- Problems
  - Communication, management, technologies, environment
- Solutions
  - Additional meetings, tasks on Github, hours spent in learning and helping each other
- Positive experiences
  - Team work, good collaboration and fun meetings :)
  - We are improving our skills and doing the best

# Question Time





# Thank you for your attention

