SYSTEMS ANALYSIS
LECTURE 3
SYSTEM INTERFACE

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Introduction – importance of the topic

- Mars Climate Orbiter
  - Program Mars Surveyor 98 Orbiter
  - Second probe Mars Polar Lander
  - Mission goal – observing Martian climate
    - Observe the Martian climate from a 400 km near circular, near polar mapping orbit
    - Examine general atmospheric circulation patterns and how they affect atmospheric transport and climate change.
    - Derive information about atmospheric winds from global temperature observations.
    - Observe atmospheric dust to better understand the seasonal dust cycle, including initiation, spreading, and dissipation of global-scale dust storms.
    - Examine features on the Martian surface that can provide information about climatic evolution
  - Value 125 mil. USD

Introduction – importance of the topic

- Mars Climate Orbiter
  - Launched 11 December 1998 from the Eastern Test Range cosmodrome
  - More than 9 months of journey to the Mars planet
  - 23.9.1999 entering planet orbit
  - Engine burst for reaching the planned altitude
  - At that time probe hidden behind the planet
  - It never appeared again

  - English control center – using data on engine power in pounds
  - Probe designed for data in newtons
  - result – altitude 57 kilometers above surface (instead of 150 km – burning in the dense planet atmosphere)

Introduction – importance of the topic

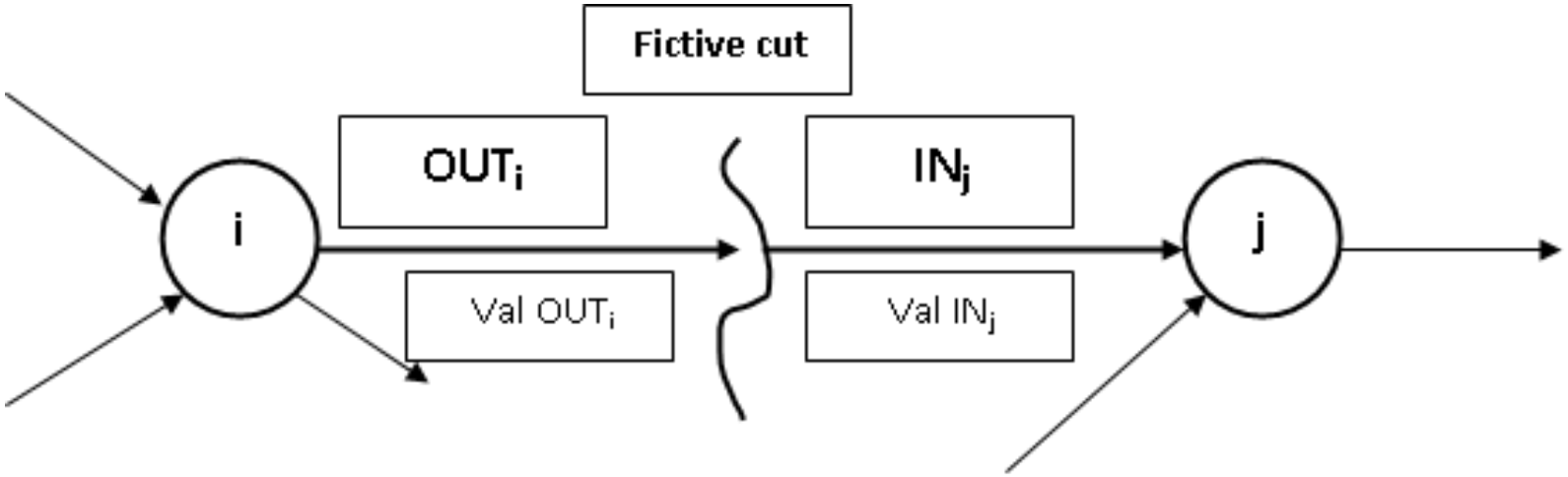
- Vraňany accident - 19.3.2007

Source:**Záznam telefonátů rozkrývá, proč musel vlak vykolejit . iDNES.cz. 5.4.2007. dostupné online: http://zpravy.idnes.cz/zaznam-telefonatu-rozkryva-proc-musel-vlak-vykolejit-p1c-/krimi.aspx?c=A070405_120207_krimi_cen (10.10.2015)**

- Car on the crossing
- Misunderstanding in communication
- Engine and 3 carriages derailed
- Damage dosens of millions CZK

Interface

- Fictive cut among two parts of the system
- Defined by set of parameters and their values on output and consequent input



Regularity

- Regularity of system interface is condition for system existence (in longer term)
- For keeping regularity there is need for:
  - The same parameters in the interface
  - Corresponding parameters‘ values

    {val pkO} ≈ {val pkI}

    ≈ stands for <=, >= or = depending on the meaning

Examples

Great Britain
240 V, 50 Hz

Czech republic
230 V, 50 Hz


Labtec


lenovo

Ensuring regularity

- Procedure:
  - Finding out irregular relations on interfaces
  - Regularization of these relations
  - Projections of implemented actions into the coherence requirements (new control of system‘s regularity)

Procedure

- Finding of relations in the adjacency matrix
  - Adjacency matrix
    - Standard two dimensional square matrix
    - Dimension n equal to the number of elements in the system
    - Displays the existence of relation between particular elements (0 – no relation, 1 – existing relation)
- Creation of input (I) and output (O) matrix containing parameters and their values for particular relations
- Comparing O and I
- Result in regularity matrix or table
- Regularizing the interface
- Re-checking the regularity

How to regularize the interface

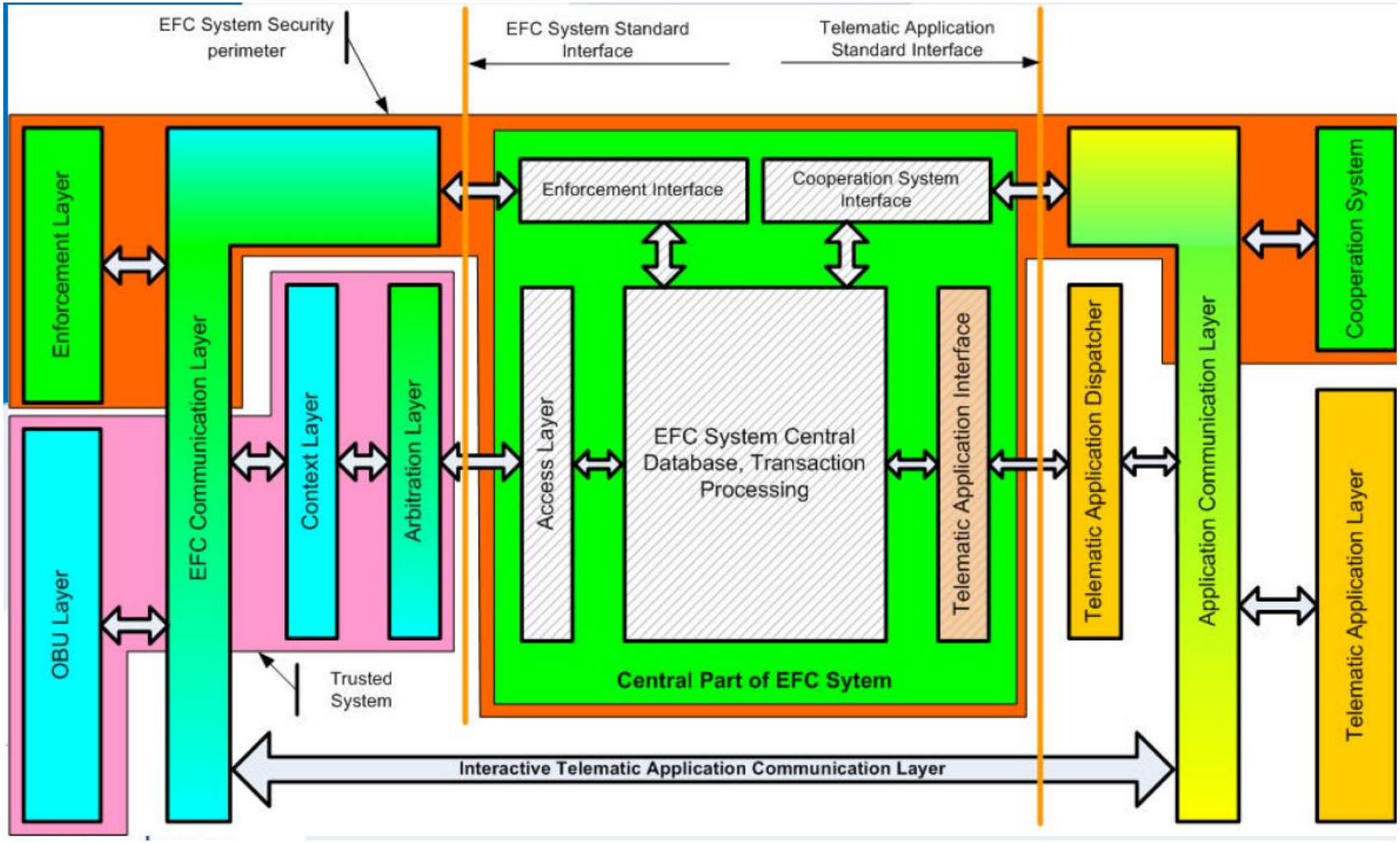
1. Changing function of the input or output element of the irregular relation (in this case there is big risk or irregularity spreading
2. Inserting conversion element (usually expensive solution)
3. Using substitutability of parameters (e.g. one currency)
4. Finding such elements in the system that can either supply the missing demand or consume surpluses
5. Reconstruction of the whole system

Finishing the task

Look for the impacts on the system‘s integrity

= we solve the task once again to check everything is correct

Architecture of a hybrid electronic fee collection system



Architecture of a hybrid electronic fee collection system