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ICT as an Enabler of Smart grids Energy Markets

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Workshop for Preparation of Croatian Technology Platform for Cooperative Renewable Energy Systems and Smart Grids
ACROSS Centre of Research Excellence & Ministry of Economy, Republic of Croatia
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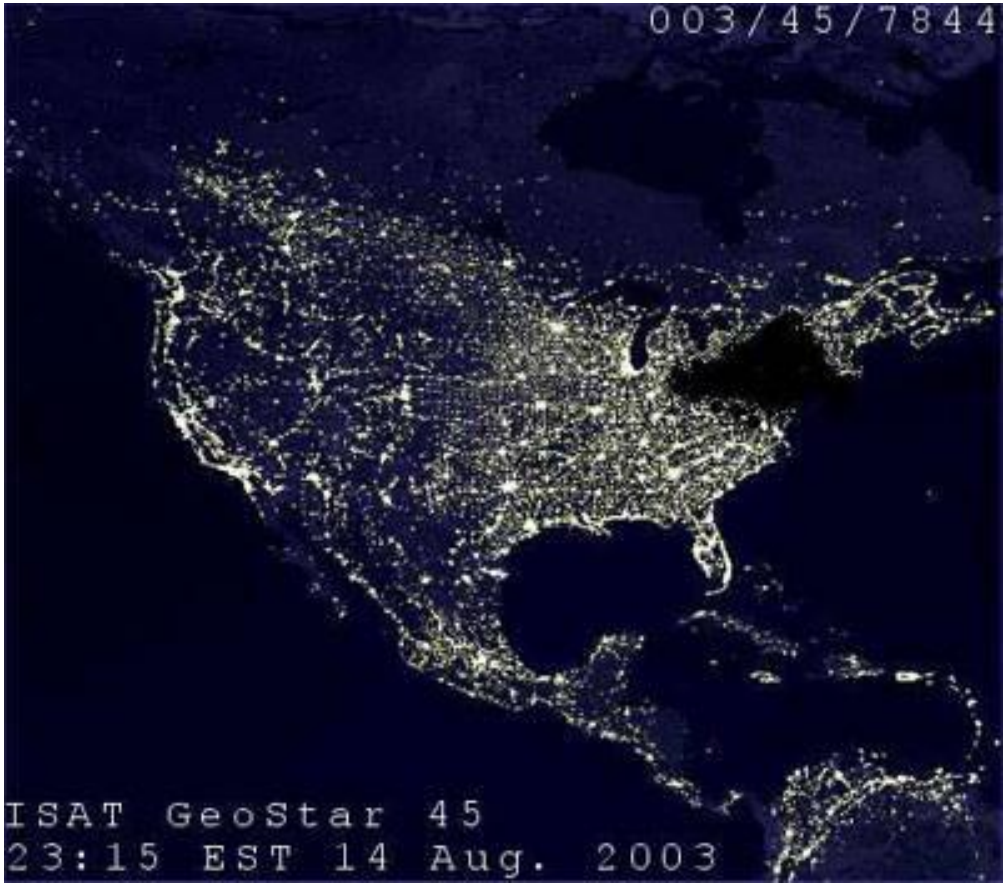
Background and Motivation (1)

Management of highly complex large-scale energy systems



Northeast blackout of 2003

Background and Motivation (2)

Transition from traditional to Smart Grids

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- some limitations of traditional power grids:
  - **centralized** production
  - **energy losses** due to distant energy distribution
  - **difficulties** in coping with **intermittent and decentralized renewables** (e.g., wind turbines and solar panels)
- Smart Grids:
  - **decentralized** production
  - **reduced energy losses** due to close energy distribution
  - **smart mechanisms** for coping with **intermittent and decentralized renewables** (cooperative production and consumption)

Smart Grids

Energy layer + ICT layer + Market layer

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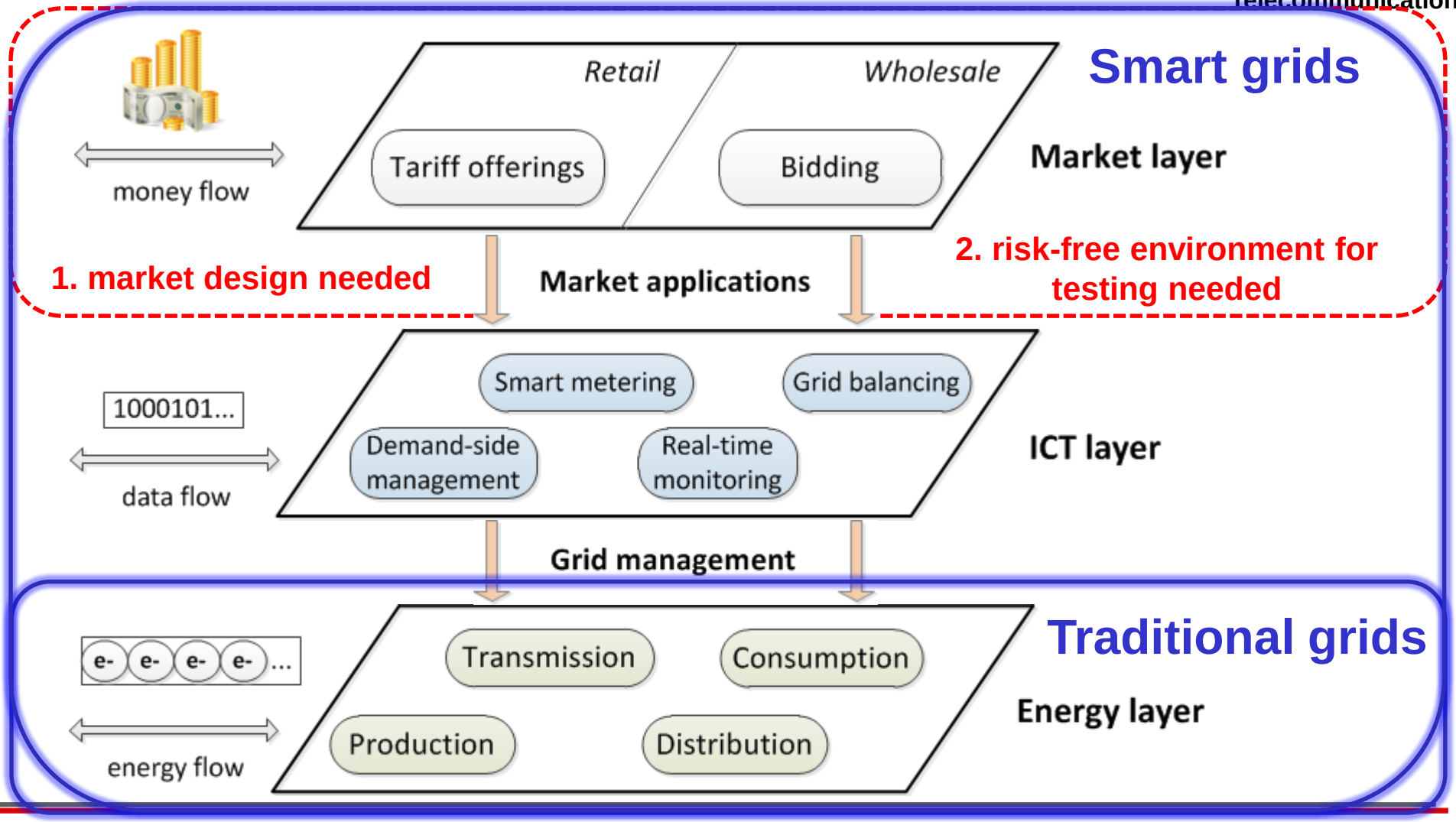

Power Trading Agent platform (1)

Introduction

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- **Smart Grids energy market simulator**
- international project (6 universities)
- purpose – **create** & **test market designs** for **Smart Grids**
- combines **market agents** and the element of **competition**
- software agent in a role of self-interested **broker**
  - **buys** and **sells** energy
  - intention of earning a **profit**
  - minimizes **energy imbalance**

- **strategic + regulatory + business support tool**

Power Trading Agent platform (2)

Main stakeholders & activities

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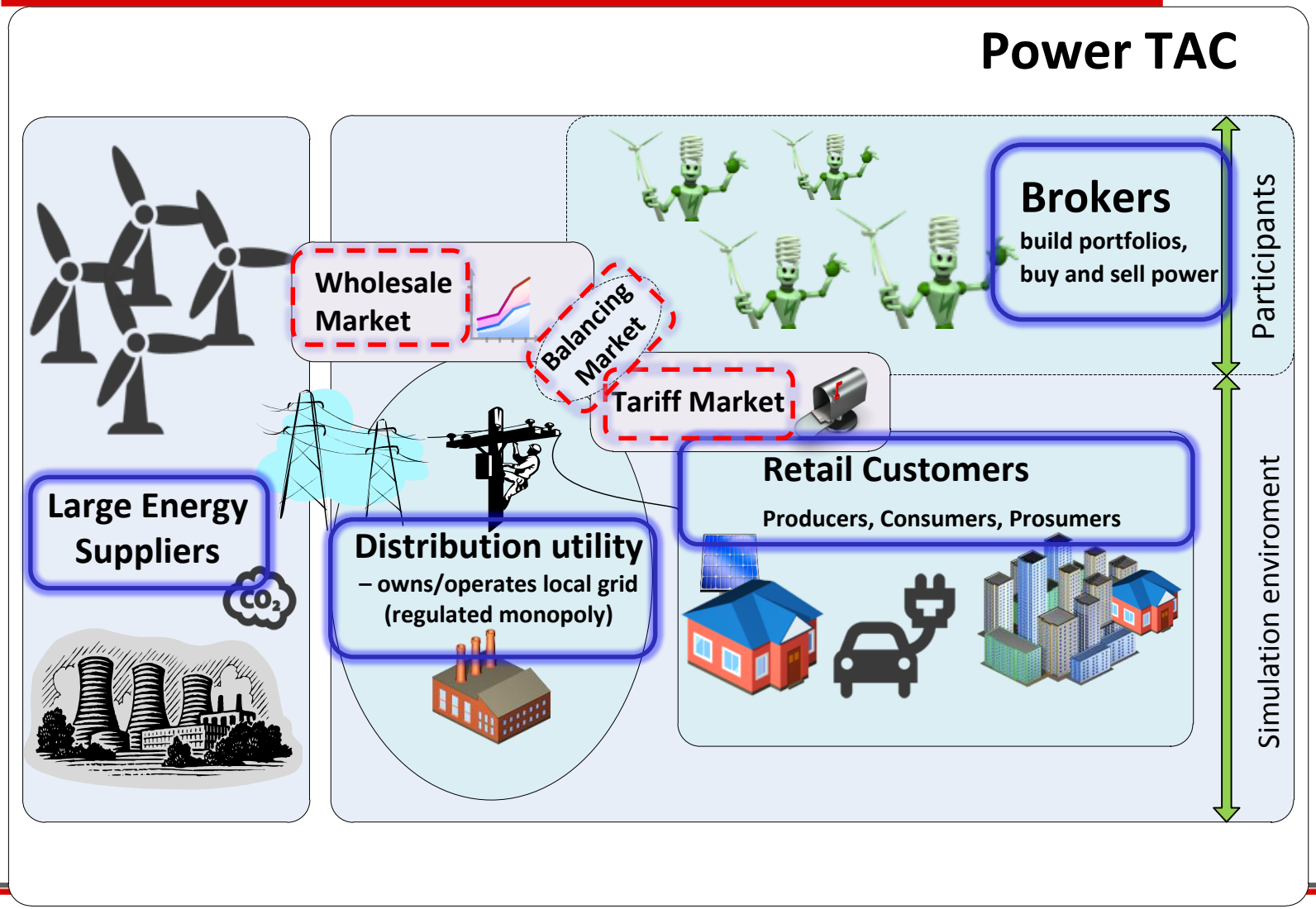

time domain is managed by **timeslots** (or **TAC hours**)

timeslot is compressed to **5 seconds** of **real time**

typical **competition** will run just over **2 hours** of **real time**

Power Trading Agent platform (3)

Producer & Consumer models

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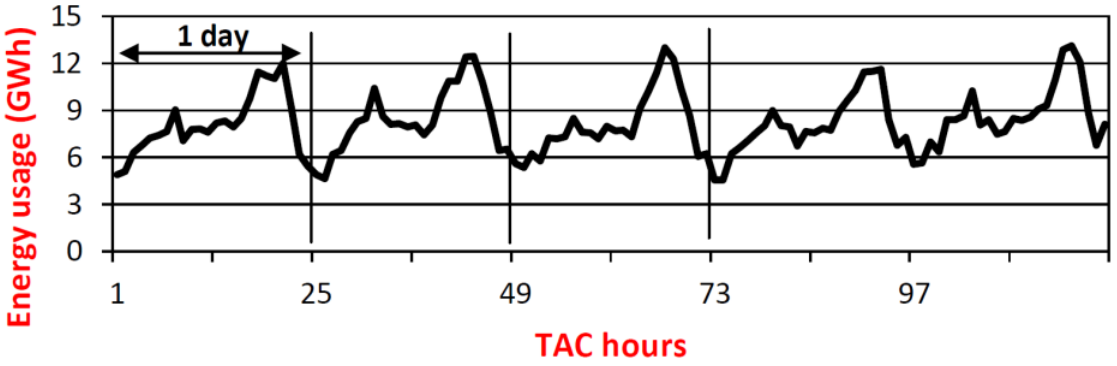
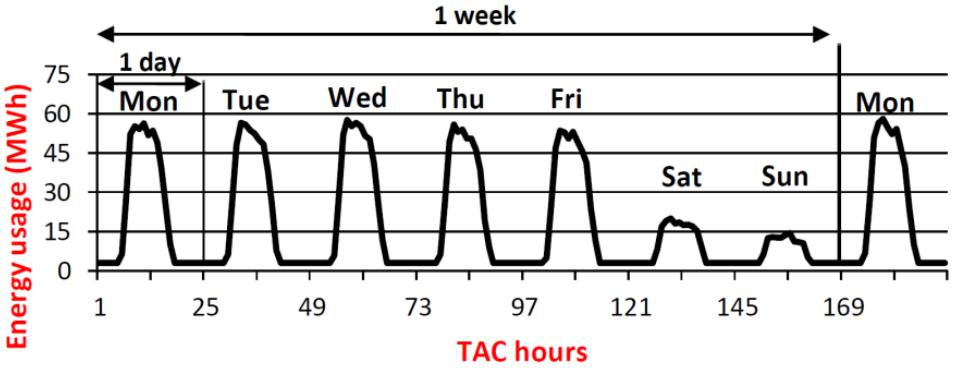
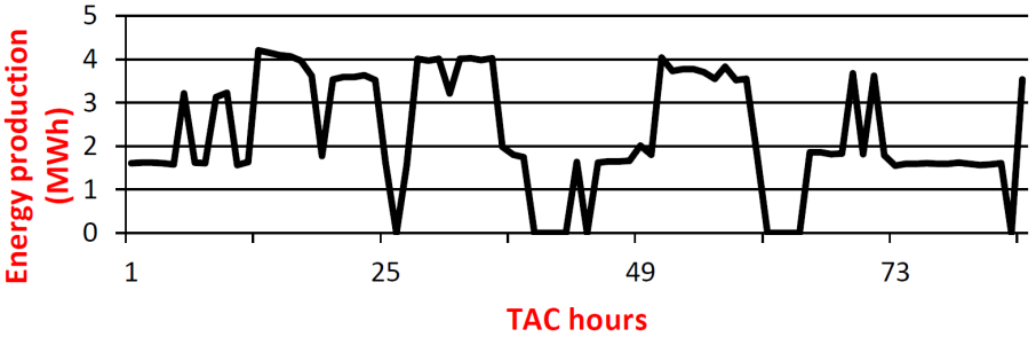
Daily periodicity – CentervilleHomes



Weekly periodicity – OfficeComplex

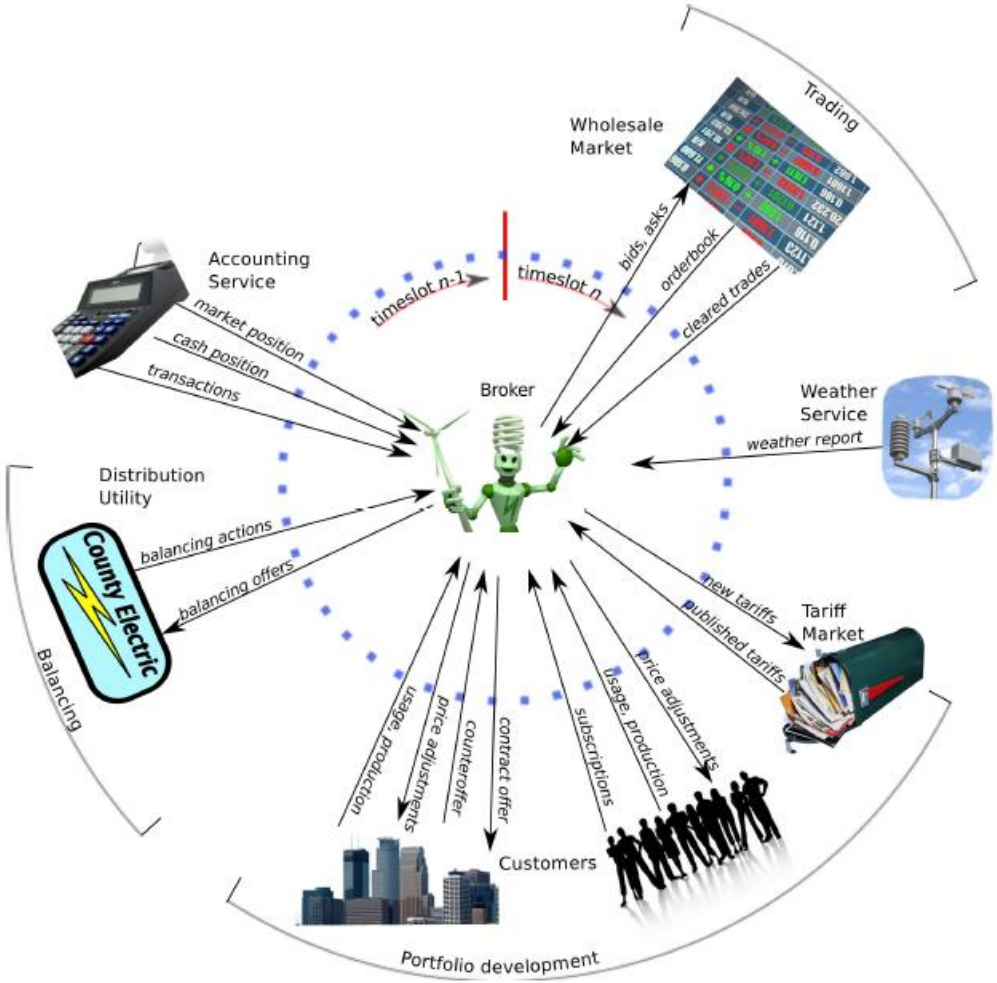


No periodicity – WindmillCoOp



Power Trading Agent platform (4)

Activities of a Power TAC broker



Power Trading Agent platform (5)

Annual competitions

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- conceived as an annual competition
  - between research teams around the world
  - agentware provided by organizers
    - "dummy" agents
  - **task** for research teams: **development of a "smart" broker**

- Power TAC 2013
  - 15 teams competing
  - July 15-16: Bellevue, Washington, USA

FER Power TAC team

Awards

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Erasmus Energy Science Award 2013

for research which pairs practical relevance to future energy business and presents new findings with scientific rigour

ConTEL 2013 Most Innovative Student Project

for most innovative student project in the field of ICT

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