Emerging Role of Agile Software Development for ITS Projects

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+ FHWA ITS Webinar

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Presentation Topics & Audience:

(F=FHWA; I=INCOSE)

1. What is “ITS”? (I)
2. Roles in ITS Projects (I)
3. Evolution of ITS (F+I)
4. SE “V” Process (I)
5. Overview of V vs. Agile (F+I)
6. Concluding Comments (F)
What is “ITS”?...

• Short Answer = “Technology in Transportation”

• USDOT Definition =
  “ITS means electronics, communication, or information processing used ... to improve efficiency or safety of a surface transportation system.” (23CFR940.3)
  (Excludes boats, planes and most freight-rail.)

• Federal regs apply to federally-funded projects
2. Typical Roles in ITS Projects

- **FHWA** –
  - Provide (some) Funding & Tech. Assistance
  - Oversee Regulations (23 CFR 940.11, others)

- **State/City DOTs** –
  - Define Needs & Concepts
  - Program funds
  - Write RFPs
  - Select & Manage Contractors

- **Contractors** –
  - System Engineers – Design. Test.
  - Vendors – Equipment & Software (~COTS)
  - Integrators – Software + Hardware + …
3. Evolution of ITS
(1966 → Now)

Tech. ~2%
Tech. >50%
1970’s – *Arterial Traffic Management*
1980’s – Freeway Traffic Management

Traffic Detection “loops”

Electronic Message Signs

Ramp Meters
1990’s – Traffic Management Centers
2000’s – “Smart Bus” Systems

- Traffic Signal Priority
- Automated Fare Collection and Passenger Counting
- Route Destination Display
- GPS & Vehicle ID
- Smart Card Reader
- Silent Alarm
- Driver Information Display
- Vehicle Diagnostics
2000’s – Traveler Information
2010’s – Electronic Tolling & HOT Lanes
2010’s – Mobile Devices

Traffic & Navigation

Parking Info & Guidance

Ride-Hailing & Carpooling
Conclusions:

1. ITS projects require higher levels of integration – multimodal, multi-agency, human users, etc.

2. Rapid technology change (e.g. mobile, cloud,…) ➔ Software requirements much more complex, plus much greater uncertainty/unpredictability

3. Software development must be managed for: Cost, Schedule, Performance … plus more

4. Software has become critically important to ITS ➔ New software methods *may* be needed.
4. SE “V” Process Began in Aerospace; Now Widely Used in ITS

Human & new-tech requirements hard to foresee.

Phyllis will describe this Agile Process next ...
6. Final Comments

1. ITS projects require higher levels of integration – multimodal, multi-agency, human elements

2. Software is critically important to ITS success

3. Software projects must be managed carefully → Cost, Schedule, Performance, Reliability

4. New software methods are available – require learning new concepts and terminology.

Phyllis Marbach will describe these methods next, then Ed Fok will discuss ITS examples.
Phyllis will use a “Bikesharing” Example Project:

3rd-Generation Bikeshare  --> “Any-to-Any”
Typical Bikeshare Use-Cases …

First-Mile / Last-Mile  Recreation  …  etc.
Bikes have GPS, Cellular Comm., RFID Reader, Solar/Battery, e-Lock, etc.
Phyllis Marbach will now describe:
-- Agile S/W Development Process
-- Role of S.E. in the Agile Process