

ΓΓΕΤ ΙSR_3013



5DMuPLIS 5 Dimensional Multi-Purpose Land Information System

Χωρο-χρονική Ανάλυση Σηματολογικά
Εμπλουτισμένη για τα Επόμενης Γενιάς
Πληροφοριακά Συστήματα Διαχείρισης
Γης



Ευρωπαϊκή Ένωση
Ευρωπαϊκό Ταμείο
Περιφερειακής Ανάπτυξης



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Υπουργείο Παιδείας και Θρησκευμάτων

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης. Συγχρηματοδοτούμενη από τον ΠΠΕ Αττικής, Μαιονίδας-Φθιώτιδας, Κρήτης & Νήσων Αγαίου, Θεσσαλίας-Στερεάς Ελλάδας & Ηπειρωτικής

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ΕΥΔΕ - ΕΤΑΚ

3D Cadastre Land information Systems



- Attempt for a Definition
 - “In a 3D cadastre a well defined collection of objects and rights above and below Earth’s surface is represented by 3D geometries”
- Greek Approach
 - “In a 3D cadastre all buildings above ground are represented by 3D geometries (... and everything else remains 2D)”

Benefits of a 3D Cadastre



- ▣ A 3D Cadastre could comprise
 - parcels as a 3D surface,
 - parcels with vertical surfaces as boundaries,,
 - 3D buildings,
 - 3D topographic objects (windmills, utility poles, power lines),
 - 3D underground objects (tunnels, subway stations, pipelines,
 - cables,...),
 - underground property (mining rights),
 - natural resources, water bodies,
 - 3D land rights, restrictions, responsibilities

Is 3D Cadastre Enough?



- ▣ The Answer is **NO**
- ▣ Our World is Dynamic
 - Spatial-temporal Changes
- ▣ Therefore, we need spatial-temporal periodic 3D modelling
- ▣ **The Current Drawback:**
 - Application of independent 3D modelling methods
 - Arduous and time consuming process
 - Impossible to be implemented in real-life situations

Is 4D Cadastre Enough?



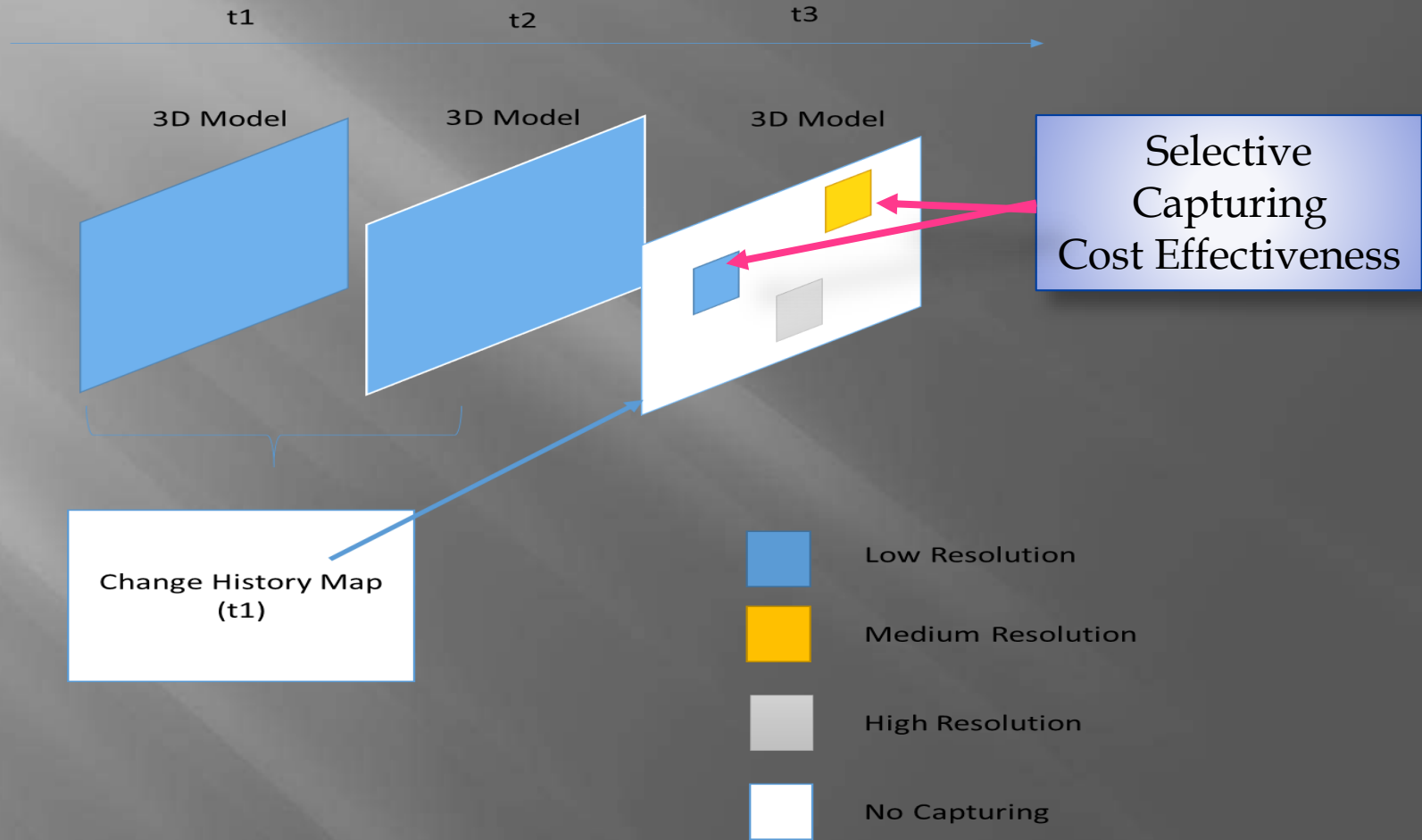
- ▣ The Answer is again **NO**
- ▣ Several Actors are involved in the world of land management
 - Engineers, Lawyers, Public Authorities, Real Estate
- ▣ Each Actor has quite different requirements
 - Requiring modeling at different scales
- ▣ Therefore creating high fidelity 3D or 4D models is not a cost effective approach

5D Land information Systems

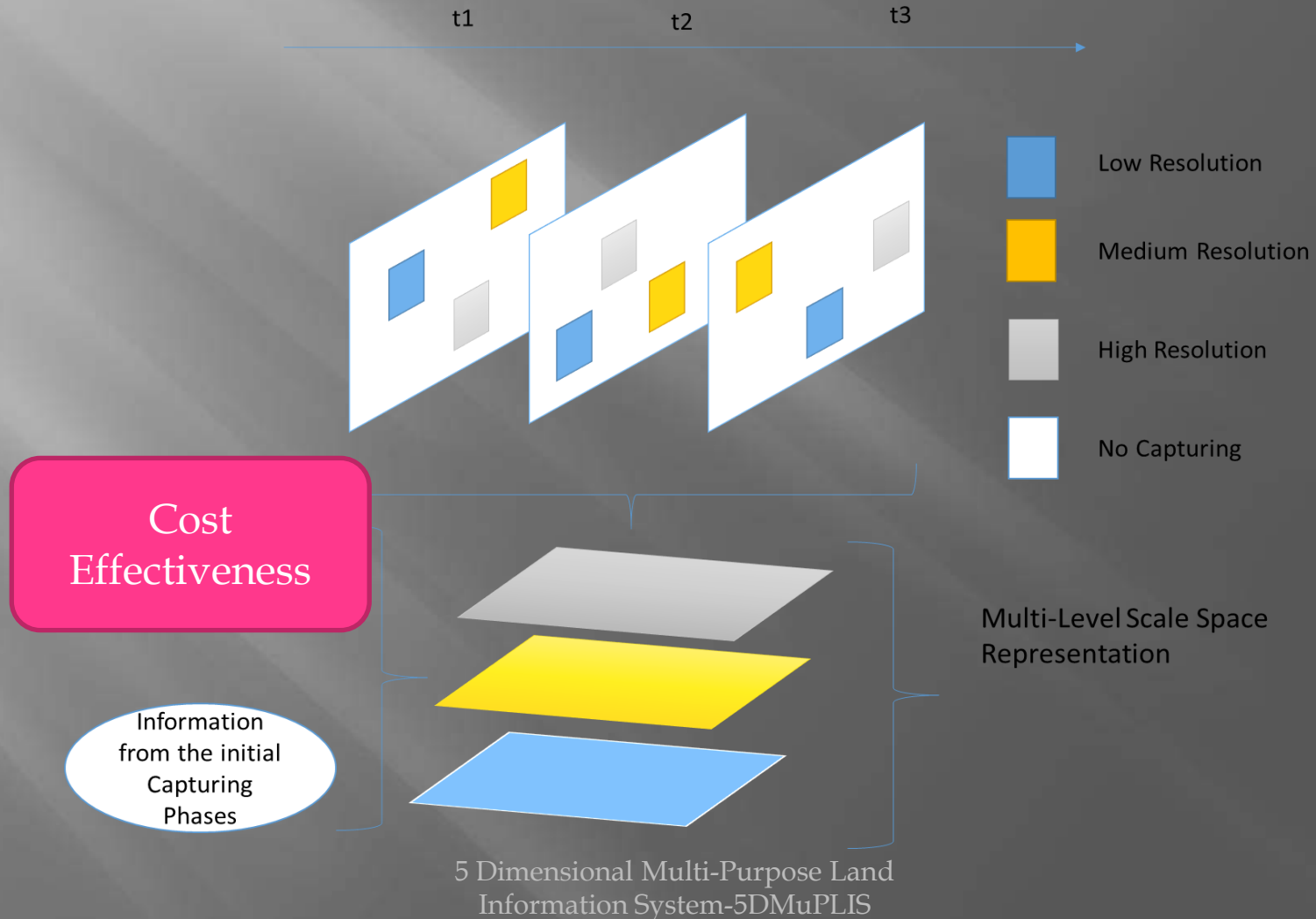


- ▣ 5D Land information Systems
 - 3D Information + Time + Scale
- ▣ A Cost Effective Solution for 3D Modeling spatial temporal changes at different scales

Creation of Change History Maps



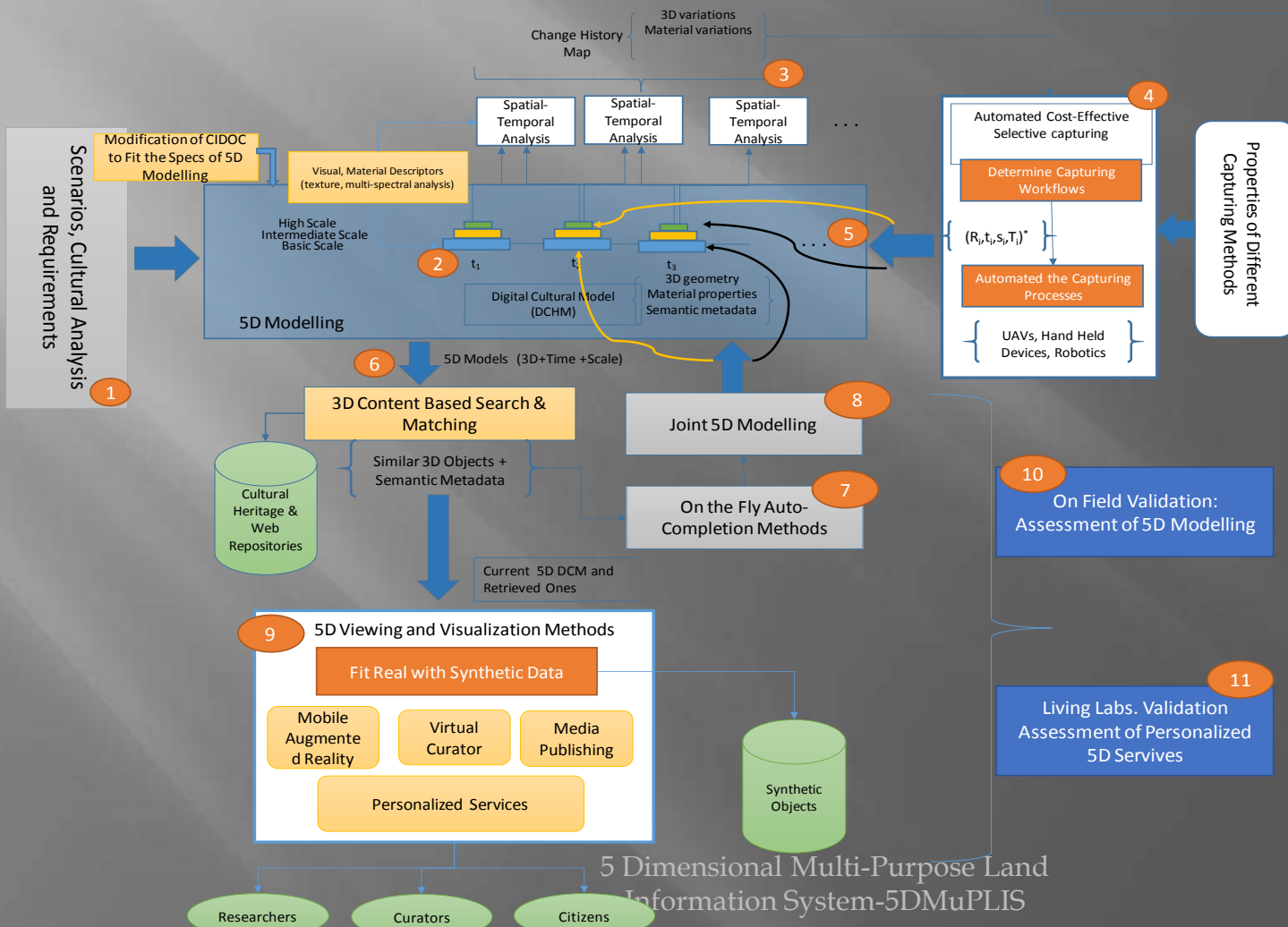
Creation of Scale Space Representations from Partial Models



Joint Reconstruction & Selective 3D Modeling



R_i Spatial Regions
 t_i Time Instance
 s_i Scale
 T_i Specific Capturing Technology (or a combination of)



5 Dimensional Multi-Purpose Land Information System-5DMuPLIS

- Researchers
- Curators
- Citizens

Semantic information



- ▣ Metadata are critical for an efficient implementation of a 5D cadastre architecture
- ▣ They allow
 - Grouping of surfaces based on high level properties
 - ▣ (e.g., shape related features)
 - Joint reconstruction, template 3D models are used for the representation of object surfaces
 - Create dynamic links, clusters of similar high levels properties

Conclusions



- ▣ 5D modeling is essential for spatial-temporal assessment and provisioning of personalized services to different actors
- ▣ Simple aggregation of independent 3D models is not a cost effective solution; impossible to be practically implemented
- ▣ Therefore we need
 - Spatial-temporal analysis, joint modeling, semantic grouping, shape repairing strategies