



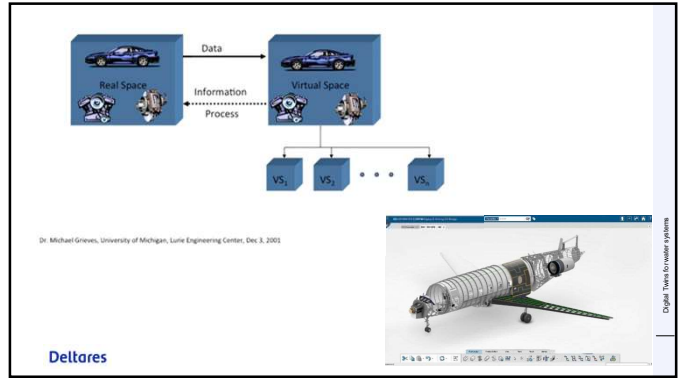
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Digital twins for water systems

Fedor Baart, Tjitte Nauta and Kun Yan

Digital Twin Technology in Water and River Management" the 18th World Water Congress; Beijing China, 11-15 Sept 2023

1



Real Space ↔ Data → Virtual Space

Information ↔ Process

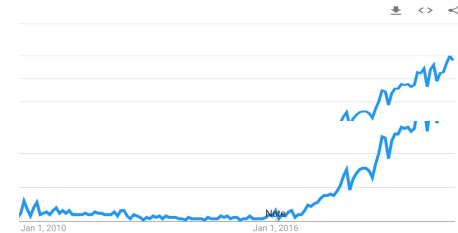
VS₁, VS₂, ..., VS_n

Dr. Michael Grieves, University of Michigan, Lurie Engineering Center, Dec. 3, 2003

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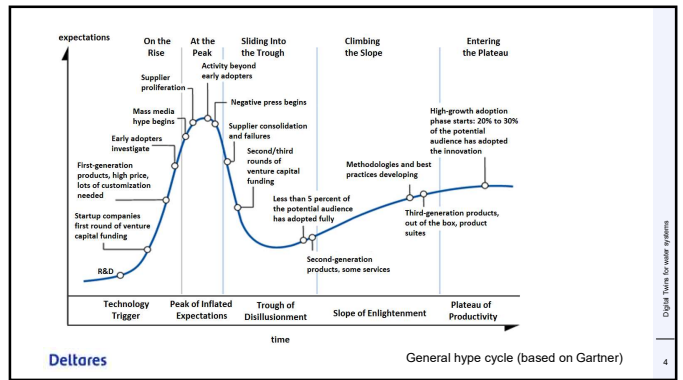
Emerging technologies: digital twins



Jan 1, 2010 Jan 1, 2016

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expectations

On the Rise At the Peak Sliding Into the Trough Climbing the Slope Entering the Plateau

Supplier proliferation, Mass media hype begins, Early adopters investigate, First-generation products, high price, lots of customization needed, Startup companies first round of venture capital funding, R&D

Activity beyond early adopters, Negative press begins, Supplier consolidation and failures, Second/third rounds of venture capital funding needed, Less than 5 percent of the potential audience has adopted fully, Second-generation products, some services

High-growth adoption phase starts: 20% to 30% of the potential audience has adopted the innovation, Methodologies and best practices developing, Third-generation products, out of the box, product suites

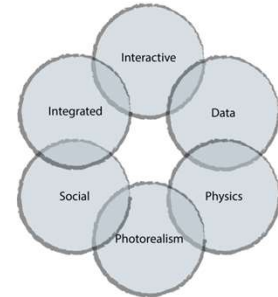
Technology Trigger Peak of Inflated Expectations Trough of Disillusionment Slope of Enlightenment Plateau of Productivity

time

Deltares General hype cycle (based on Gartner)

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Environmental Digital Twin: 6 components



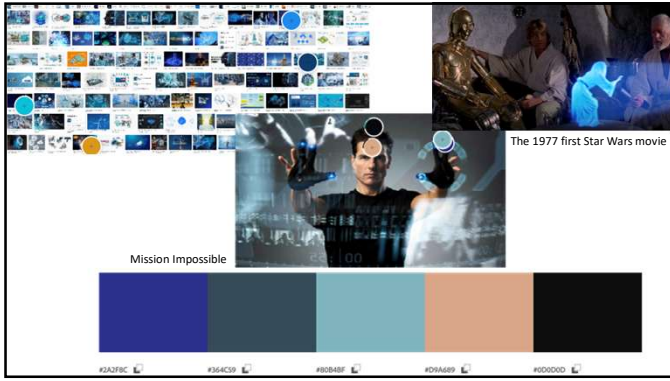
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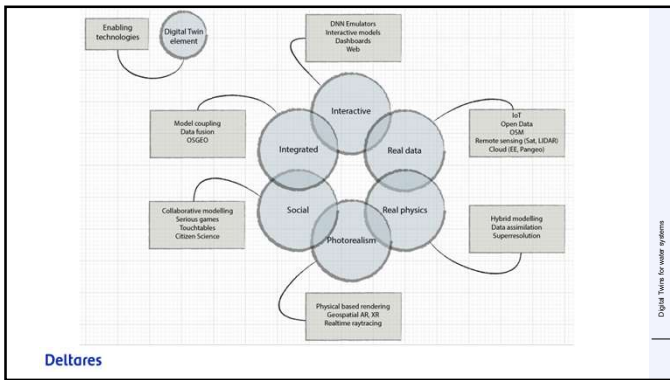
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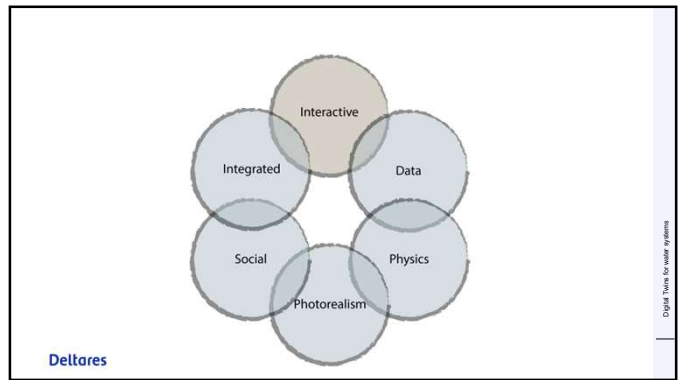
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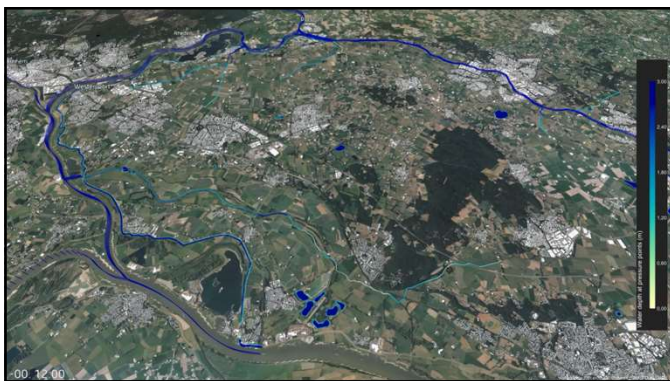
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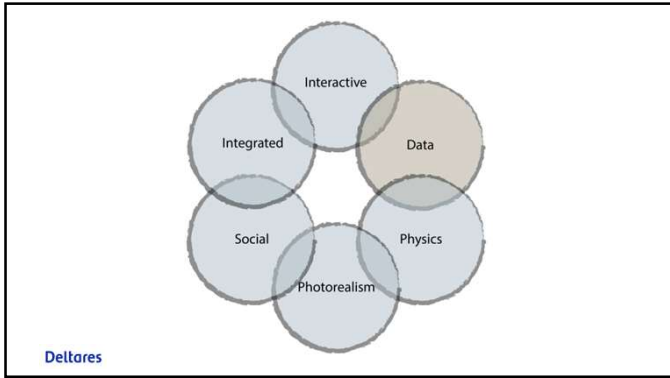
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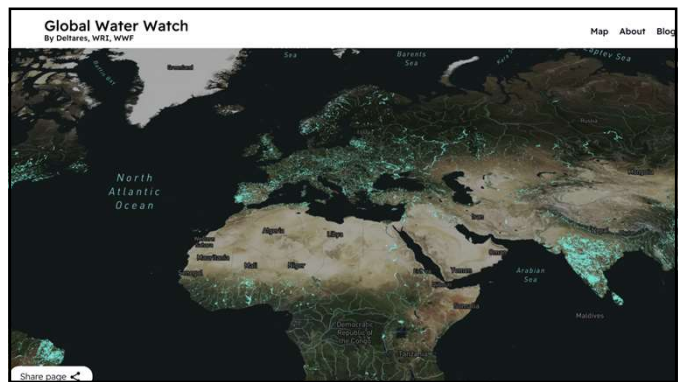
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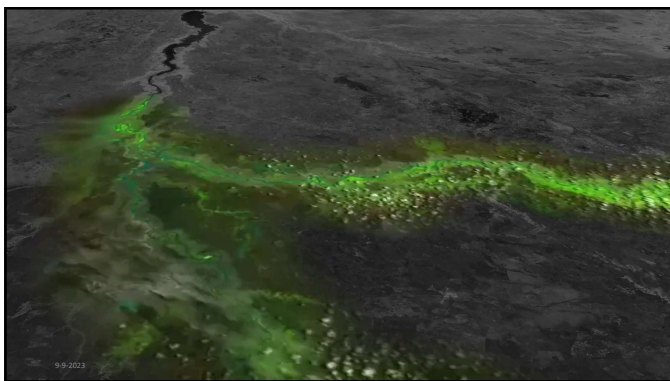
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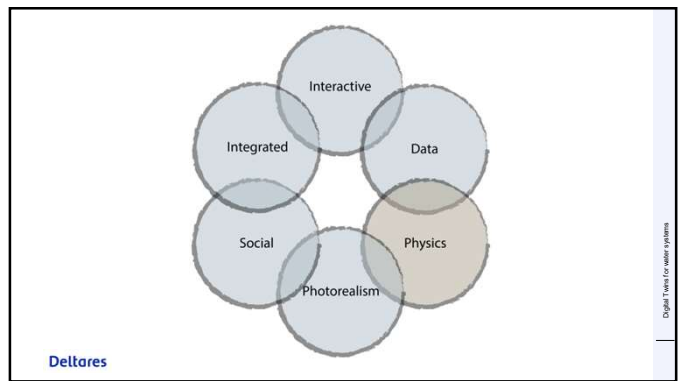
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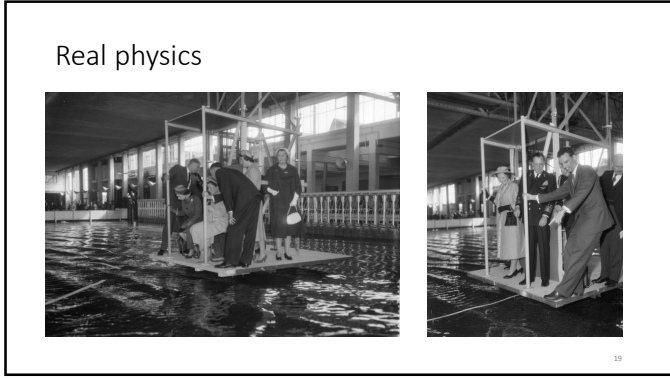
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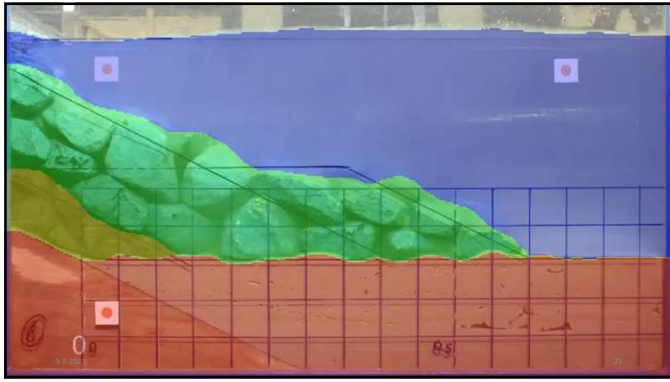
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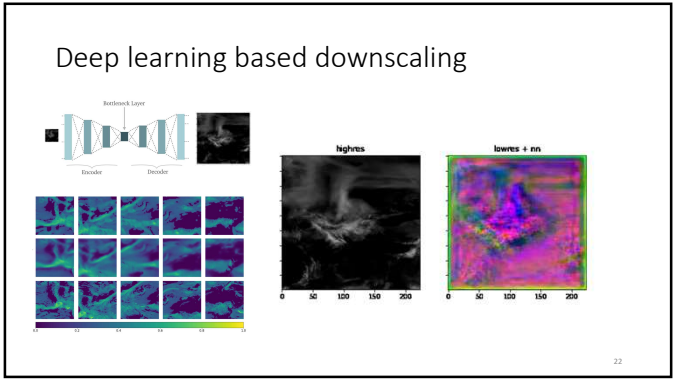
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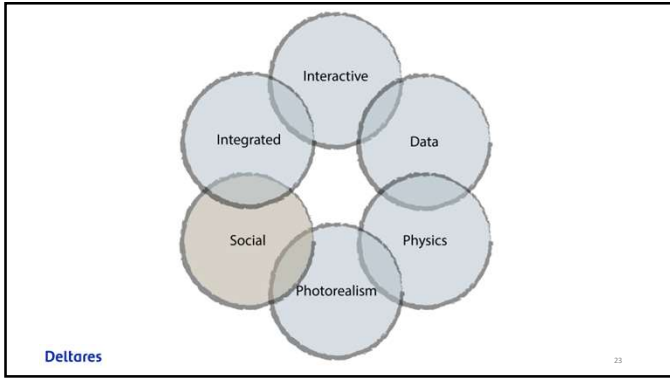
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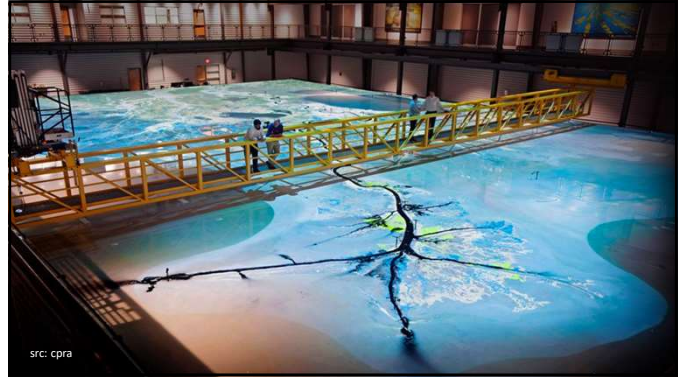
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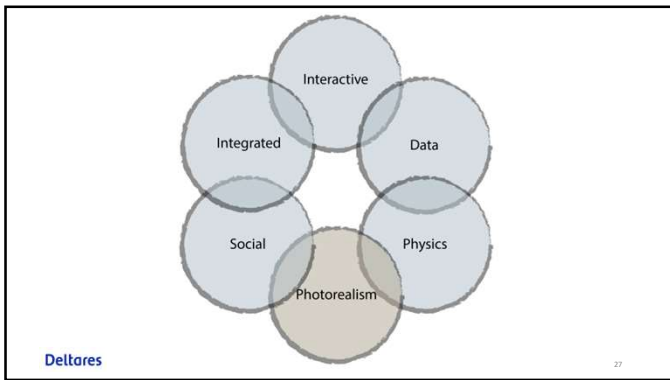
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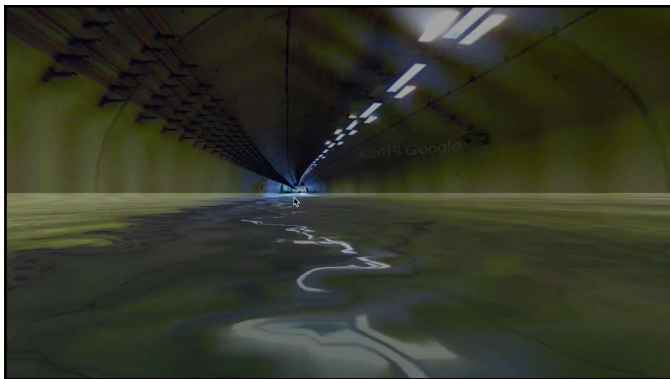


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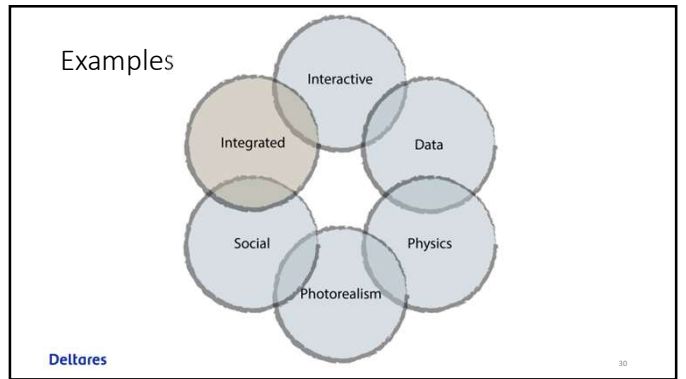
Digital Twin North Sea
 Customer: IenW
 Partners: Maris, Buas, WMR, RWS

Location	Status	Capacity
112 MW		
1469 MW		

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Digital Twin Earth

DestinE Technical Architecture

Europe is building a 'digital twin' of Earth to revolutionize climate forecasts

By Paul Vasquez | Oct 1, 2020, 10:40 AM

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Microsoft: azure digital twin & planetary computer

A Planetary Computer

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Google Earth Engine

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Digital Twin SALTSolutions

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Expectations versus importance

Rank	Expect	Most essential
1	visualization	interactive
2	data	data
3	physics	realtime
3	interactive	integrated
4	realtime	physics
5	social	social
6	integrated	visualization

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Thank you for your attention!

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Regional Manager Asia - Pacific

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