

An aerial photograph of a rural landscape. A river flows through the scene, bordered by green fields and a dirt path. In the center, there is a large white house with a red-tiled roof and a dormer window. To the left, there are several smaller buildings, including a red one and a wooden shed. The area is surrounded by lush greenery and trees. The lighting suggests a bright, sunny day.

D-HYDRO Regional Hydrology and Urban



D-HYDRO geschikt maken voor Waterschapstoepassingen



Inschatting kostenplaatje: 3.1 M€

- Pre-alpha (prototype)
- Alpha
- Beta
- General Availability (GA)

	1 June 2019	AANBOD	PROJECT
D-HYDRO / Delft3D FM Suite			
D-Flow FM			
1D			
Rural			1D2D
Urban			1D2D
River		?	WS / RIV?
Linking options:			
1D2D embedded (rural)			1D2D
1D2D vertical stacked (urban)			1D2D
1D2D lateral (river)		?	WS / RIV?
1D2D longitudinal (coastal, lake)		?	?
2D			B&O
3D			3D
Z-layer sigma			?
D-Real Time Control			
2D			B&O
3D		?	?
D-Morphology			
2D			B&O
3D		?	?
D-Waves			
2D			B&O
3D		?	?
D-Water Quality			
2D			B&O
3D		?	3D
D-Hydrology			
Lumped		?	1D2D
Distributed		?	1D2D
Python scripting			
3D Interactive Viewer (DFX)			?
Linux			
Windows 10			B&O
Open source			?

D-Flow FM			
1D			
Rural			
Urban			
River			?

Linking options:			
1D2D embedded (rural)			
1D2D vertical stacked (urban)			
1D2D lateral (river)			
1D2D longitudinal (coastal, lake)			

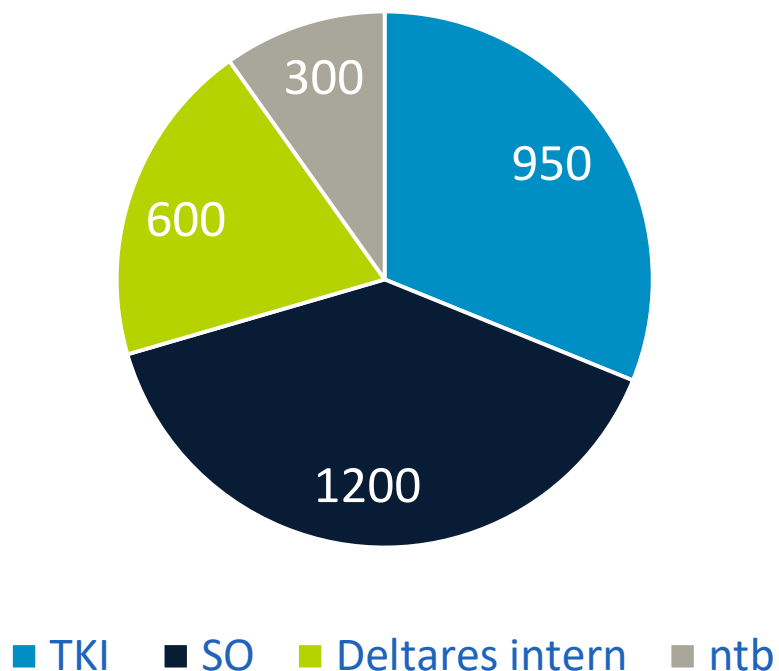
D-Hydrology			
Lumped			
Distributed			

Bèta versie omvat: Feature compleet en gevalideerd, met documentatie, inzetbaar in projecten onder bèta testing licentie (i.v.m. mogelijke bugs)
 GA versie omvat: Bèta eigenschappen, maar getest en gevalideerd in projecten

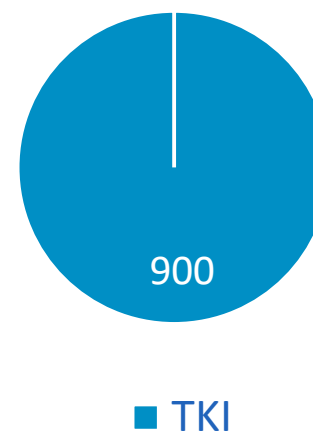
Beoogde financiering D-HYDRO RHU 2019 en 2020

– bedragen in kEur

Software ontwikkeling



Pilots



Budget D-HYDRO RHU project






2019		2020	
totaalplan RHU 3.1 mi Eur			
2.1 mi Eur in 2019		1 mi Eur in 2020	
RH 1,25 + 0,5 mi Eur		RH 0,5 mi Eur	
U 0,35 mi Eur		U 0.23 + 0.27 mi Eur	
	✦	✦	✦
	okt	jul	dec
	dec		

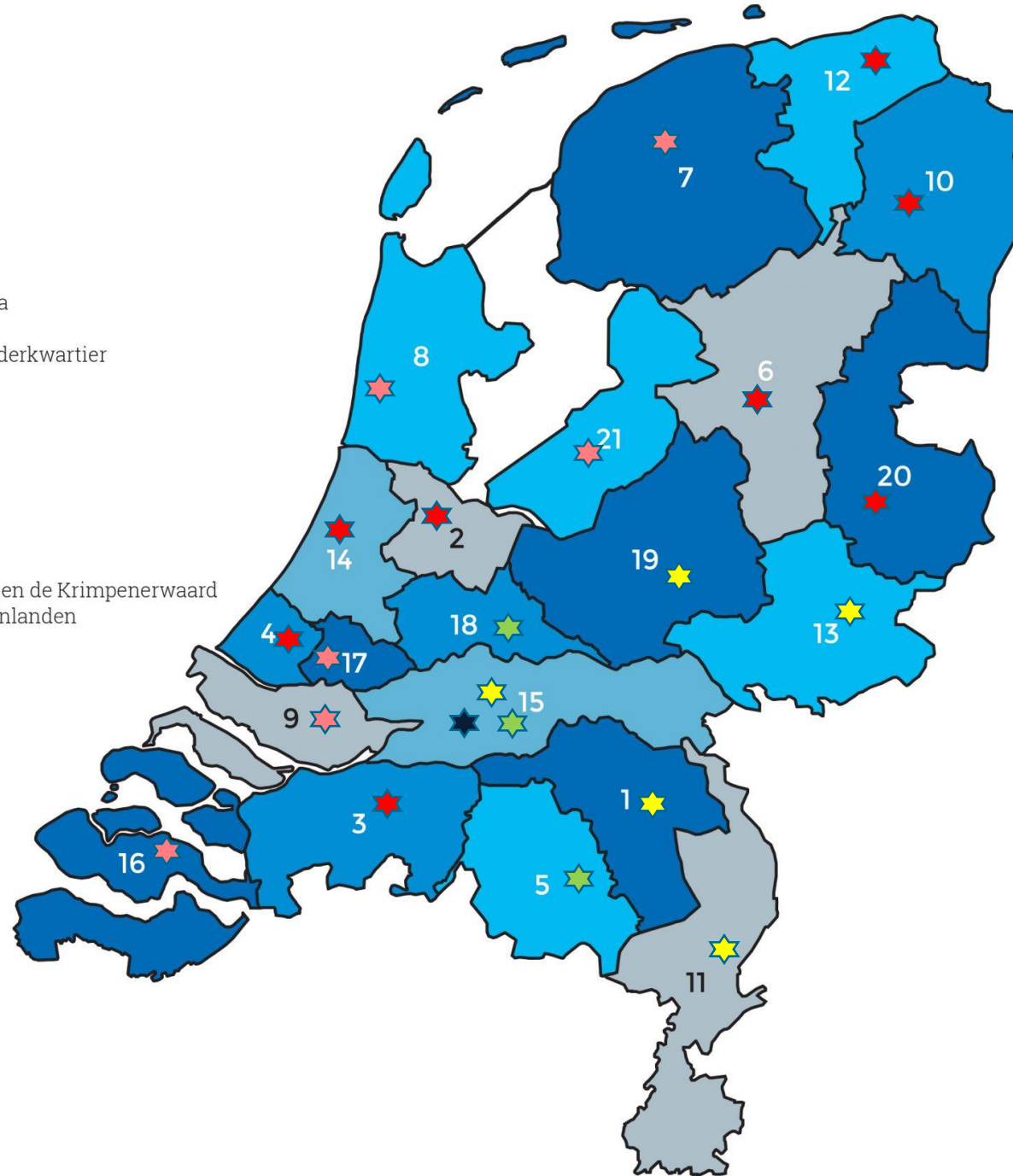
Beta releases

GA releases

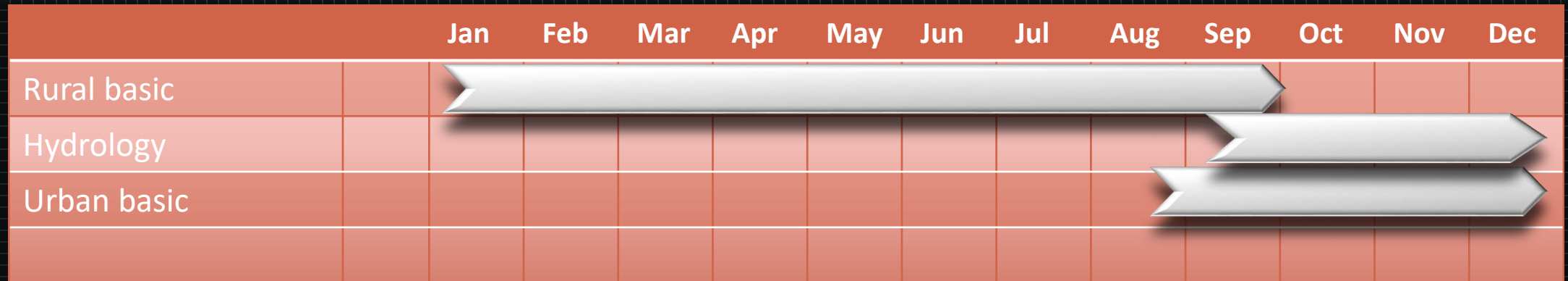
LEGENDA

1. Waterschap Aa en Maas
2. Waterschap Amstel, Gooi en Vecht
3. Waterschap Brabantse Delta
4. Hoogheemraadschap van Delfland
5. Waterschap De Dommel
6. Waterschap Drents Overijsselse Delta
7. Wetterskip Fryslân
8. Hoogheemraadschap Hollands Noorderkwartier
9. Waterschap Hollandse Delta
10. Waterschap Hunze en Aa's
11. Waterschap Limburg
12. Waterschap Noorderzijlvest
13. Waterschap Rijn en IJssel
14. Hoogheemraadschap van Rijnland
15. Waterschap Rivierenland
16. Waterschap Scheldestromen
17. Hoogheemraadschap van Schieland en de Krimpenerwaard
18. Hoogheemraadschap De Stichtse Rijnlanden
19. Waterschap Vallei en Veluwe
20. Waterschap Vechtstromen
21. Waterschap Zuiderzeeland

- TKI Urban 
- TKI Waterschappen 
- TKI Hydrologie 
- TKI RH 
- TKI RH tweede batch 



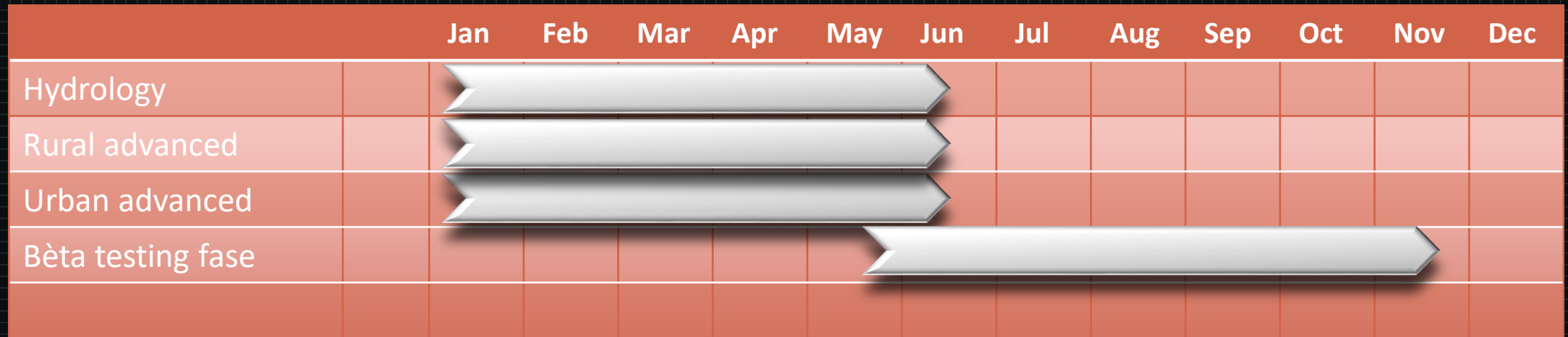
Roadmap D-HYDRO 2019



Belangrijke release data:

- Najaars release (oktober): Rural basic (Bèta versie)
- Winter release (december): Rural basic (+ Hydrologie) + Urban basic (Bèta versie)

Roadmap D-HYDRO 2020



Belangrijke releases:

- Zomer release : Rural advanced + Hydrology + Urban advanced (Bèta versie)
- Winter release : Rural advanced+ Hydrology + Urban advanced (GA versie)

Bèta versie omvat: Feature compleet en gevalideerd, met documentatie (user manual en Technical Reference), inzetbaar in projecten onder bèta testing licentie (i.v.m. mogelijke bugs)

GA versie vat: Bèta eigenschappen, maar getest en gevalideerd in projecten

Ontwikkelstappen (increments) met features

* De huidige 2D functionaliteiten binnen het FM rekenhart vormen het uitgangspunt (startpunt) van waarop wordt doorontwikkeld.

D-HYDRO Suite: Rural basic (Increment 1)

- 1D network
- Cross sections
- Roughness
- Boundaries
- Converters (Importers)
- 1D structures
- Laterals
- Storage nodes (rational method)
- 1D2D links
- 2D line elements (fixed weirs/ levee breach, ...)
- RTC on 1D structures

D-HYDRO Suite: Rural Basic + Hydrology lumped (Increment 2)

- Catchments (lumped)
- Catchments links
- Meteo data
- lumped RR-concepts

D-HYDRO Suite: Rural Basic + Hydrology lumped + Hydrology distributed (Increment 3)

- Distributed RR concept

D-HYDRO Suite: Rural Basic + Hydrology + Urban Basic (Increment 4)

- 1D pipe network
- Sewer objects and structures
- Roof objects
- 1D2D links
- DWF profiles
- Sewer validation and inspection features
- NWRW concept

D-HYDRO Suite: Rural Advanced + Hydrology + Urban Basic (Increment 5)

- Final Rural version, includes all functionalities necessary for rural modelling

D-HYDRO Suite: Rural Advanced + Hydrology + Urban Advanced (Increment 6)

- Final Urban version, includes all functionalities necessary for urban modelling

Ontwikkeling op 'agile' manier: per hoofdonderwerp worden keuzes gemaakt o.b.v. prioritering

Inventarisatie benodigde SOBEK functionaliteiten (1D en RR) voor D-HYDRO					
	Ingevuld door Waterschappen: Vallei en Veluwe (WSVV) Aa en Maas (WSAM) Limburg (WSLB) Rijn en IJssel (WSRIJ) Rivierenland (WSRL) De Dommel (WSDommel) Hoogheemraadschap De Stichtse Rijnlanden (HDSR)	Score per functionaliteit Totale score is optelling van individuele score's van Waterschappen 1.00 = maximale score: voor alle waterschappen "must have" 0.50 = middelste score: voor alle waterschappen "nice to have" 0.00 = laagste score: voor alle waterschappen "not needed"			
Onderwerp	Functionaliteit	totale score	must have*	nice to have*	not needed*
Hydrologie-lumped (RR)	RR-paved	0,93	xxxxxx	x	
	RR-unpaved	0,79	xxxxx	x	x
	RR-greenhouse	0,79	xxxxx	xxx	
	RR-open water rain/evap	0,86	xxxxx	xx	
	RR-structures	0,79	xxxxx	x	x
	RR-industrie	0,43		xxxxxxx	x
	RR-RwZI	0,93	xxxxxxx	x	
	RR-Sacramento	0,07		x	xxxxxxx
	RR-HBV	0,36	xx	x	xxxx
	RR-Wagmod (Wageningen model)	0,21	x	x	xxxxx
	RR-Walrus	0,64	xxxxx	x	xx
	RR-LGSI	0,07		x	xxxxxxx
	RR-SCS	0,00			xxxxxxx
	RR-NWRW	0,14		xx	xxxxxx
	RR-boundary (can be coupled to 1D lateral)	0,93	xxxxxxx	x	
	RR routing link	0,86	xxxxx	xx	
RR unpaved surface flow link / groundwater flow link	0,43		x	xxxx	xx
1D Flow <i>kunstrinken</i>	weir (rechte stuw)	1,00	xxxxxxx		
	orifice	1,00	xxxxxxx		
	pump	1,00	xxxxxxx		
	culvert (culvert, siphon, inverted syphon)	1,00	xxxxxxx		
	bridge (pillar, abutment, soil bed, fixed bed)	1,00	xxxxxxx		
	universal weir	1,00	xxxxxxx		
	river weir (RWS)	0,50	xx	xxx	xx
	advanced weir	0,57	xxx	xx	xx
	river pump	0,43	xx	xx	xxx
	general structure	0,64	xxx	xxx	x
	compound structure;	0,64	xxxxx	x	xx
	database structure	0,50	xxx	x	xxx
	<i>cross-sections</i>	trapezium (ty 1)	1,00	xxxxxxx	

Development team



Product Owners D-HYDRO RHU



Kernel:



Product Owner



Architect



Scrum master



developers



Testbank

Testers:



GUI:



Product Owner



Architect



Scrum master



Requirements Engineer



Developers

Quality Owners:



Uniforme bestandsinvoer

- D-Flow FM en SOBEK komen samen.
- Riviermodellers hebben soms andere aanpakken dan rural modellers.
- Het moet wel makkelijk blijven.

D-Flow Flexible Mesh, User Manual

Keyword	Type	Default	Description
<i>(continued from previous page)</i>			
frictionIds	String[]		Space separated list of roughness variable names associated with the roughness sections. Either this parameter or frictionTypes should be specified. If sectionCount=1 and neither parameter is specified, the frictionIds defaults to "Main".
frictionTypes	Int[]		Space separated list of roughness types associated with the roughness sections (see section B.16 for encoding). Either this parameter or frictionIds should be specified. Can be specified as a single value if all roughness sections use the same type.
frictionValues	Double[]		Space separated list of roughness values; their meaning depends on the roughness types selected (only used if frictionTypes specified).

defines one roughness variable. The following roughness types have been implemented

- ◇ 0 = Chezy C ($m^{1/2}/s$)
- ◇ 1 = Manning n ($s/m^{1/3}$)
- ◇ 2 = White-Colebrook k_{m} (m) – Delft3D style
- ◇ 3 = White-Colebrook k_{m} (m) – WAQUA style
- ◇ 7 = White-Colebrook k_{m} (m) – Strickler style
- ◇ 8 = Strickler k_s ($m^{1/3}/s$)
- ◇ 9 = Bos-Bijkerk γ (-)

The file description is given below.

Table B.7: Roughness definition.

Keyword	Type	Default	Description
[General]			
fileVersion	String	2.00	File version. Do not edit
fileType	String	roughness	File type. Do not edit
[Global]			
frictionId	String		<i>One global block per file</i> Name of the roughness section
frictionType	Int	1	The global roughness type which is used if no branch definition is given. Starting of this section defines different roughness types. The global default variable
frictionValue	Double		The global default value
[Branch]			
branchId	String		<i>Optional: one block per branch</i> The name of the branch
frictionType	Int	1	The roughness type to use for the encoding of the types. See the table at the beginning of the file for the encoding of the types.
functionType	Int		Function type for the roughness. Possible values: ◇ 0 = Constant ◇ 1 = Function of discharge ◇ 2 = Function of water depth
numLevels	Int		Number of levels in table
levels	Double[]		Discharge (m^3/s) or water depth (m) for each level
numLocations	Int	0	Number of levels in table
chainage	Double[]		Space separated list of location values (m). Location values are relative to the start of the chainage.
frictionValues	Double[][]		numLevels lines of space separated lists of numLocations values. The meaning of the values depends on the roughness type selected (see

GUI ontwikkelingen

The screenshot displays the D-Flow FM Suite 2019.02 HM (1.5.2.43851) GUI. The main window shows a map of the Netherlands with various geographical features and infrastructure. The interface includes several toolbars and panels:

- Top Menu Bar:** File, Home, View, Tools.
- Map Toolbar:** Select, Measure Distance, Show Profile, Time Series, Export As Image, Map Coordinate System, Feature information, Add tile, Add layer, Move Points, Move Point, Add Point, Remove Point, Legend, Scale Bar, North Arrow.
- Decorations Panel:** Legend, Scale Bar, North Arrow.
- Network Panel:** Network, Features 2D, Region, Network Coverage, Analysis.
- Project Panel:** Project1, Hydro Model, Map, Meteorological Data, Models, D-Flow FM, Cross Section Definitions, Roughness Sections, Settings, Validation Report, Output.
- Properties Panel:** Properties, 2D, 1D, 0D.
- Map Panel:** Map, ~Hydro Model, ~Network, ~Unstructured Grid, ~1D2D Links, ~Catchments, ~Hydro Links, ~Roughness 1D, ~Roughness 2D, ~Bed Level, ~Initial Conditions 1D, ~Initial Conditions 2D, ~Features 1D, ~Models, ~Output, Bing Roads.
- Time Navigator:** Time Navigator, 01/01/0001 00:00:00, Delay: 0.1 sec.
- Bottom Panel:** Messages, Time Navigator, Chart, Map, Operations, Toolbox, 100.00% zoom.

GUI ontwikkelingen

The screenshot displays the Delta Shell GIS application interface. The main window shows a map of a region with a blue unstructured grid overlaid on a polygonal area. The map includes labels for various locations and roads, such as 'De Brekken', 'De Kooi', 'Janesloot', 'Langweer', 'Boornzwaag', 'Houtvaartweg', 'Woudfennen', 'Tramwei', 'E22', 'A7', 'It Noard', 'Ziirde', 'Omkomte', 'Kooilaan', 'Langwarderd', 'Bredyk', 'Langweerd', 'Nunmer', 'Pontdyk', 'Koeverdierhuis', 'Hubberweg', and 'Muzekamp'. A scale bar at the bottom right indicates distances up to 800 meters.

The interface includes a top menu bar with 'File', 'Home', 'View', 'Map', and 'Grid'. Below this is a toolbar with various GIS tools categorized into 'Editing', 'Create', 'Polygon actions', 'Grid actions', 'Generate grid', 'Settings', and 'Map'. The 'Map' menu is open, showing options like 'Grid', 'Polygons', 'Splines', 'Land boundaries', 'Samples', 'Point Cloud', 'Unstructured Grid', and 'Bing Roads'. The 'Settings' panel is also visible, showing options for 'Triangulate cells' and 'Account for land boundaries', with 'Net-boundary to landBoundary' selected.

On the left side, there is a 'Project' pane showing the current project 'Project1' and a 'Properties' pane. At the bottom, a 'Messages' pane displays a log of system events, including messages about closing views, no view registered, and start importing data. The status bar at the very bottom shows 'Undo / Redo', 'Chart', 'Map', 'Toolbox', and a zoom level of '100.00 %'.

Visualisatie D-HYDRO resultaten:

1. D-HYDRO GUI (User interface)

2. Ontsluiting in Q-GIS

Zowel in Q-GIS 2 met Crayfish plugin, als in Q-GIS 3 (v.a. 3.6.3)

3. DFX

3D visualisatie van D-HYDRO resultaten.

