Atlas of Cancer Signaling Networks (ACSN) and NaviCell are user-friendly web-based environments for integrative systems biology of cancer

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What will attract scientific community to participate in model creation, sharing and update?

<u>Addressing the following questions:</u>

1. How to ensure efficient model sharing (easy access repository)?

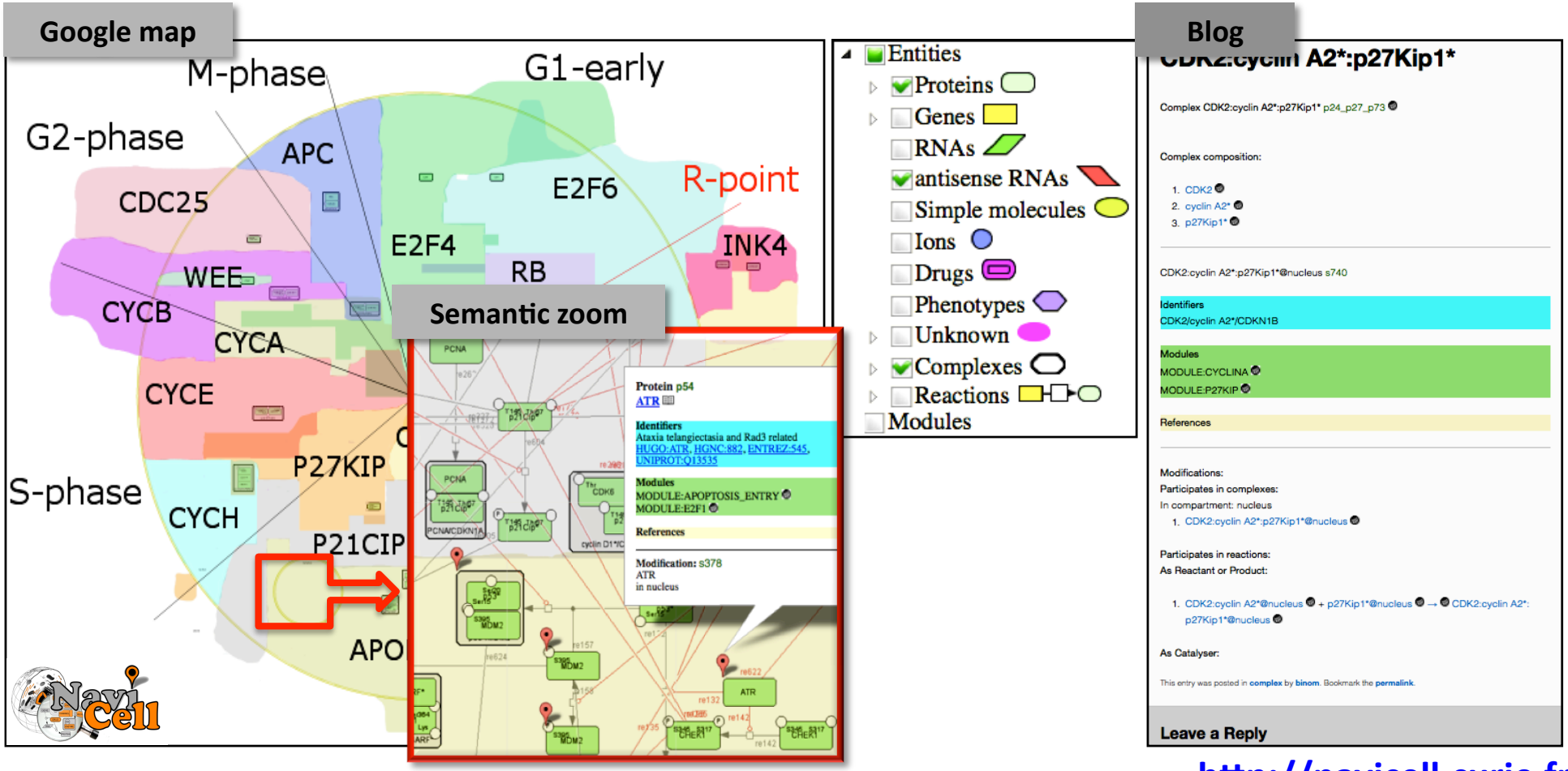
2. How to allow model exploration (efficient navigation tool)?

3. How to organize model curation by scientific community and model update (forum for model commenting and maintenance)?

A web tool for navigation, curation and maintenance of large models

NaviCell = map (Google Maps engine) + Blog (WordPress)

Provides advanced navigation features (semantic zooming; supports hierarchical structure of maps)

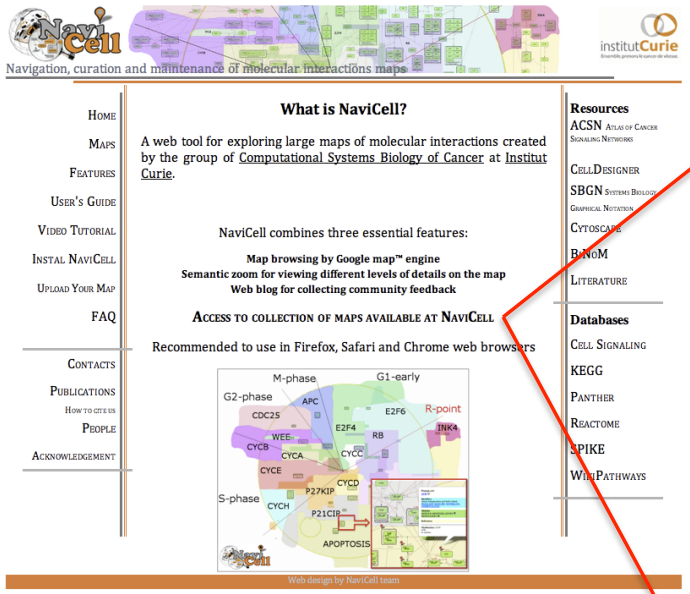


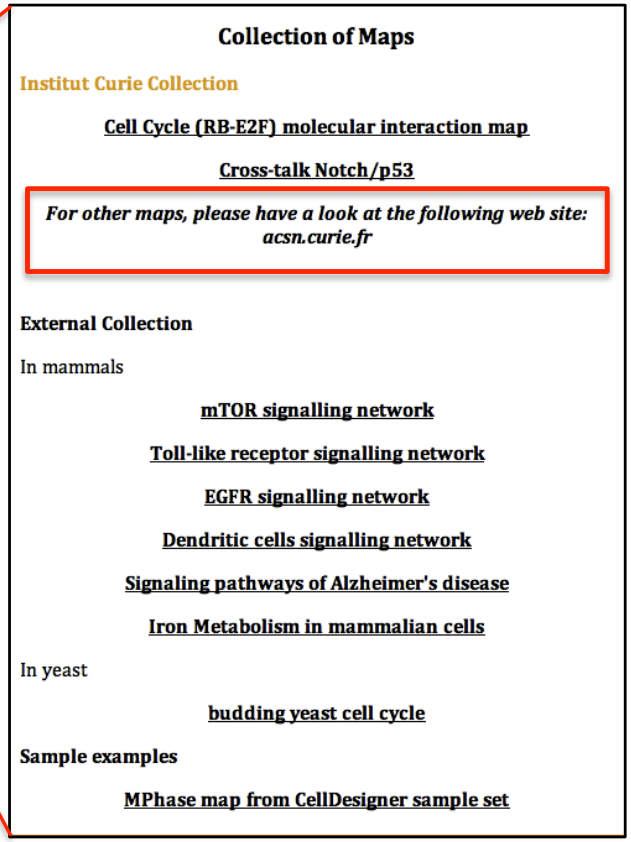
NaviCell: a web tool for navigation, curation and maintenance of large molecular interaction maps.
Kuperstein I, Pook S, Cohen DPA, Calzone L, Barillot E and Zinovyev A (in revison)

http://navicell.curie.fr

navicell@curie.fr

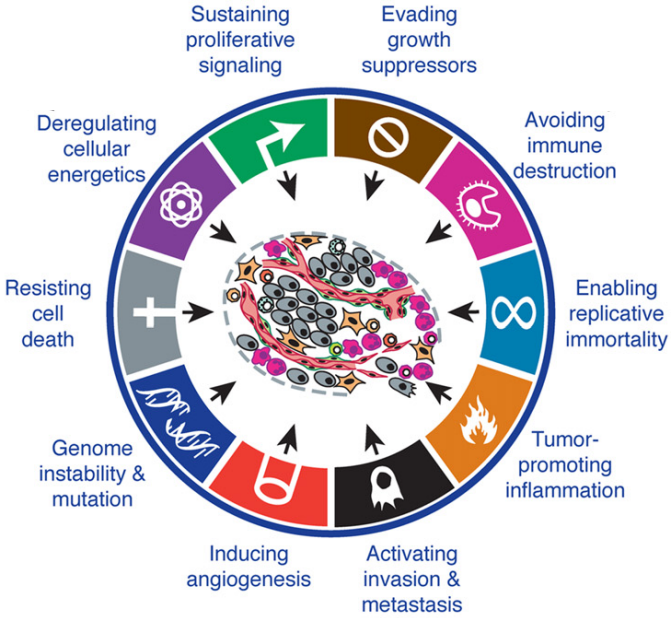
A web repository for available CellDesigner models

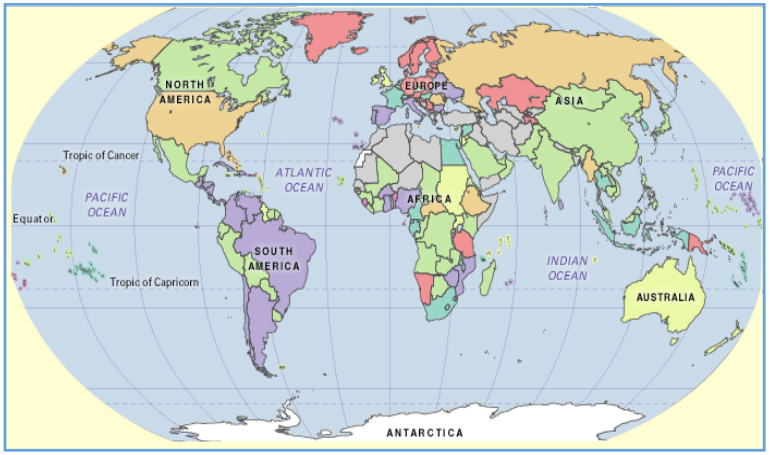


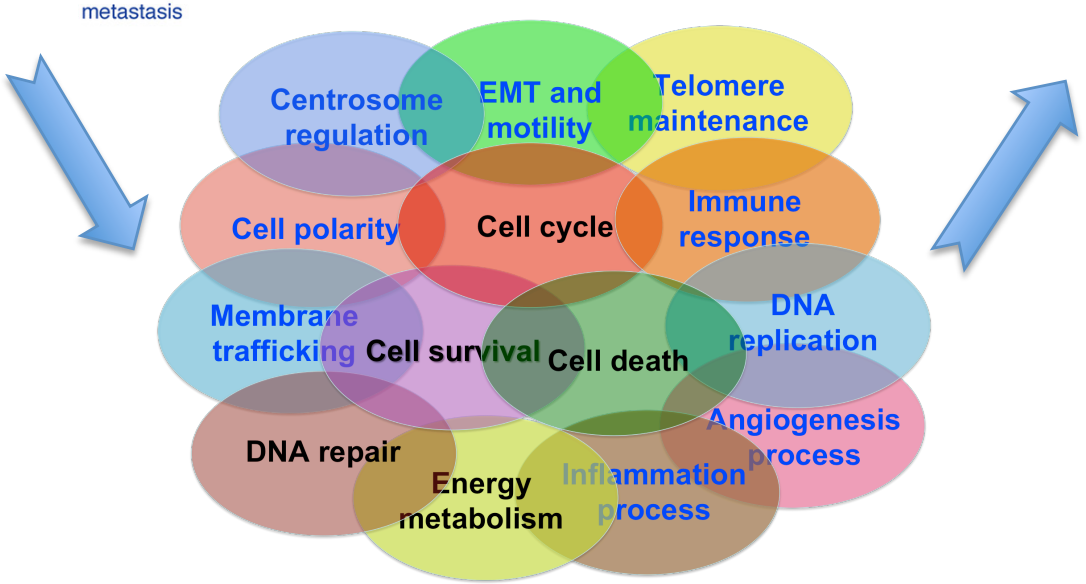


NaviCell is a web tool suitable for visualization, navigation and exposure for community curation of models from any collections or databases or for individual projects

Atlas of Cancer Signalling Networks (rationale)







http://acsn.curie.fr

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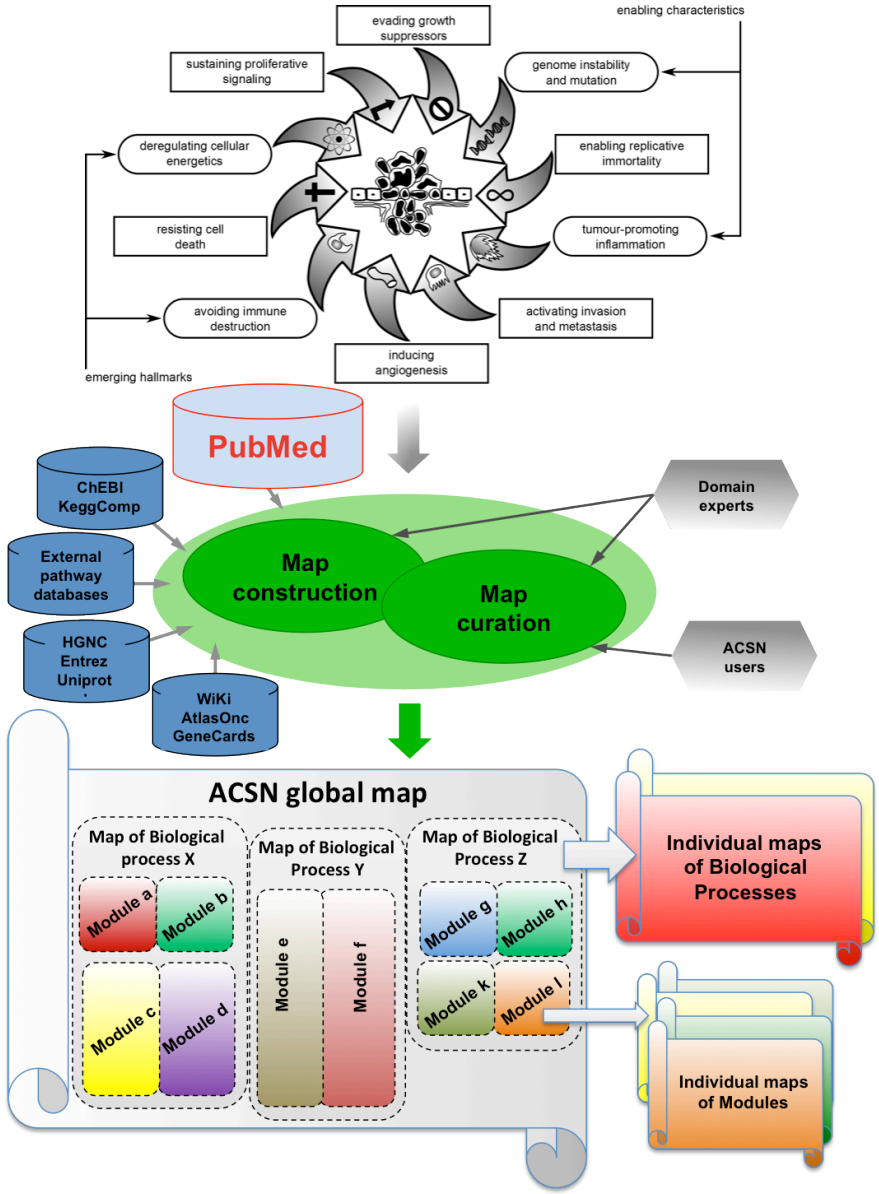
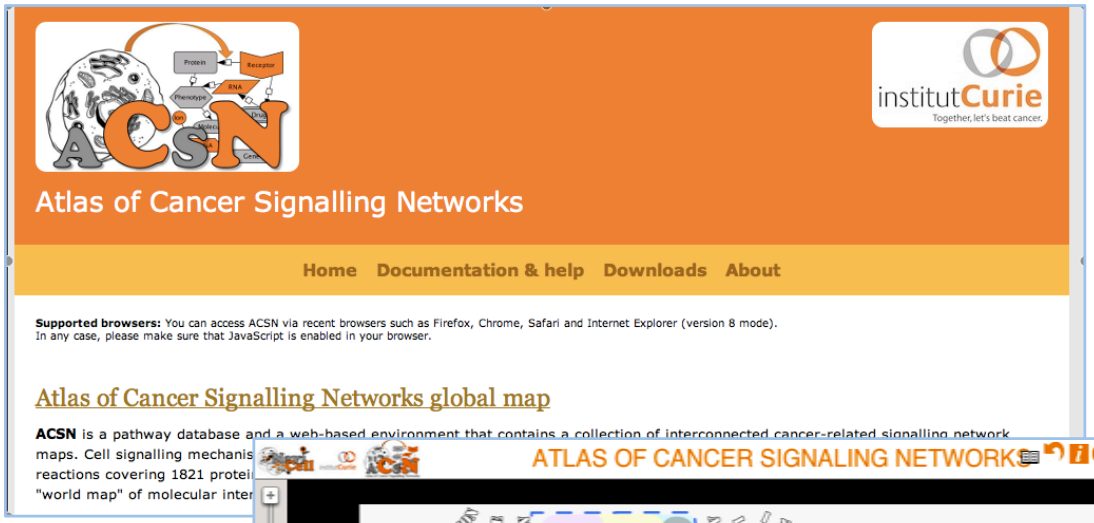
Atlas of Cancer Signalling Networks (structure)

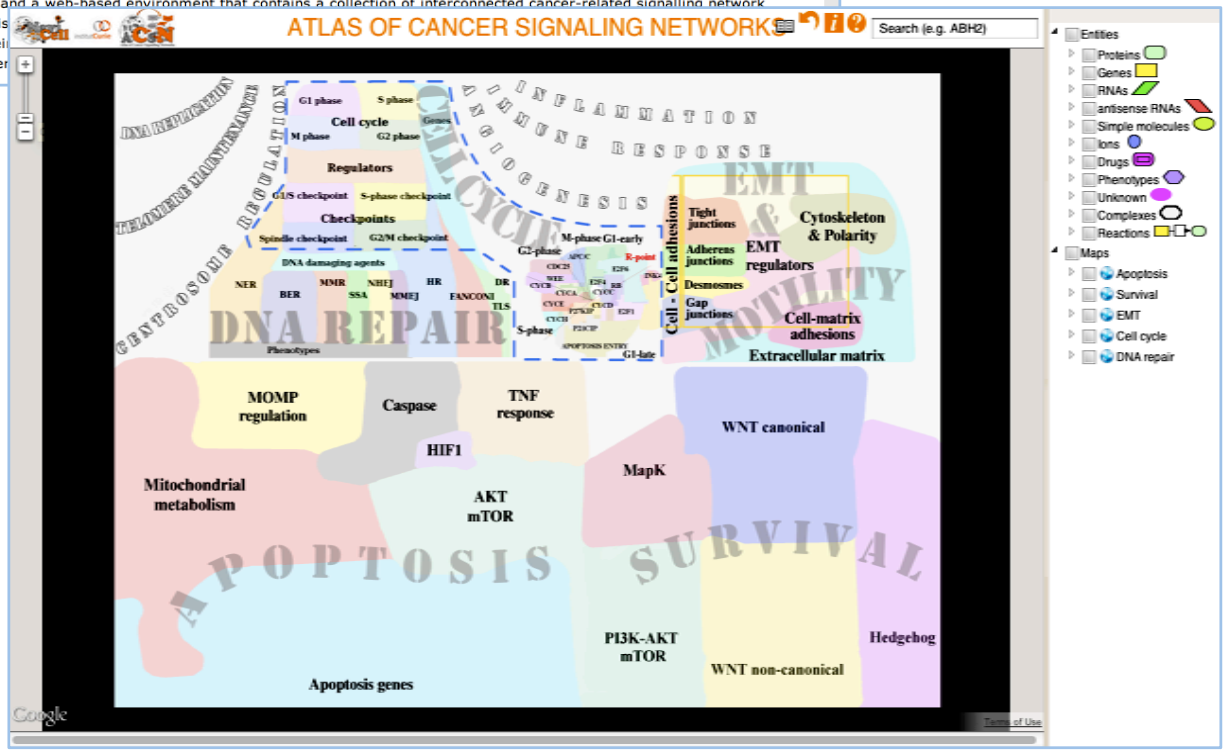


http://acsn.curie.fr

acsn@curie.fr

Atlas of Cancer Signalling Networks (features)





Features:

Cancer-related

Manually curated

Comprehensive

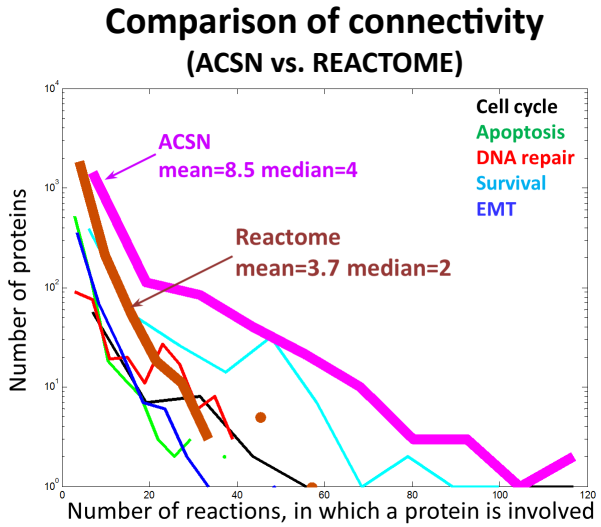
Interconnected

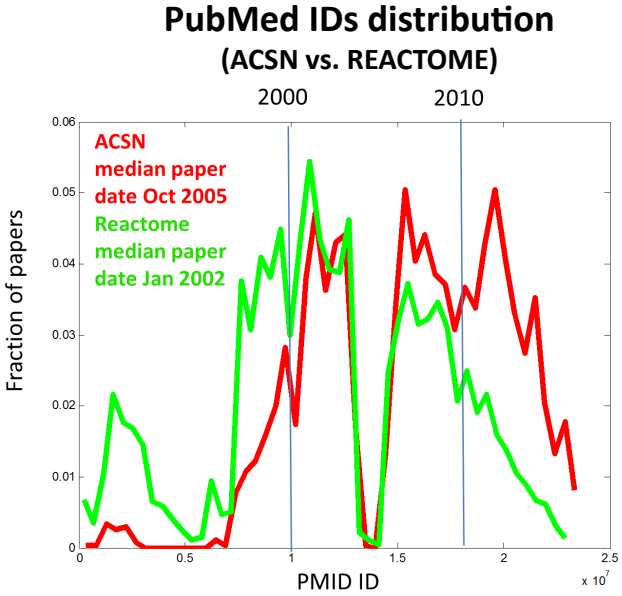
Browsable and zoomable

Applicable for data integration

Atlas of Cancer Signalling Networks (content)

Map/Module	Chemical species	Proteins	Reactions	References	Creation date	Last update
Apoptosis map	**1640**	**687**	**1166**	**595**	2010	2013
AKT_MTOR	142	67	98	61		
CASPASES	197	110	118	109		
HIF1	59	28	30	20		
MITOCH_METABOLISM	704	411	397	212		
MOMP_REGULATION	255	120	184	143		
TNF_RESPONSE	212	113	142	62		
APOPTOSIS_GENES	213	113	142	208		
Cell cycle map	**165**	**78**	**165**	**235**	2008	2011
APOPTOSIS_ENTRY	49	16	24	46		
APC	40	16	24	11		
CDC25	21	9	14	29		
CYCLINA	18	15	8	23		
CYCLINB	31	16	31	37		
CYCLINC	5	7	2	2		
CYCLIND	32	12	20	18		
CYCLINE	31	24	14	19		
CYCLINH	15	12	7	12		
E2F1	34	15	20	27		
E2F4	32	16	17	21		
E2F6	28	18	14	5		
INK4	10	5	5	11		
P21CIP	31	24	15	23		
P27KIP	30	23	15	21		
RB	23	18	10	19		
WEE	10	6	4	11		
Cell survival map	**1926**	**554**	**1304**	**846**	2011	2013
WNT_NON_CANONICAL	442	179	285	179		
WNT_CANONICAL	201	336	492	221		
HEDGEHOG	351	97	245	251		
PI3K_AKT_MTOR	393	128	262	203		
MAPK	248	100	176	64		
DNA repair map	**709**	**377**	**505**	**593**	2010	2013
CHECKPOINTS	N.a.	N.a.	N.a.	N.a		
G1_S_CHECKPOINT	66	38	34	141		
S_PHASE_CHECKPOINT	83	43	45	122		
G2_M_CHECKPOINT	98	47	61	176		
SPINDLE_CHECKPOINT	39	36	19	77		
CELL_CYCLE	N.a.	N.a.	N.a.	N.a		
G1_CC_PHASE	77	40	46	122		
S_CC_PHASE	114	80	47	140		
G2_CC_PHASE	16	15	26	46		
M_CC_PHASE	65	40	35	75		
DNA_REPAIR_PATHWAYS	N.a.	N.a.	N.a.	N.a		
BER	111	57	57	205		
NER	90	48	36	125		
MMR	57	35	30	130		
HR	121	69	49	230		
NHEJ	58	37	25	158		
MMEJ	36	23	13	115		
FANCONI	115	82	54	182		
TLS	35	24	17	88		
SSA	29	19	13	75		
DR	14	3	8	44		
EMT and cell motility map	**1233**	**571**	**1078**	**522**	2012	2013
EMT_REGULATORS	296	82	199	172		
ECM	250	98	130	146		
CELL_MATRIX_ADHESIONS	218	88	169	59		
CYTOSKELETON_POLARITY	279	206	269	198		
CELL_CELL_ADHESIONS	341	162	324	230		
TIGHT_JUNCTIONS	N.a.	N.a.	N.a.	N.a.		
ADHERENS_JUNCTIONS	N.a.	N.a.	N.a.	N.a.		
DESMOSOMES	N.a.	N.a.	N.a.	N.a.		
GAP_JUNCTIONS	N.a.	N.a.	N.a.	N.a.		
ACSN global map	**5905**	**1821**	**4600**	**2774**	2013	





	Chemical species	Proteins	Reactions	References	Creation date
ACSN global map	**5905**	**1821**	**4600**	**2774**	**2013**

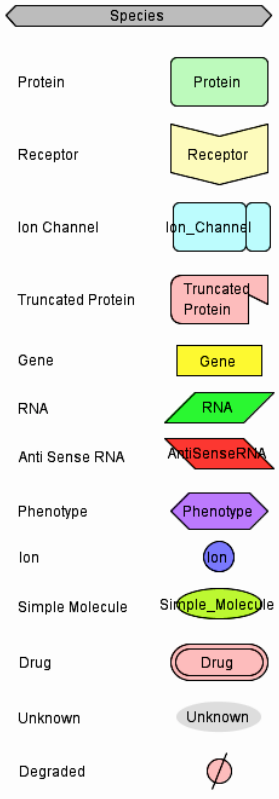
Standards and tools

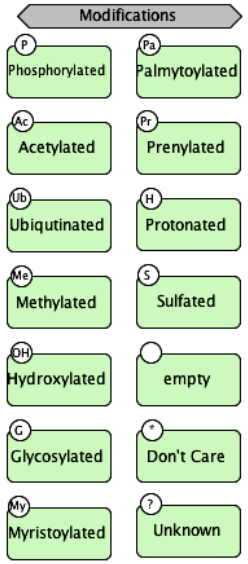
for signaling networks construction

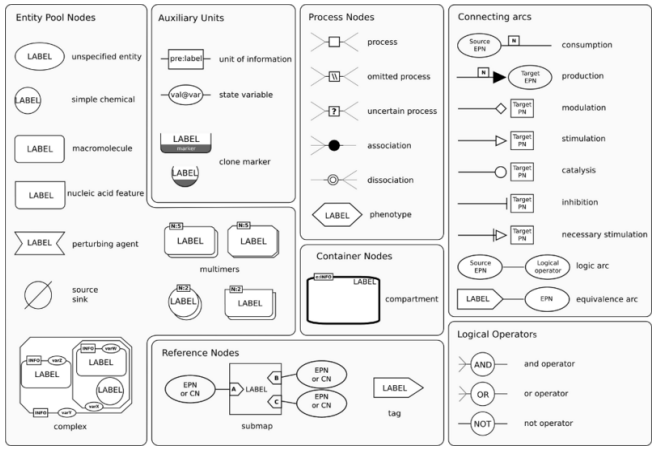
Visual syntax

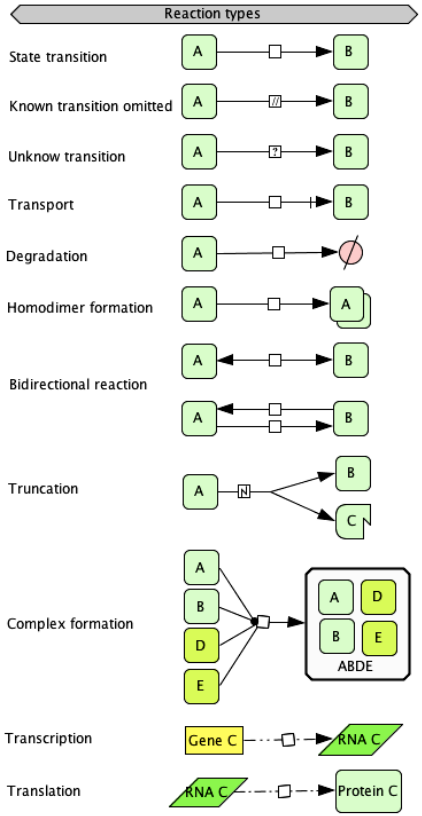
Systems Biology Graphical Notation (SBGN)

Biological molecules and interactions representation









Tool: CellDesigner

Diagram editor for signalling networks representation

CellDesigner.org

The Systems Biology Graphical Notation.
Le Novère N, et. al
Nat Biotechnol. 2009 Aug;27(8):735-41.

Biochemical modeling with Systems Biology Graphical Notation.
Jansson A, Jirstrand M.
Drug Discov Today. 2010 May;15(9-10):365-70.

ACSN DEMO

Conclusions

-NaviCell is a tool that combines several essential features for map navigation, curation, maintenance

-NaviCell uses existing open-source interfaces (Google Maps engine, WordPress)

-NaviCell is a repository of available models created in CellDesigner

-NaviCell can be used as a tool for visualization, navigation and commenting of any models in existing databases or for individual projects

-ACSN is a repository of models related to signalling implicated in cancer

-ACSN is created using systems biology standards and the content of ACSN is available in several exchange formats

-ACSN is a way of representing biological information in the form of territory where biological processes are represented as continents and countries on atlas, in analogy with geographical maps

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institutCurie
Ensemble, prenons le cancer de vitesse.

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Institut national
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