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# **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?**

## **Addressing the following questions:**

- 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)

Google map

Semantic zoom

Blog

### CDK2:cyclin A2\*:p27Kip1\*

Complex CDK2:cyclin A2\*:p27Kip1\* p24\_p27\_p73

Complex composition:

1. CDK2
2. cyclin A2\*
3. p27Kip1\*

CDK2:cyclin A2\*:p27Kip1\*@nucleus s740

**Identifiers**

CDK2/cyclin A2\*/CDKN1B

**Modules**

MODULE:CYCLINA

MODULE:P27KIP

**References**

**Modifications:**

Participates in complexes:

In compartment: nucleus

1. CDK2:cyclin A2\*:p27Kip1\*@nucleus

Participates in reactions:

As Reactant or Product:

1. CDK2:cyclin A2\*@nucleus + p27Kip1\*@nucleus → CDK2:cyclin A2\*:p27Kip1\*@nucleus

As Catalyser:

This entry was posted in [complex](#) by [binom](#). Bookmark the [permalink](#).

Leave a Reply

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 revision)

<http://navicell.curie.fr>

[navicell@curie.fr](mailto:navicell@curie.fr)



# A web repository for available CellDesigner models



Navigation, curation and maintenance of molecular interactions maps

- HOME
- MAPS
- FEATURES
- USER'S GUIDE
- VIDEO TUTORIAL
- INSTALL NAVICELL
- UPLOAD YOUR MAP
- FAQ
- CONTACTS
- PUBLICATIONS
- HOW TO CITE US
- PEOPLE
- ACKNOWLEDGEMENT

### What is NaviCell?

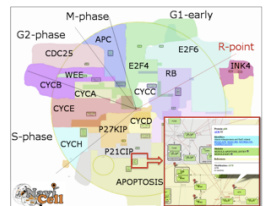
A web tool for exploring large maps of molecular interactions created by the group of Computational Systems Biology of Cancer at Institut Curie.

NaviCell combines three essential features:

- Map browsing by Google map™ engine
- Semantic zoom for viewing different levels of details on the map
- Web blog for collecting community feedback

**ACCESS TO COLLECTION OF MAPS AVAILABLE AT NAVICELL**

Recommended to use in Firefox, Safari and Chrome web browsers



Web design by NaviCell team

### Resources

- ACSN ATLAS OF CANCER SIGNALING NETWORKS
- CELLESDSIGNER
- SBGN SYSTEMS BIOLOGY GRAPHICAL NOTATION
- CYTOSCAPE
- BIOGRID
- LITERATURE

### Databases

- CELL SIGNALING
- KEGG
- PANTHER
- REACTOME
- SPIKE
- WIKIPATHWAYS

## Collection of Maps

### Institut Curie Collection

- Cell Cycle (RB-E2F) molecular interaction map
- Cross-talk Notch/p53

*For other maps, please have a look at the following web site:*  
[acsn.curie.fr](http://acsn.curie.fr)

### External Collection

In mammals

- mTOR signalling network
- Toll-like receptor signalling network
- EGFR signalling network
- Dendritic cells signalling network
- Signaling pathways of Alzheimer's disease
- Iron Metabolism in mammalian cells

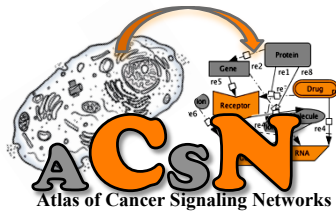
In yeast

- budding yeast cell cycle

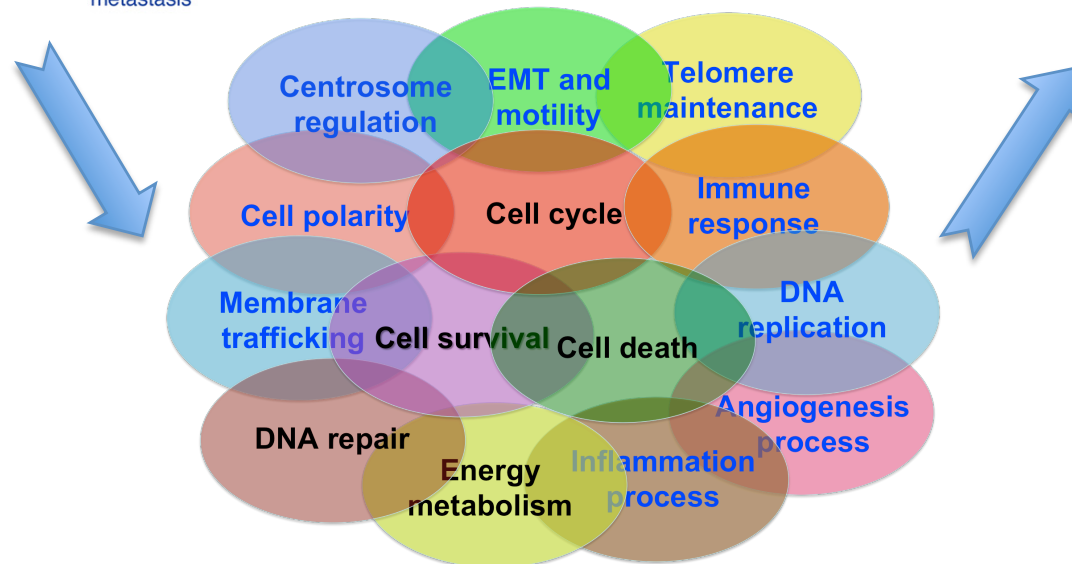
Sample examples

- MPhase map from CellDesigner sample set

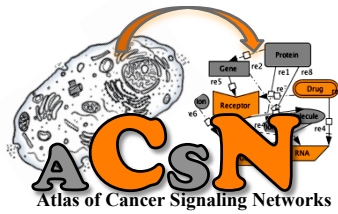
NaviCell is a web tool suitable for visualization, navigation and exposure for community curation of models from any collections or databases or for individual projects



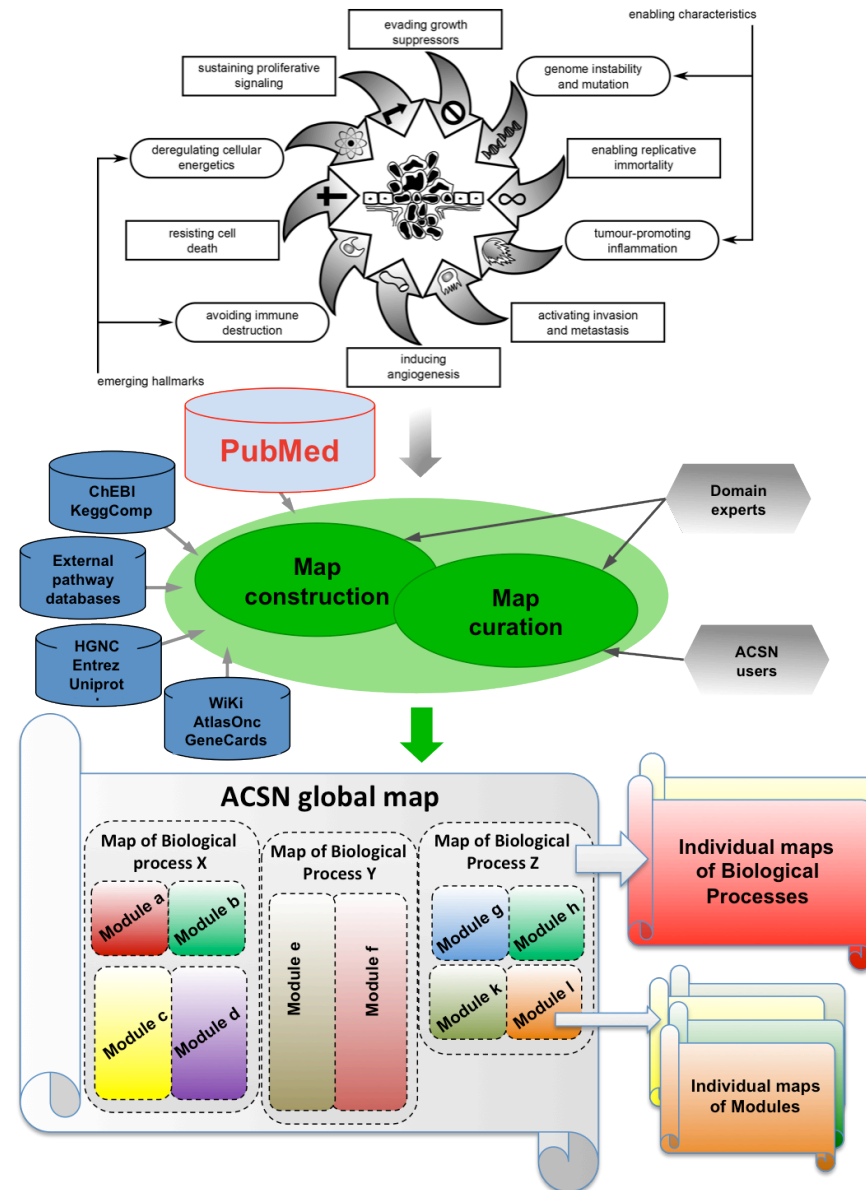
# Atlas of Cancer Signalling Networks (rationale)



<http://acsn.curie.fr>  
acsn@curie.fr



# Atlas of Cancer Signalling Networks (structure)



<http://acsn.curie.fr>  
acsn@curie.fr



# Atlas of Cancer Signalling Networks (features)



institutCurie  
Together, let's beat cancer.

## Atlas of Cancer Signalling Networks

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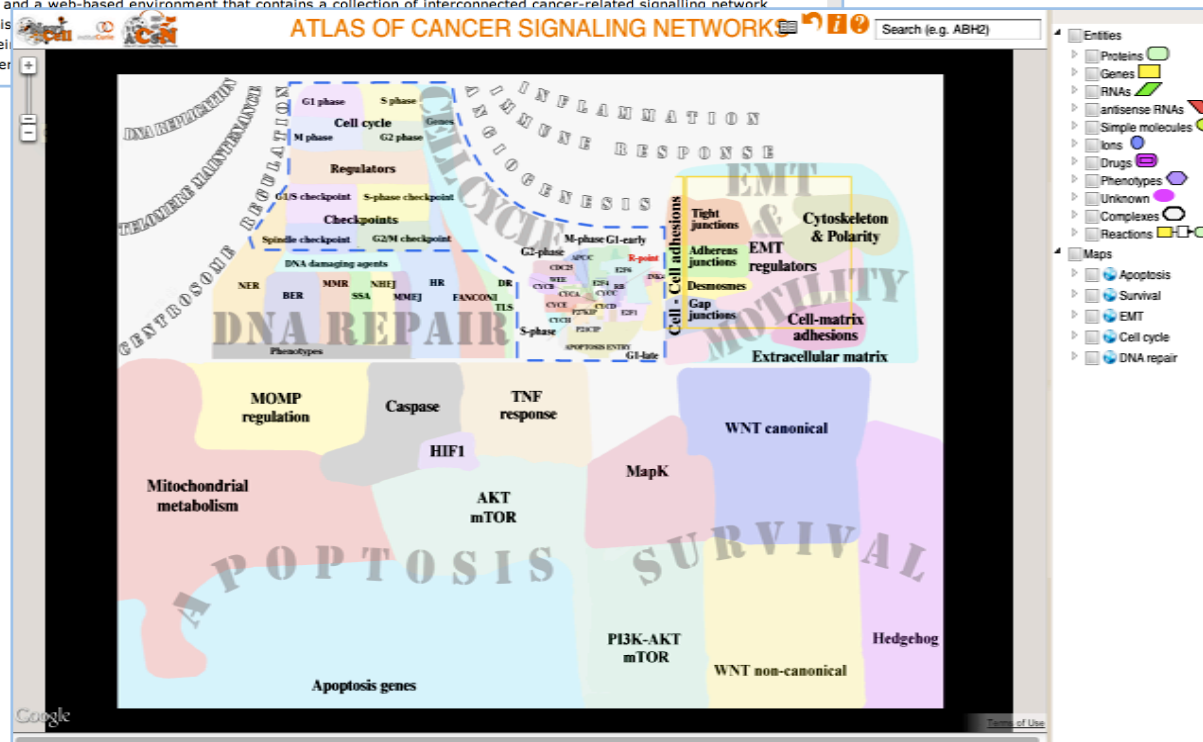
**Supported browsers:** You can access ACSN via recent browsers such as Firefox, Chrome, Safari and Internet Explorer (version 8 mode). In any case, please make sure that JavaScript is enabled in your browser.

[Atlas of Cancer Signalling Networks global map](#)

ACS N is a pathway database and a web-based environment that contains a collection of interconnected cancer-related signalling network maps. Cell signalling mechanisms and reactions covering 1821 proteins and 1821 protein interactions, representing the "world map" of molecular interactions in cancer.

Features:

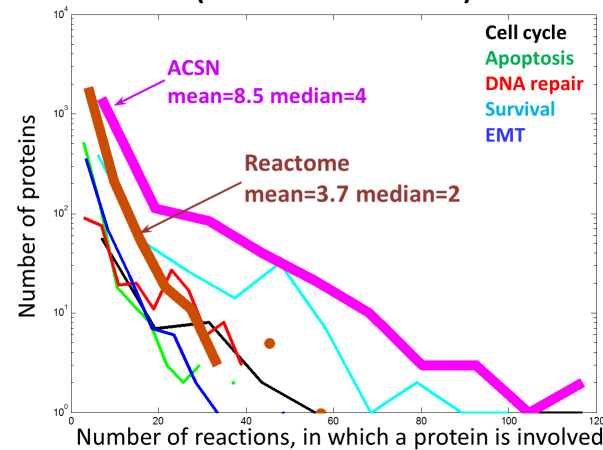
- Cancer-related
- Manually curated
- Comprehensive
- Interconnected
- Browsable and zoomable
- Applicable for data integration



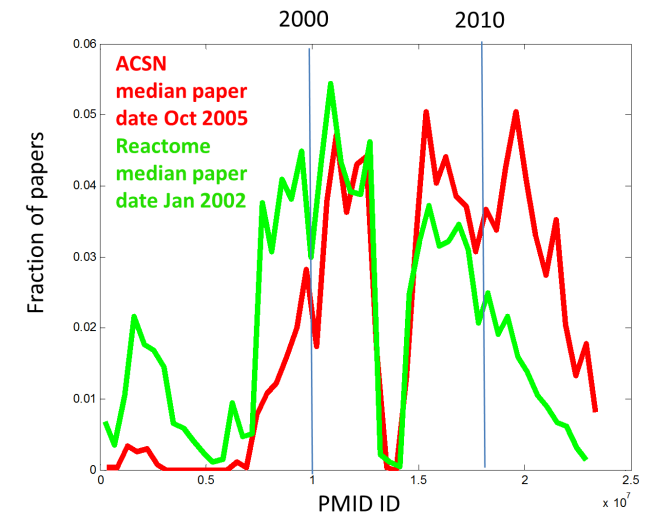
# Atlas of Cancer Signalling Networks (content)

Map/Module	Chemical species	Proteins	Reactions	References	Creation date	Last update
<b>Apoptosis map</b>	<b>1640</b>	<b>687</b>	<b>1166</b>	<b>595</b>	2010	2013
AKT_MTOR	142	67	98	61		
CASPASES	197	110	118	109		
HIF1	59	38	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		
<b>Cell cycle map</b>	<b>165</b>	<b>78</b>	<b>165</b>	<b>235</b>	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		
DNK4	10	5	5	11		
P21CIP	31	24	15	23		
P27KIP	30	23	15	21		
RB	23	18	10	19		
WEE	10	6	4	11		
<b>Cell survival map</b>	<b>1926</b>	<b>554</b>	<b>1304</b>	<b>846</b>	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		
<b>DNA repair map</b>	<b>709</b>	<b>377</b>	<b>505</b>	<b>593</b>	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		
<b>EMT and cell motility map</b>	<b>1233</b>	<b>571</b>	<b>1078</b>	<b>522</b>	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.		
DESMOZOMES	N.a.	N.a.	N.a.	N.a.		
GAP_JUNCTIONS	N.a.	N.a.	N.a.	N.a.		
<b>ACSN global map</b>	<b>5905</b>	<b>1821</b>	<b>4600</b>	<b>2774</b>	2013	

Comparison of connectivity  
(ACSN vs. REACTOME)



PubMed IDs distribution  
(ACSN vs. REACTOME)



	Chemical species	Proteins	Reactions	References	Creation date
<b>ACSN global map</b>	<b>5905</b>	<b>1821</b>	<b>4600</b>	<b>2774</b>	<b>2013</b>

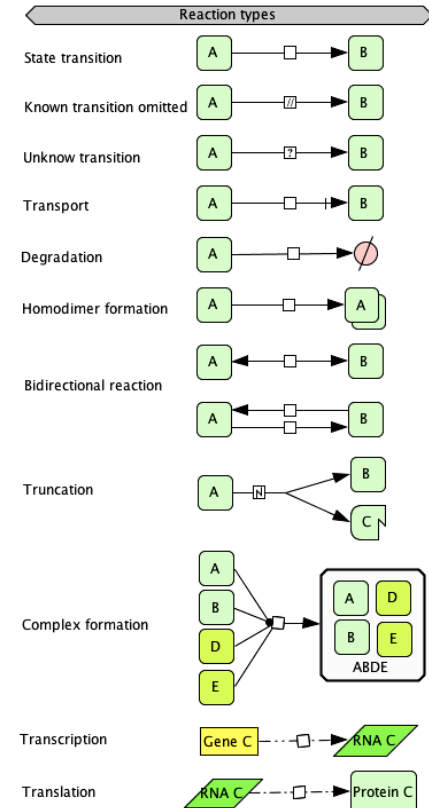
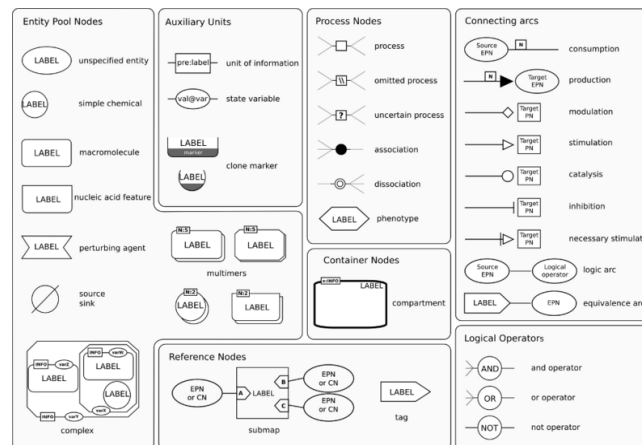
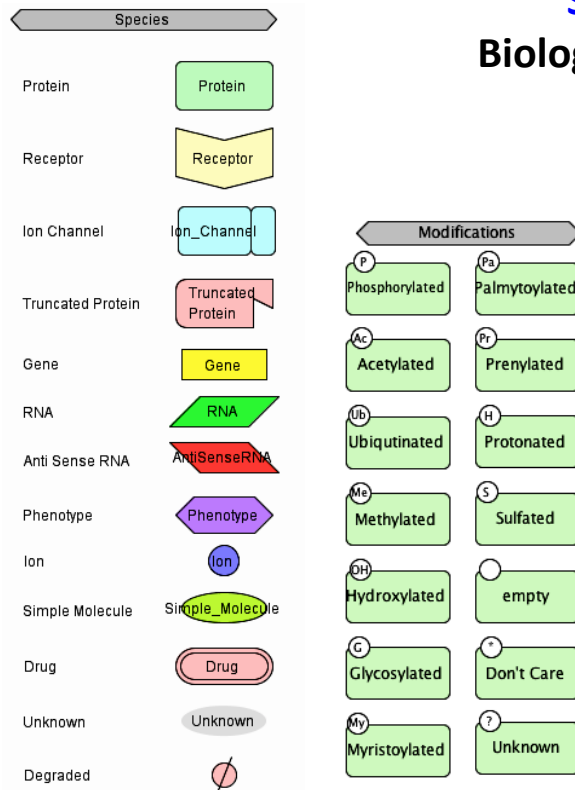


# Standards and tools for signaling networks construction

## Visual syntax

### Systems Biology Graphical Notation (SBGN)

#### Biological molecules and interactions representation



## Tool: CellDesigner

### Diagram editor for signalling networks representation



# 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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