The NCI Informatics Technology for Cancer Research (ITCR) Program Renewal

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The Informatics Technology for Cancer Research (ITCR) program at the National Cancer Institute (NCI) promotes basic, translational, and clinical informatics projects to support cancer research

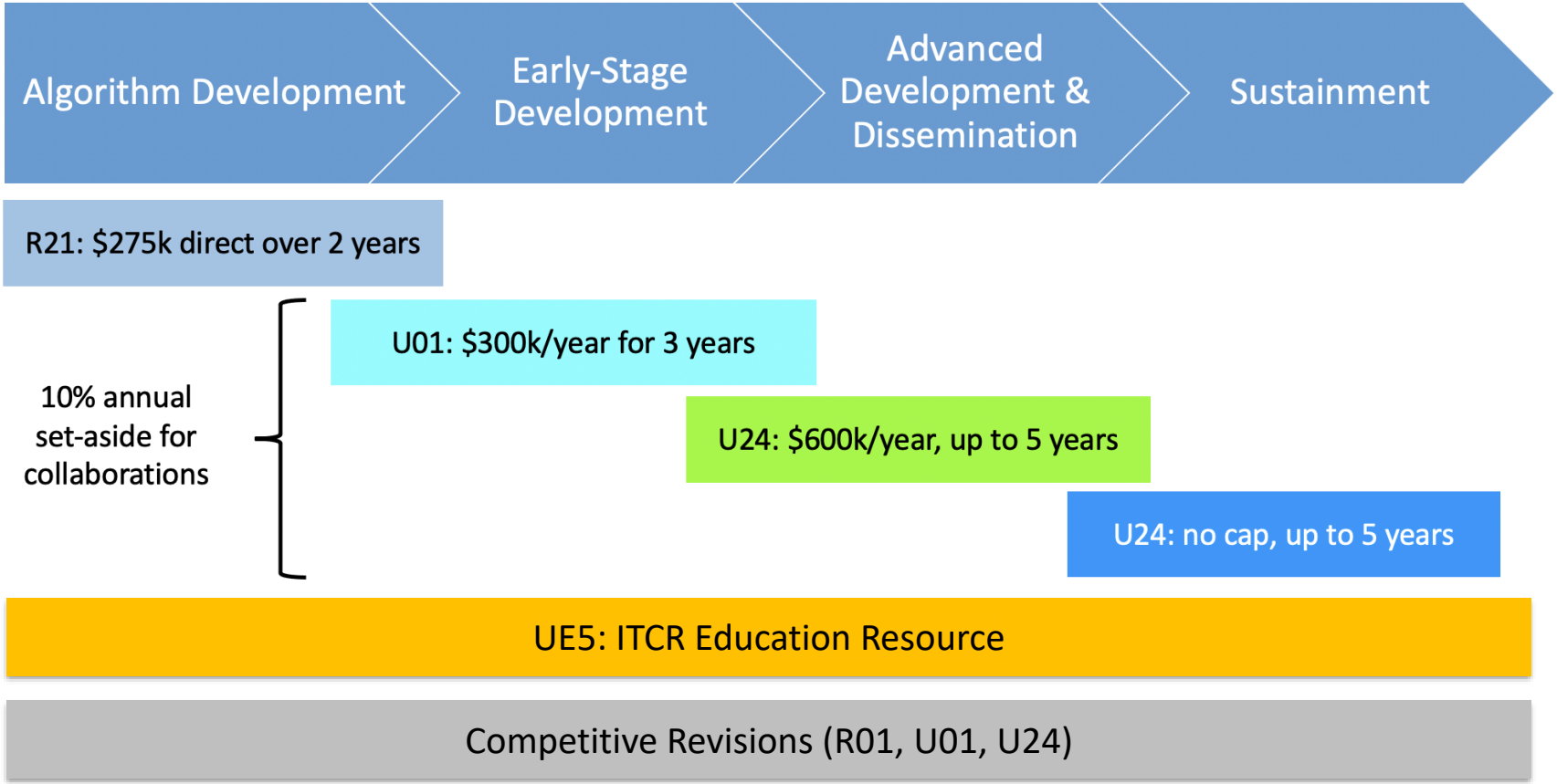
Nearly 100 informatics tools

Spanning the spectrum of cancer research

Open source and freely available

- Promote integration of informatics technology development with cancer research
- Support different stages of the informatics technology development lifecycle
- Enable technology dissemination and software reuse
- Foster communication and interaction among development teams

Current ITCR Program Structure

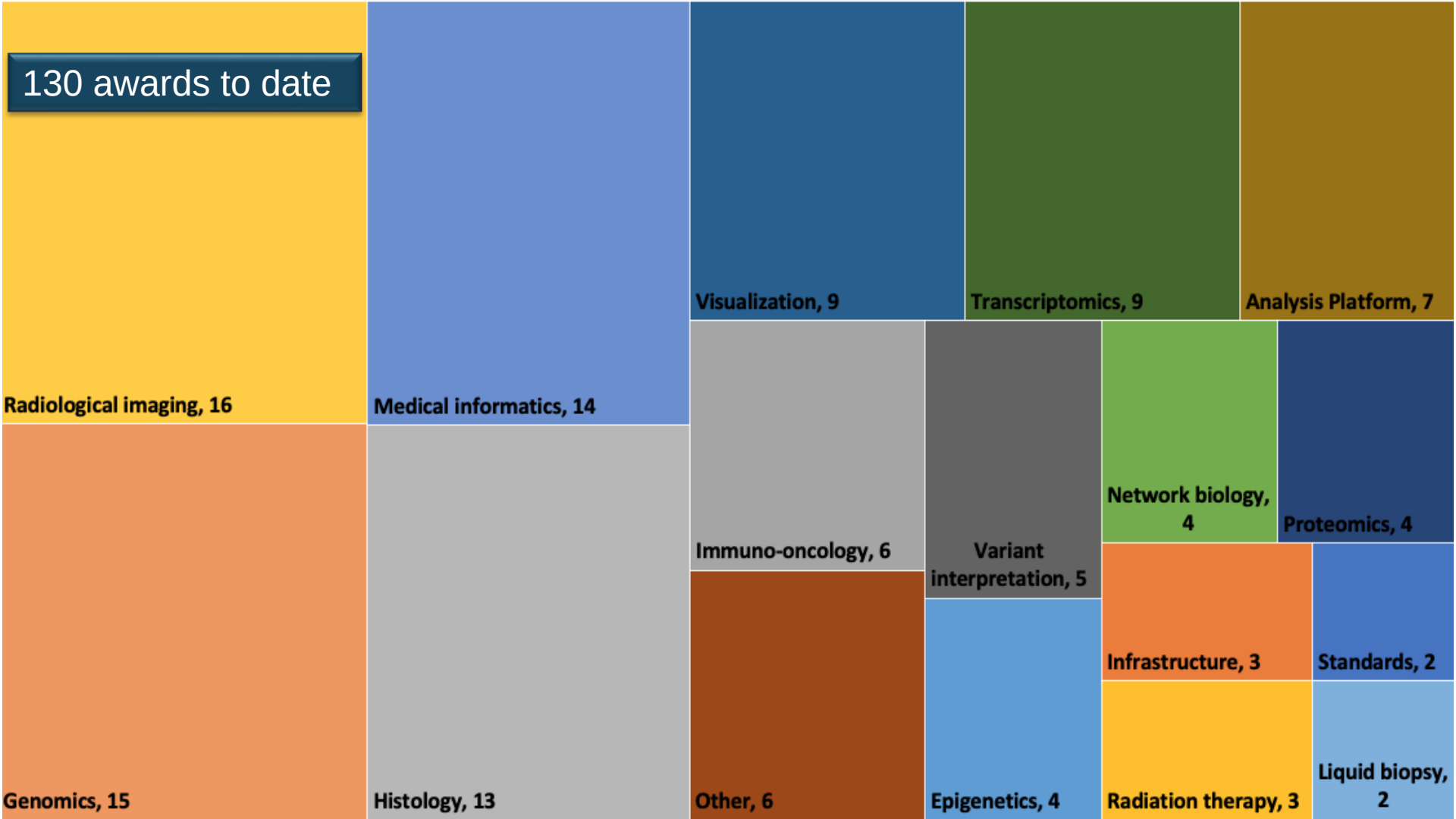


ITCR Program Impact

- Support for widely-used informatics tools and resources
- Supporting advances across the cancer research continuum
- Emphasis on collaboration and interoperability
- Improved adoption and citation of ITCR tools
- Enhanced outreach and training

Tool	Purpose	Usage
Integrative Genomic Viewer (IGV)	Visualization tool for interactive exploration of genomic datasets	>10,500 citations
TOPAS	Radiotherapy planning tool	>500 citations 1470 licensed users/453 institutions
CIViC	Curated knowledge resource of cancer variants	3000 web users/month >1M API calls/month
pyRadiomics	Platform for radiomic analysis	>900 citations since 2017
OHIF Viewer	Radiology image viewer	Incorporated into >400 open source projects
Bioconductor (ITCR modules)	Analysis methods and structures for multi-modal data	Downloaded >12,000/month in Q1 2021
UCSC Xena	Joint visualization and analysis of multi-omic and phenotypic data	>3000 citations
Trinity	Transcriptome reconstruction	>11,000 citations

130 awards to date



130 awards to date

- Data management, storage, organization, and data sharing resources
- Data mining, visualization, and analytics tools and platforms
- Data annotation tools, including common data elements and ontologies
- Statistical methods and machine learning methods
- Natural language processing and text mining approaches
- Clinical decision support and treatment planning tools
- Technology to support next generation clinical trials and clinical trial matching

ITCR Tool Catalog

https://itcr.cancer.gov/informatics-tools

pVACtools

Galaxy COMMUNITY HUB

JBrowse

Integrative Genomics Viewer

Trinity

Hemonc.org

RADIOMICS

TOPAS

GSEA Gene Set Enrichment Analysis

Xena Public / Xena Private

PDX FINDER

CANCER Digital Slide Archive

CIViC Clinical Interpretation of Variants in Cancer

GenePattern

TIES

quantitative image informatics QIICR for cancer research

Pathology Image Informatics Platform

cBioPortal FOR CANCER GENOMICS

globus a uchicago non-profit service

NDEx

Cancer Imaging Phenomics Toolkit (CaPTk)

emerse

OpenCRAVAT

Bioconductor OPEN SOURCE SOFTWARE FOR BIOINFORMATICS

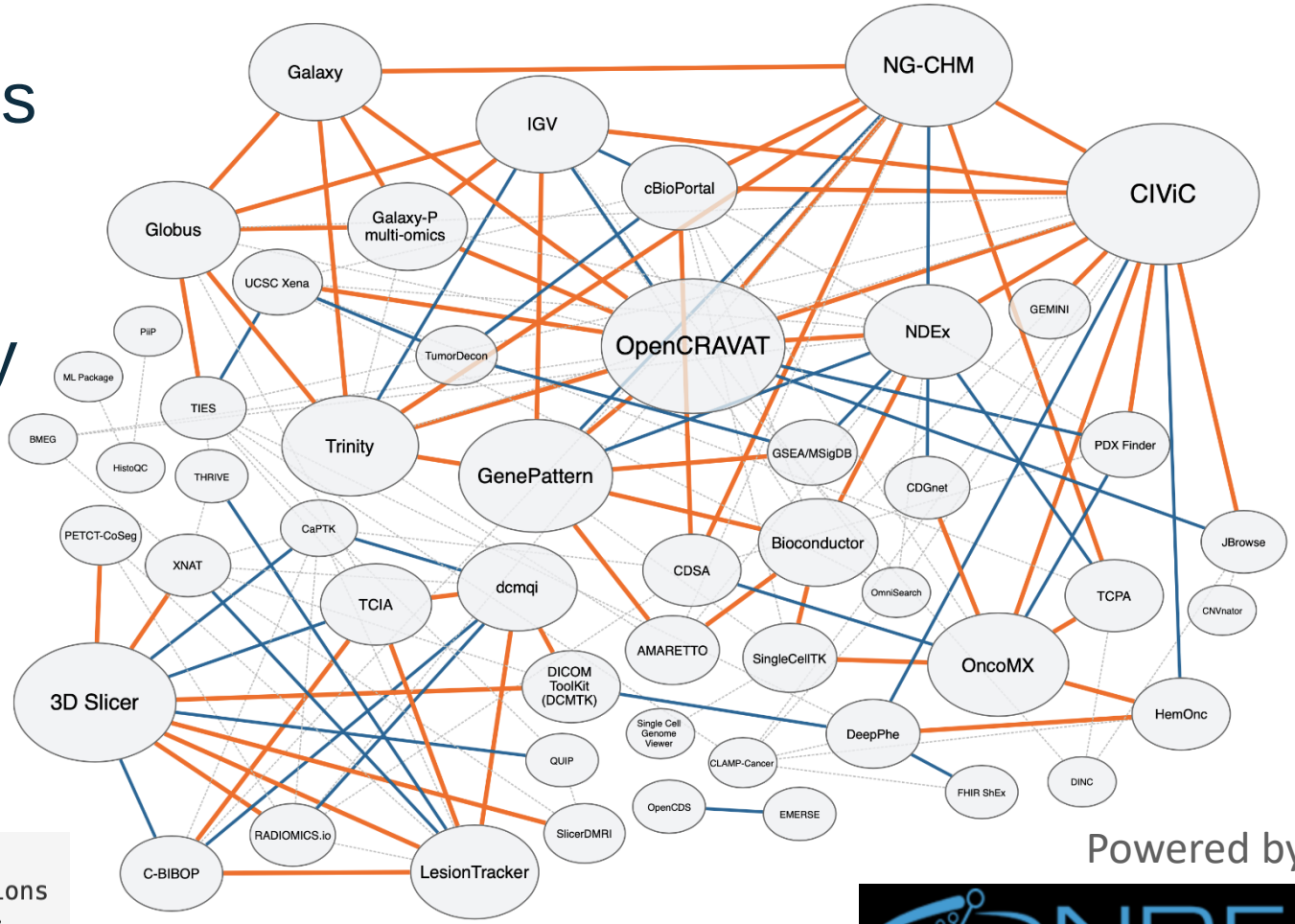
XNAT open

Cistrome Project

CLAMP Clinical Language Annotation, Modeling, and Processing Toolkit

ITCR promotes collaboration and tool interoperability

50 collaborations supported through set-side funds



Edge Color legend
Orange solid: Existing connections
Blue solid: Ongoing connections
Grey dashed: Proposed connections

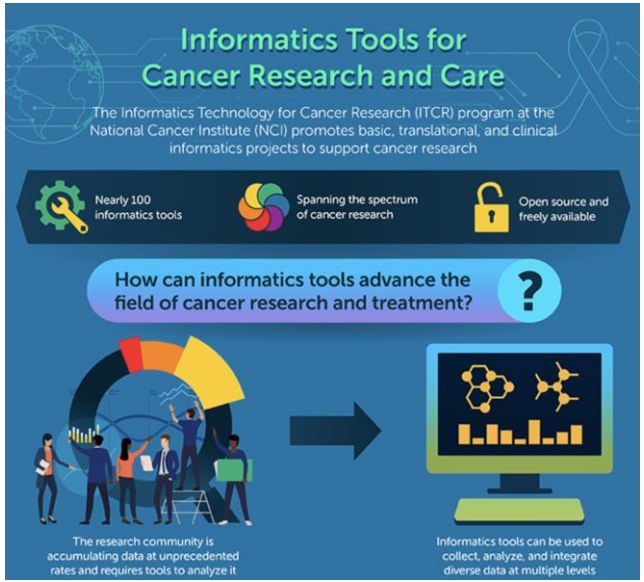
Powered by NDEx

Activities to promote dissemination of ITCR Tools

- Training and Outreach Working Group
- Focused journal issues
- Presence at prominent scientific conferences
- Webinar series
- NCI scientific program meetings
- Social media

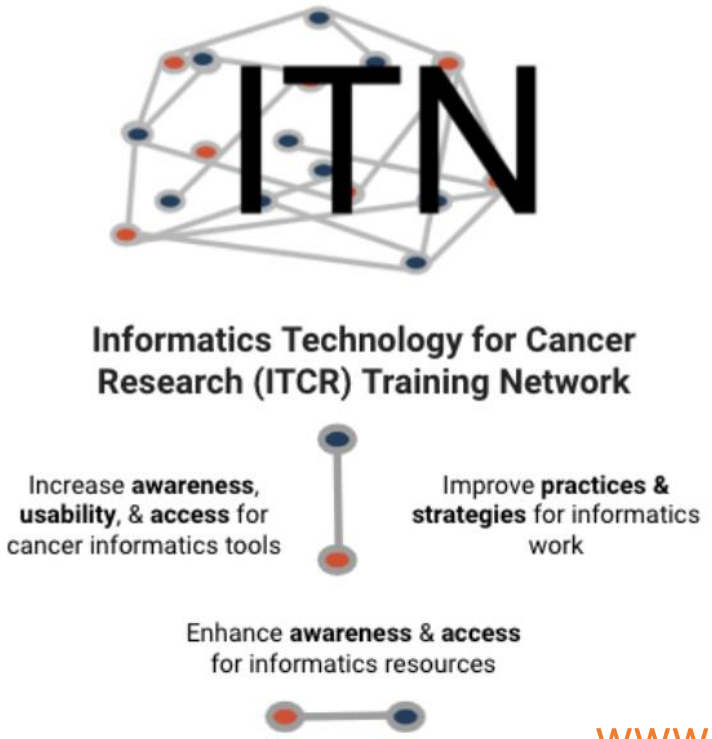
JCO® Clinical Cancer Informatics
An American Society of Clinical Oncology Journal

Informatics Tools for Cancer Research and Care — Bridging the Gap between Innovation and Implementation



ITCR UE5 Education Resource

Initiated 9/1/2020



Leadership for Cancer Informatics Research

Cancer Informatics Data Management
Cancer Informatics Data Visualization
Cancer Genome Informatics
Cancer Clinical Informatics
Cancer Imaging Informatics
Machine Learning for Cancer Informatics
Reproducibility for Cancer Informatics

Documentation and Usability

Dissemination and Engagement

www.itcrtraining.org

Summary: Evaluation Panel Feedback

- ITCR has been crucial to cancer research and should continue to be supported.
- Continue to vigorously promote collaborations among tool developers.
- Emphasize emerging technologies to keep pace with advances in cancer research.
- Maximize the value of the technologies by
  - Promoting skill and workforce development
  - Advancing standards for the development, evaluation, and dissemination of tools
  - Fostering academic-industry partnerships
  - Ensuring tools are ethical and transparent

ITCR Renewal Proposal

R21: $275k direct over 2 years

Continue RFAs as Clinical Trial Optional
2 receipt dates/year

10% annual set-aside for collaborations

U01: $300k/year for 3 years

U24: $600k/year, up to 5 years

U24: no cap, up to 5 years

- *Balance early and late stage development funding through program team prioritization*
- *Engage SBIR for collaboration with industrial partners and focused contract topics*
- *Discontinue Competitive Revisions due to low response rate*

Proposed budget for renewal, new awards

	DC per award per year	Est. awards per year	Total costs per year
R21	$137,500	5	$1.02 M
U01	$300,000	5	$2.25 M
U24 Advanced Dev	$600,000	4	$3.60 M
U24 Sustainment	$750,000	1	$1.13 M
		TOTAL	**$8.00 M**

Reviewers' Feedback

Drs. Plevritis, Thompson, and Becich

- Prioritize considerations for sustainment of the ITCR technologies
- Consider promoting industry partnerships
- Increase portfolio diversity, especially for clinical and translational tools
- Enhance connections/collaboration with other NCI programs

Examples of ITCR tools supporting NCI Programs

NCI Program	ITCR Tools in Use
Consortium for Molecular and Cellular Characterization of Screen-Detected Lesions (MCL)	3D Slicer, Bioconductor, cBioPortal, CiVIC, CLAMP-cancer, CNVnater, DICOM Toolkit, GSEA, IGV, Single Cell Genomics Viewer
Early-Detection Research Network (EDRN)	3D Slicer, cBioPortal, Galaxy, GenePattern, Globus, IGV, OncoMX, P-Mart, QIIME2, Trinity, UCSC Xena
Human Tumor Atlas (HTAN)	Galaxy, cBioPortal
Cancer Systems Biology Consortium (CSBC)	Galaxy, Bioconductor, GenePattern Notebooks, NDEx, MSigDB, 3D Slicer, TCPA, IGV
Clinical Proteomic Tumor Analysis Consortium (CPTAC)	Bioconductor, cBioPortal, GSEA/MSigDB, IGV, GenePattern, TCIA

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