Track 3: Software Usability Assessment

Hua Xu, UTHealth

Kai Zheng, Univ. Michigan

Motivation

- Emerging informatics/Big Data initiatives in biomedicine
  - CTSA
  - BD2K
- Software plays an important role in data science, many ongoing efforts
  - Discoverability
  - Access
  - Sustainability
- Usability is another important issue

Goal

- Conduct a formal usability study to assess end-users' experience with finding, installing, and running clinical NLP systems, thus to provide insights to common issues about software usability
- Not a competition, no rankings among systems
- Hope to help participants to identify strength and weakness of their systems

Participating systems

- 8 submissions initially
- 5 systems in the final list

Name	Description
BioMEDICUS	Biomedical concept extraction
CliCon/CliNER	Clinical concept extraction
MIST	De-identification of clinical
MedEx-UIMA	Medication extraction
MedXN	Medication extraction

Dimensions of evaluation

- Information gathering
  - Find out the system's designed objectives
  - Locate web demo (if available—only 2 systems have)
  - Assess usefulness of the web demo (if provided)
- Installing
  - Locate installation instructions
  - Install software prerequisites
  - Install the system
- Using
  - Locate user manual
  - Use the system to process several sample medical documents
  - Interpret the results generated

Evaluation scale

- Effortless or nearly effortless (2)
- Somewhat easy but there are challenges (1)
- Somewhat difficult (0)
- Extremely difficult, nearly impossible (-1)
- I was not able to locate it (-1, if appropriate)

Evaluators

MD & Informatics

MD & Informatics

Pharmacist & Informatics

Pharmacist & Informatics

Nurse & Informatics

Nurse & Informatics

Informatics

Informatics

Techie

Techie

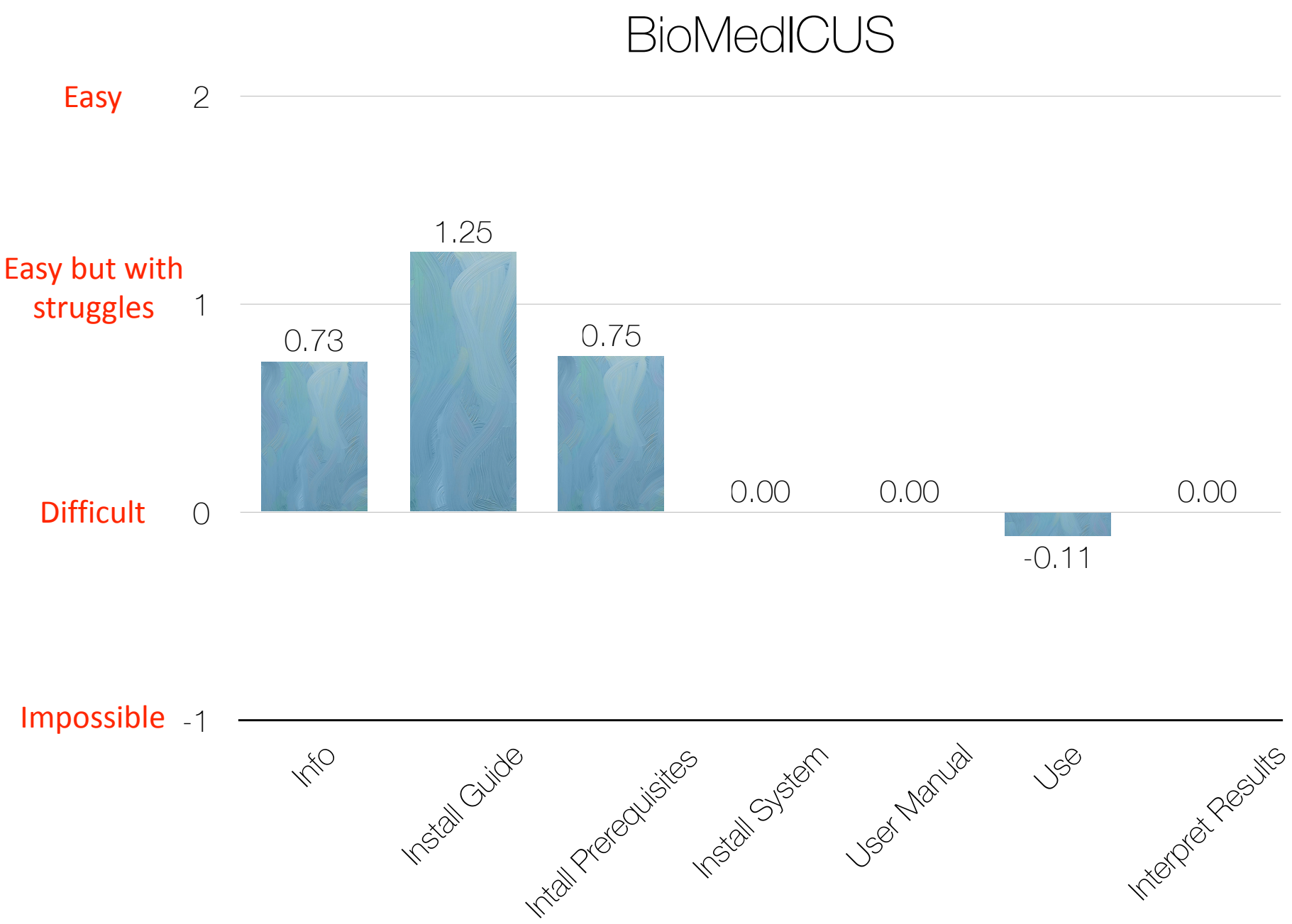
Techie

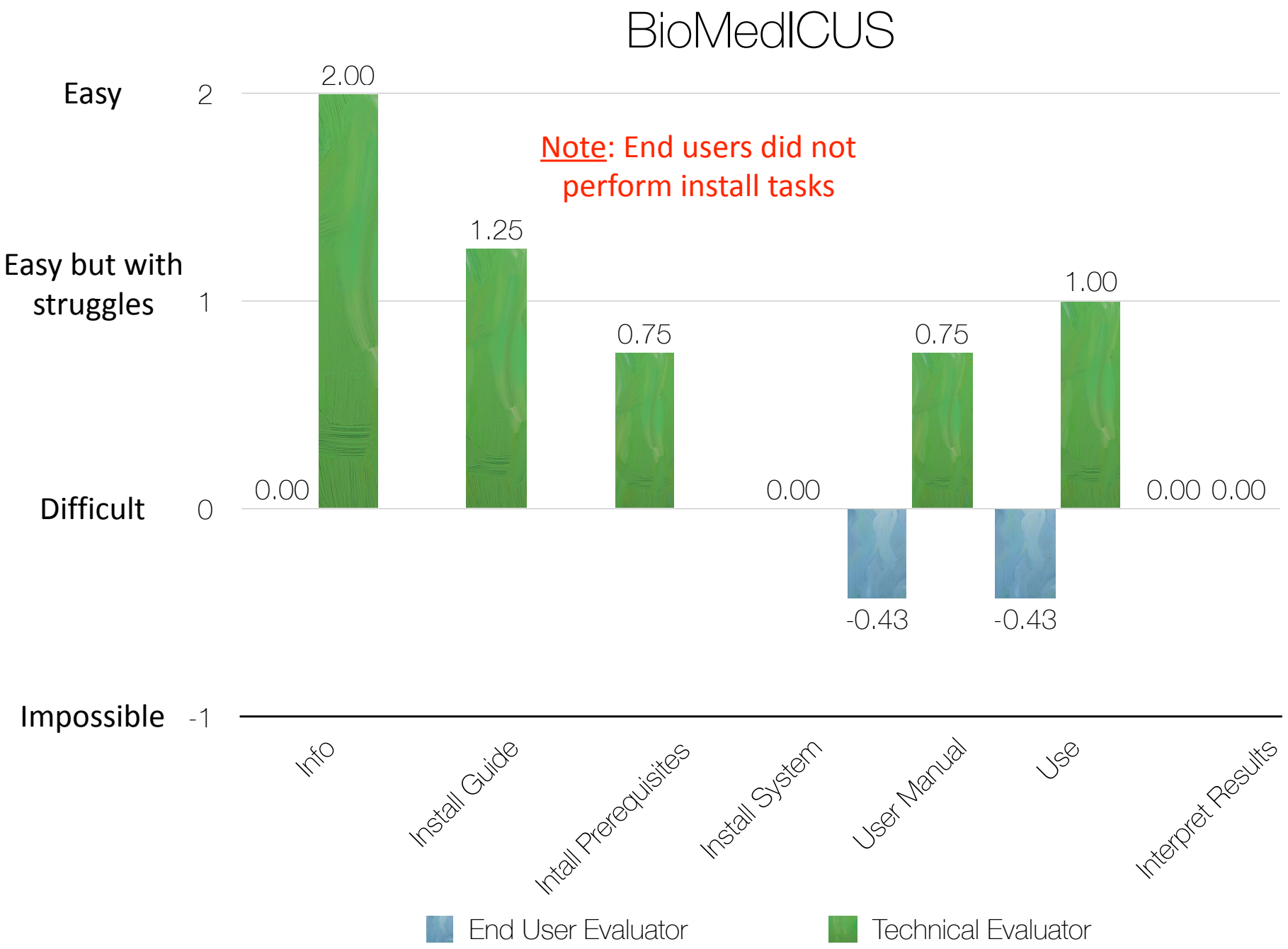
Techie

Evaluation environment

- Ubuntu 14.04.1 LTS
  - Separate Ubuntu instances for installation evaluation
  - A single Ubuntu instance with all systems installed for end user evaluation
- TURF
  - Screen activities (cursor movements, clicks, and keystrokes)
  - Think-aloud

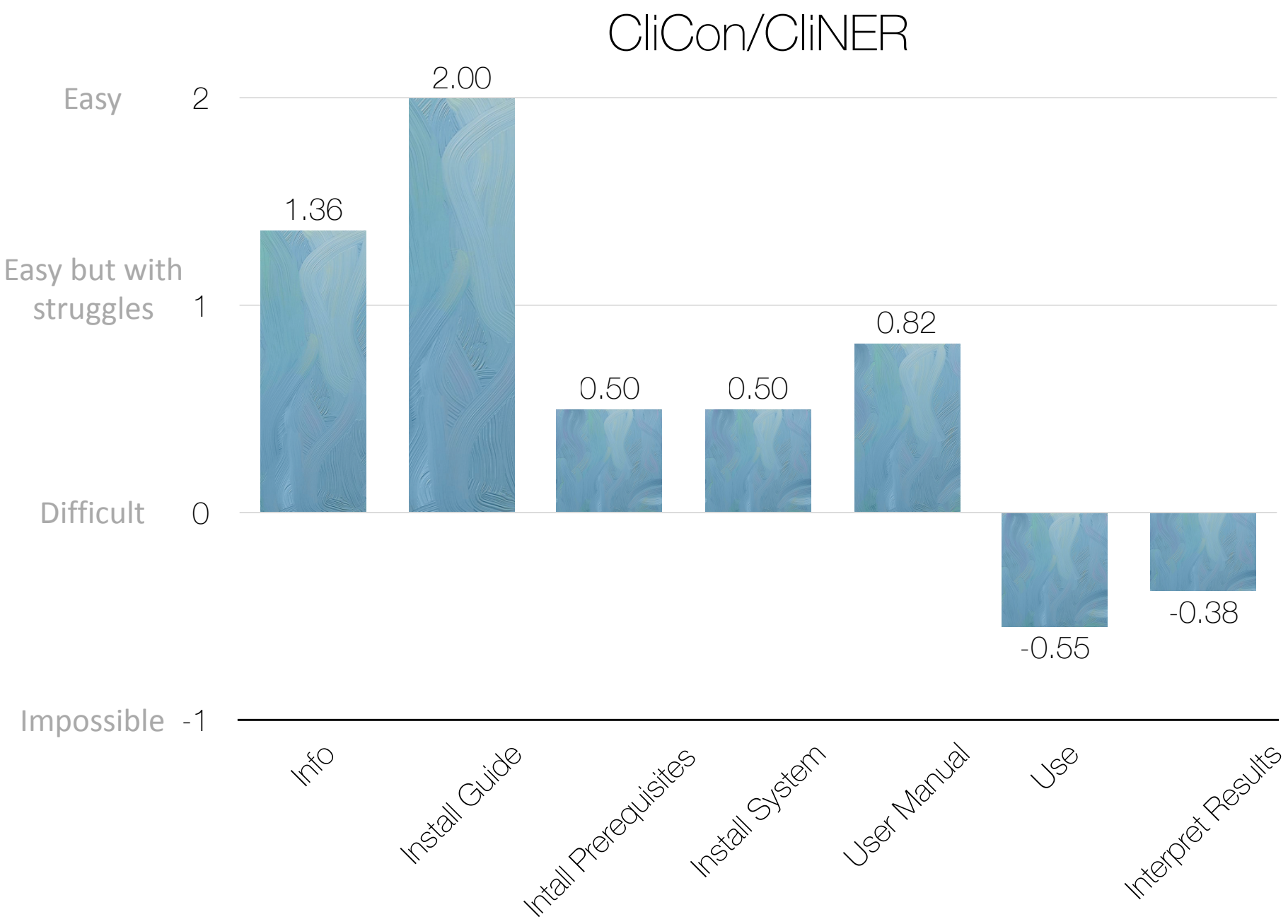
Results

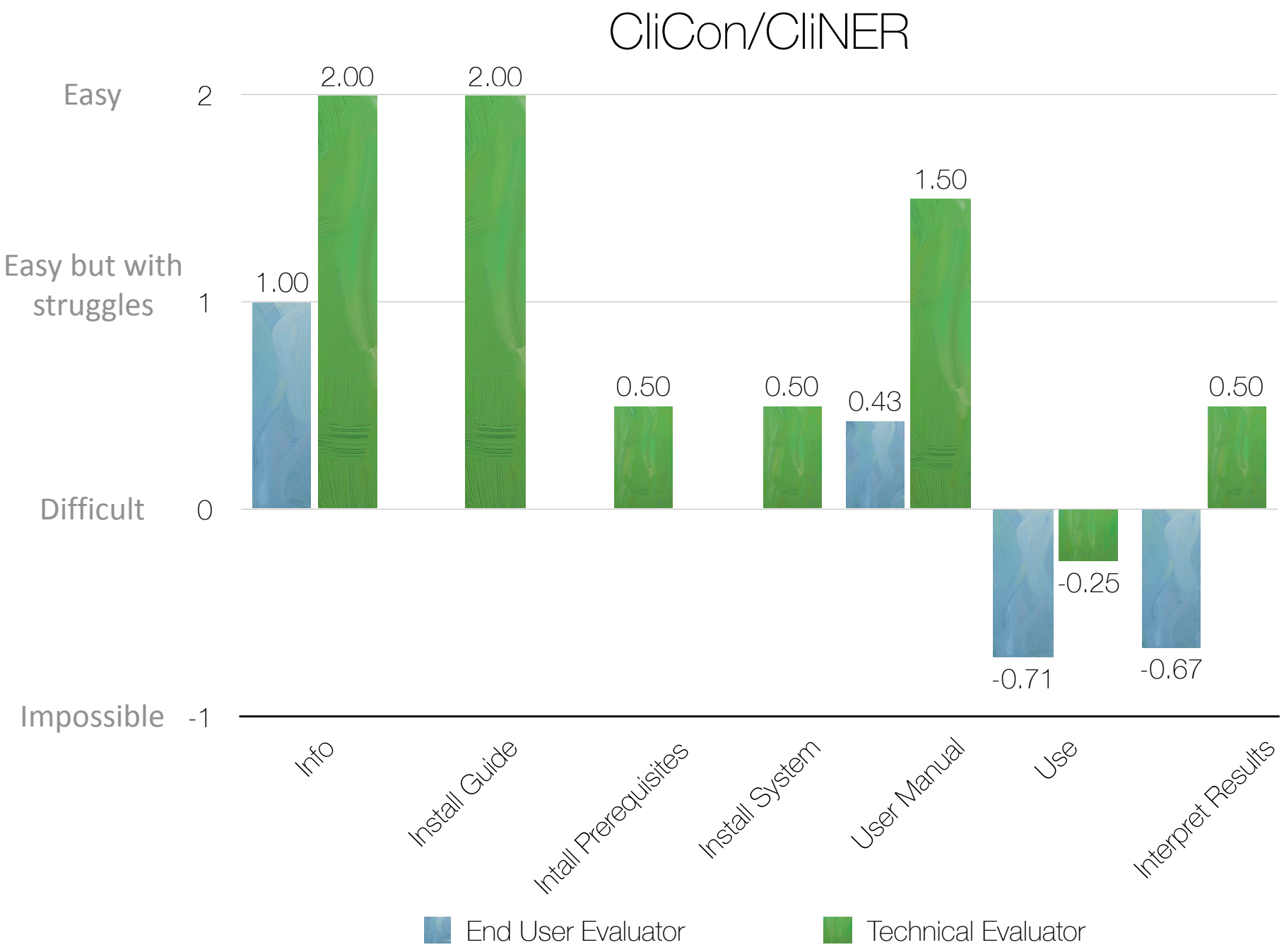

BioMedICUS
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
0.73
1.25
0.75
0.00
0.00
-0.11
0.00
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results

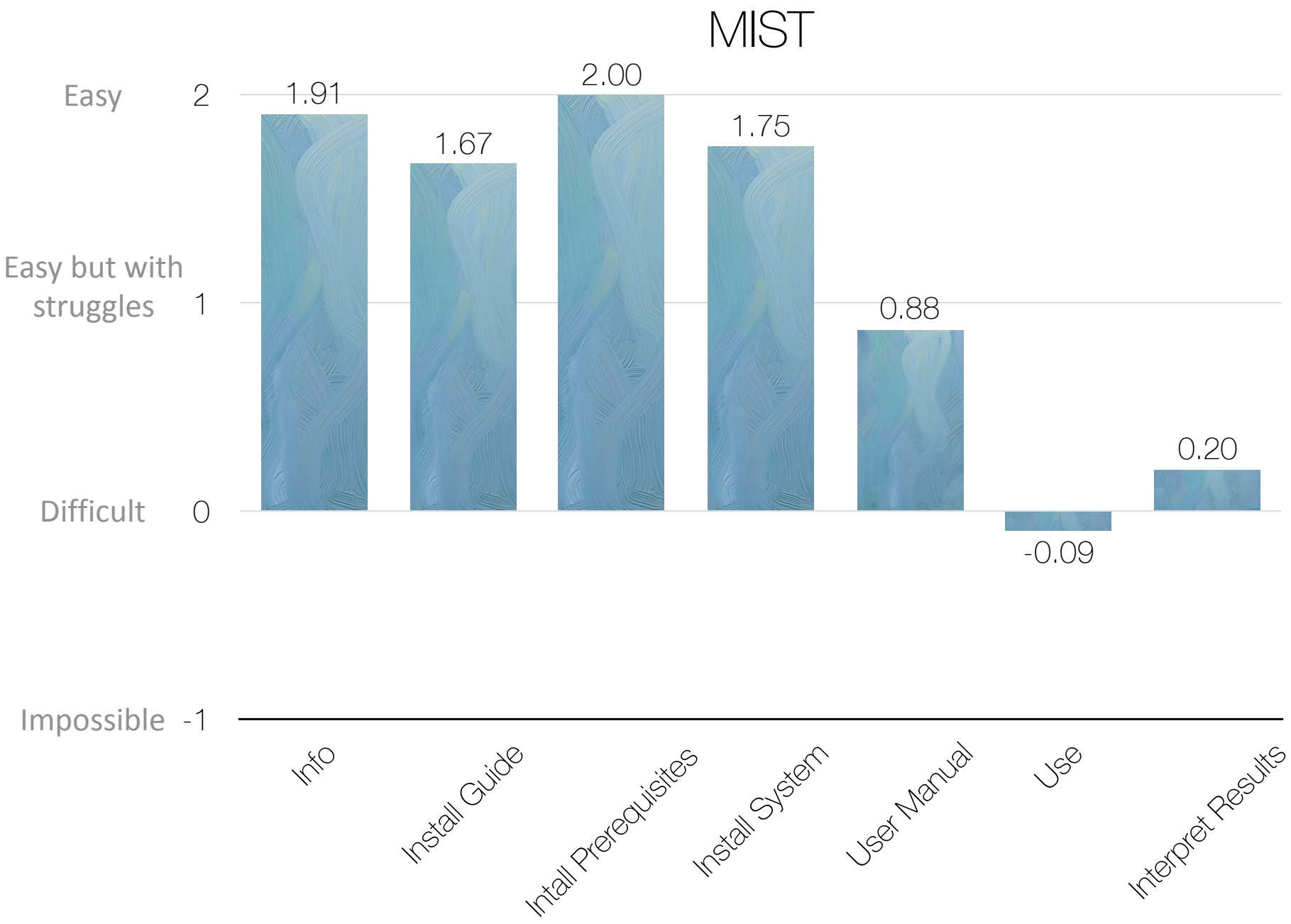

BioMedICUS
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
Note: End users did not perform install tasks
2.00
1.25
0.75
0.00
0.00
0.75
1.00
0.00
0.00
-0.43
-0.43
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results
End User Evaluator
Technical Evaluator

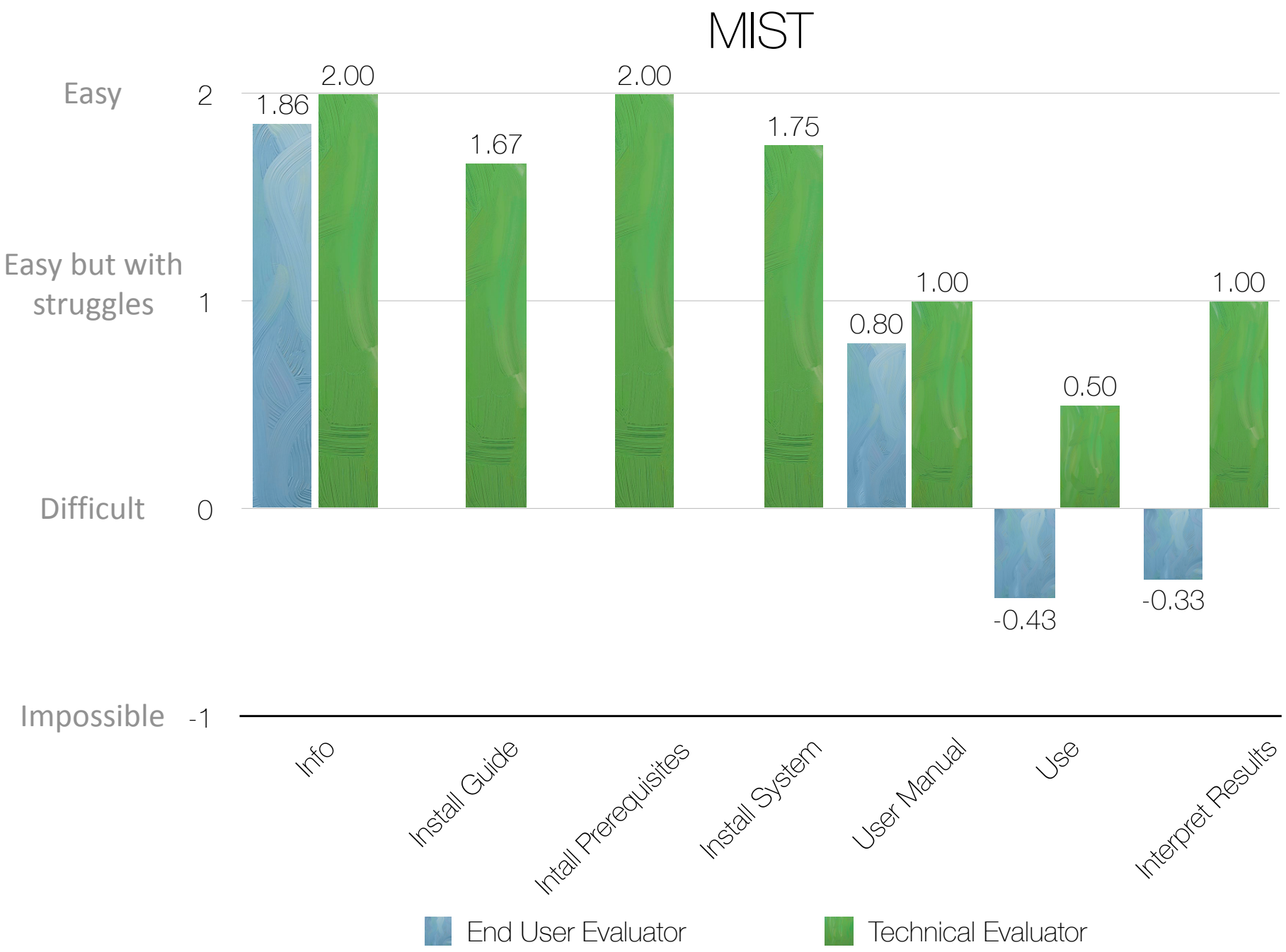
I can only find general objectives - provide new analytic tools for processing and analyzing text - I do not find feature, design guidance or similar information.

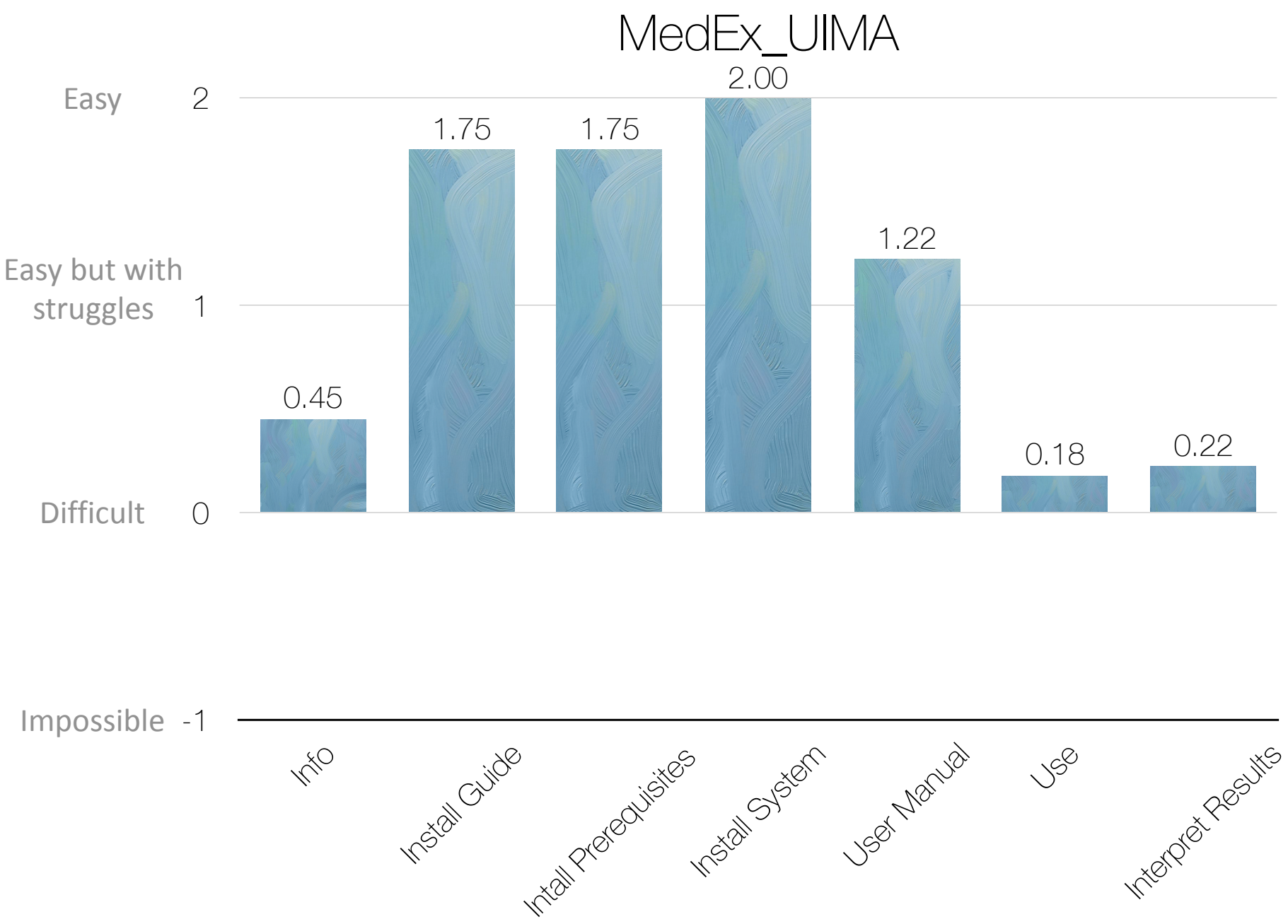
The website is a BitBucket project website. It is mainly a project maintenance website, all about the technical details of tool installation and source code. There is one short paragraph vaguely talking about the design objective of this tool. It does not really motivate the first-time users / speculators. It would be good to include links to the external project website, or related research work.

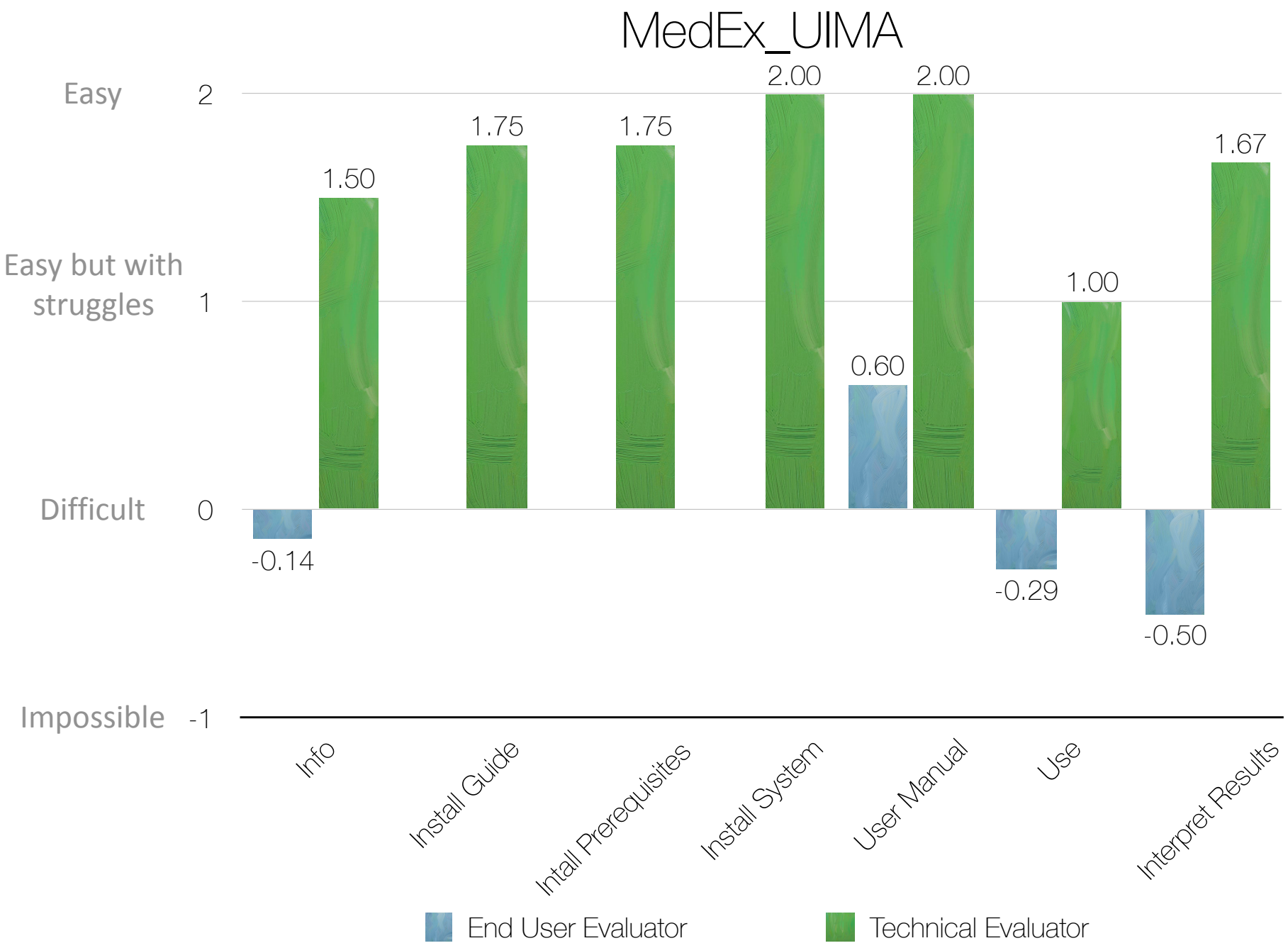

CliCon/CliNER
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
1.36
2.00
0.50
0.50
0.82
-0.55
-0.38
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results

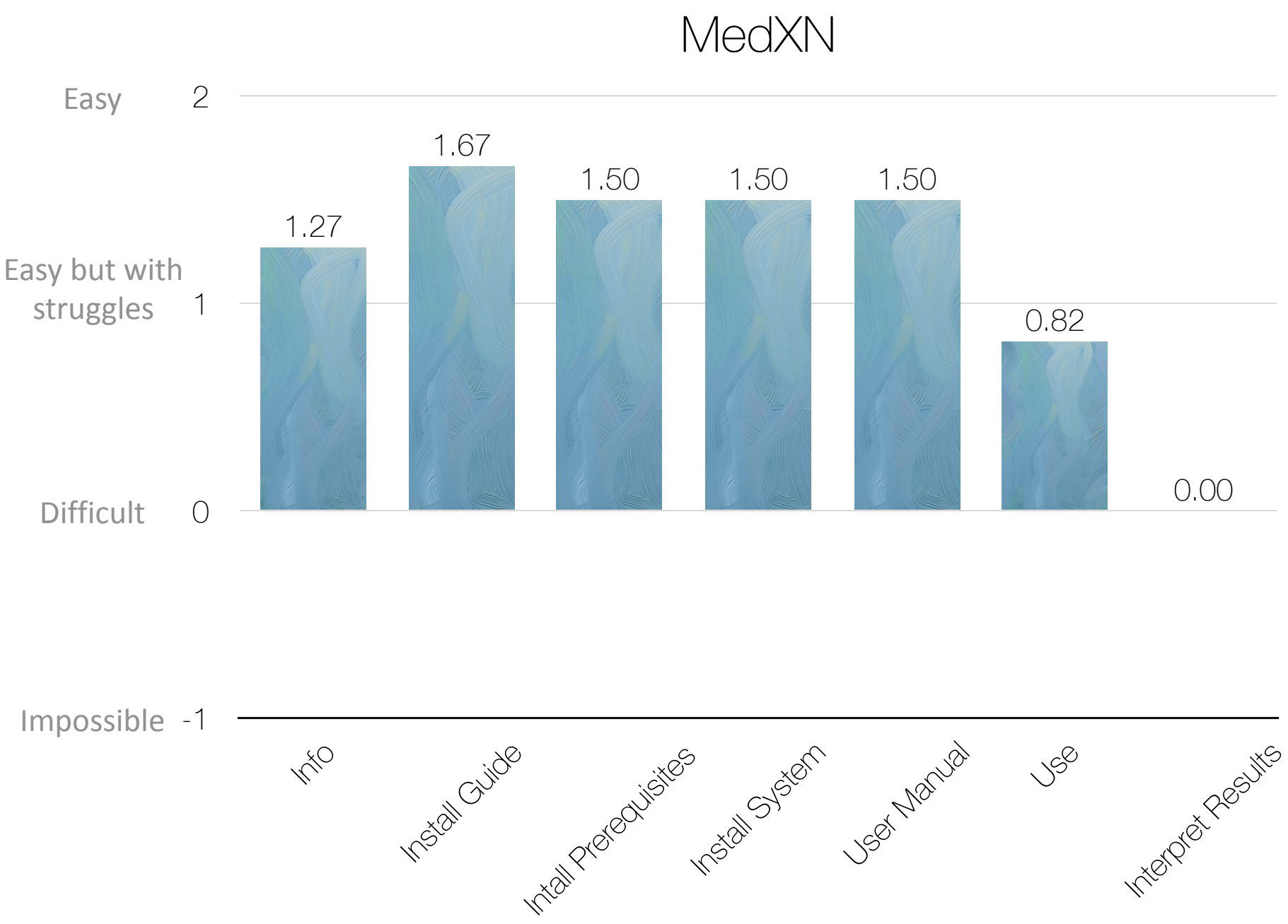

CliCon/CliNER
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
2.00
2.00
1.00
0.50
0.50
0.43
1.50
0.50
-0.71
-0.25
-0.67
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results
End User Evaluator
Technical Evaluator

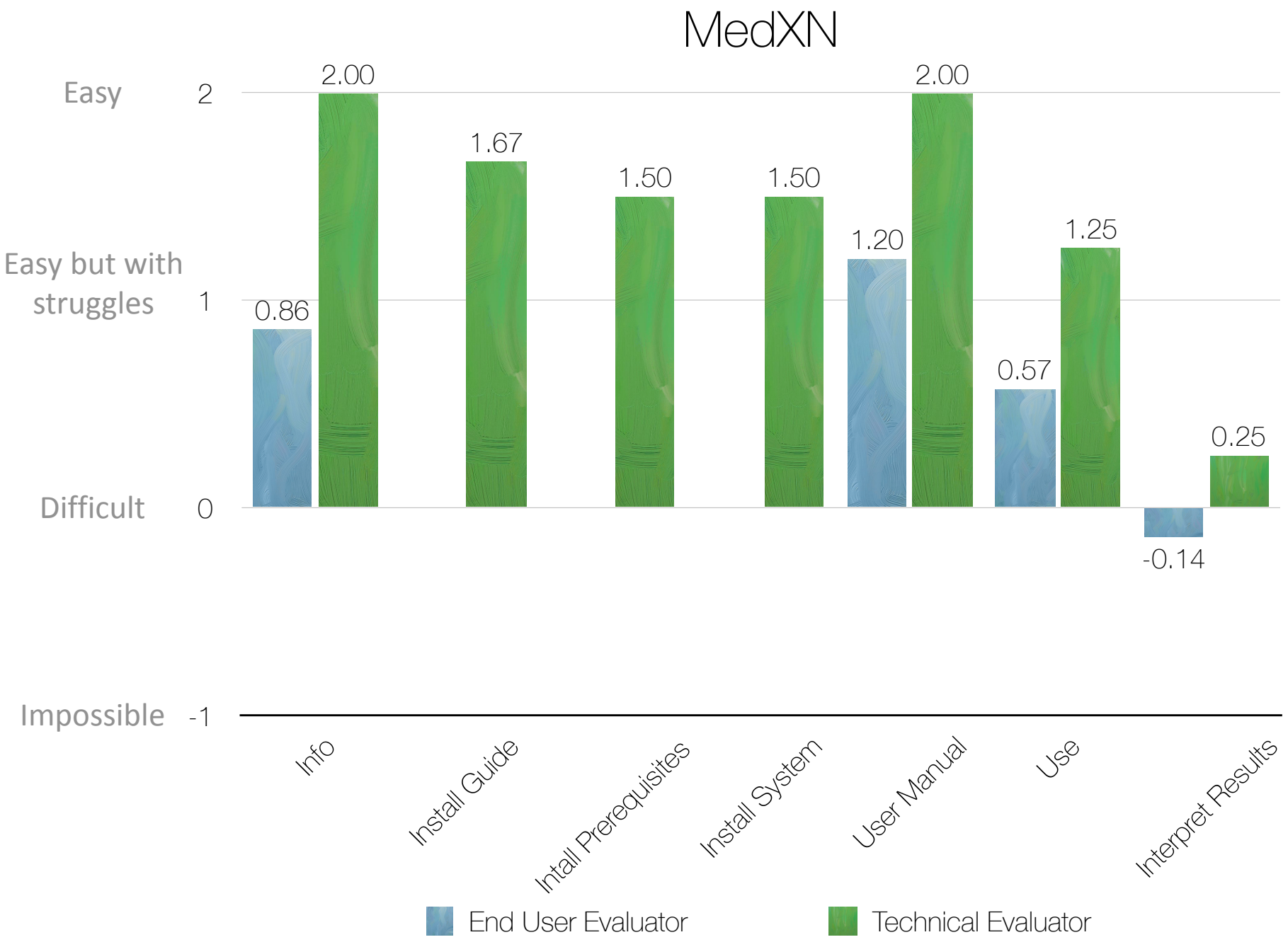

MIST
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
1.91
1.67
2.00
1.75
0.88
-0.09
0.20
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results

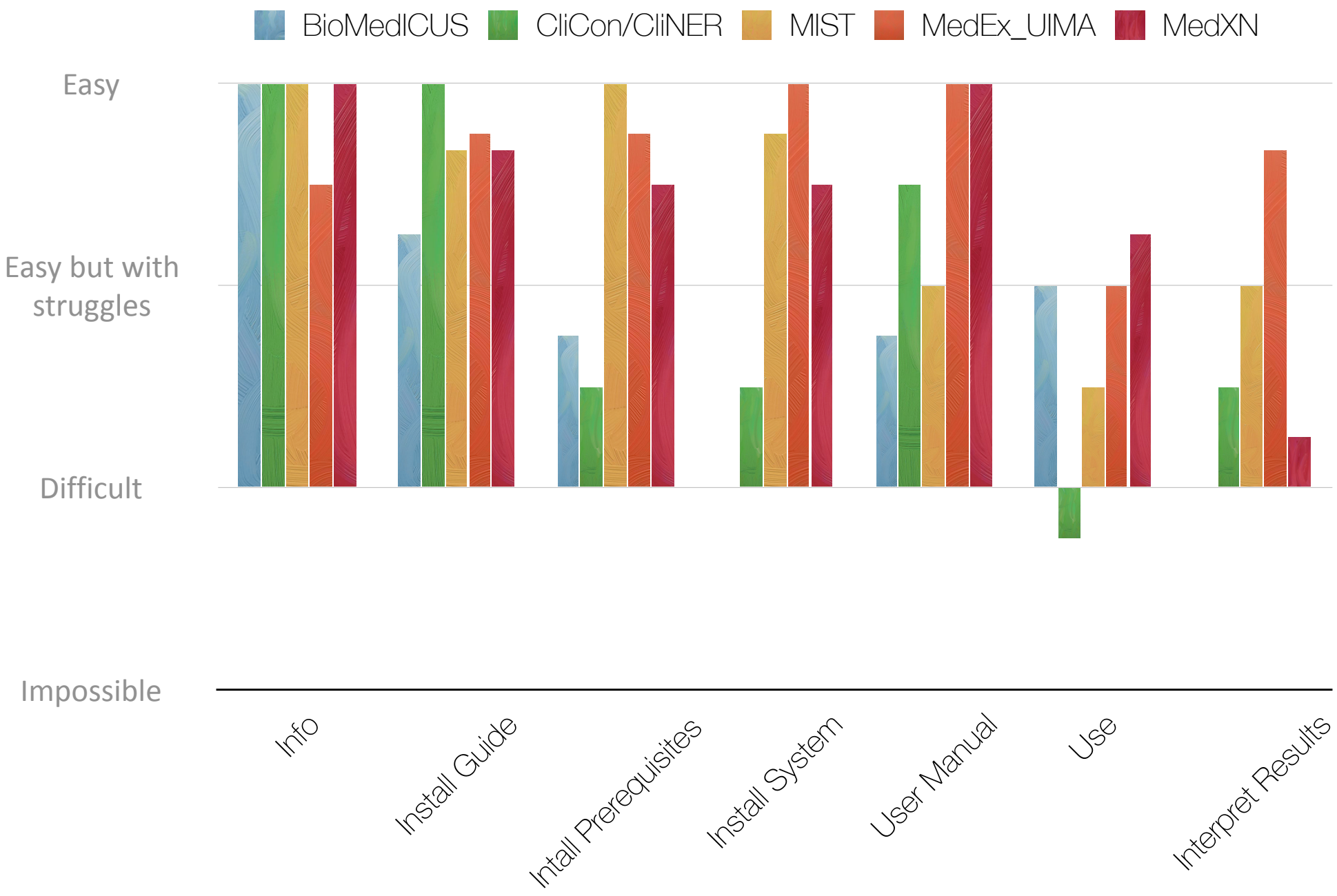

MIST
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
1.86
2.00
1.67
2.00
1.75
0.80
1.00
0.50
-0.43
-0.33
1.00
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results
End User Evaluator
Technical Evaluator

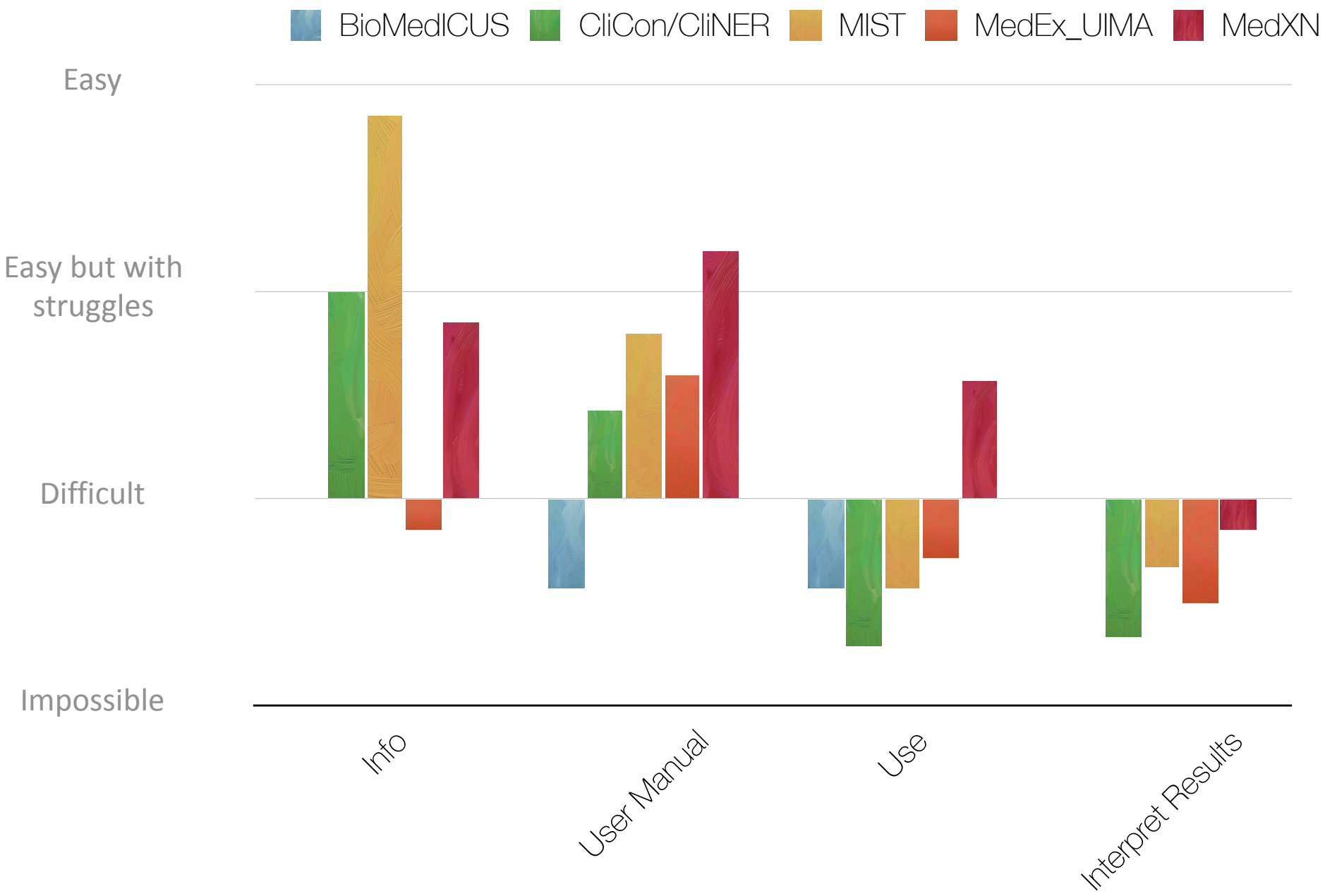

MedEx_UIMA
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
0.45
1.75
1.75
2.00
1.22
0.18
0.22
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results


MedEx_UIMA
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
1.50
1.75
1.75
2.00
2.00
1.67
1.00
0.60
-0.14
-0.29
-0.50
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results
End User Evaluator
Technical Evaluator


MedXN
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
1.27
1.67
1.50
1.50
1.50
0.82
0.00
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results


MedXN
Easy
Easy but with struggles
Difficult
Impossible
2
1
0
-1
2.00
1.67
1.50
1.50
1.20
2.00
0.57
1.25
0.25
-0.14
0.86
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results
End User Evaluator
Technical Evaluator


BioMedICUS
CliCon/CliNER
MIST
MedEx_UIMA
MedXN
Easy
Easy but with struggles
Difficult
Impossible
Info
Install Guide
Intall Prerequisites
Install System
User Manual
Use
Interpret Results


BioMedICUS
CliCon/CliNER
MIST
MedEx_UIMA
MedXN
Easy
Easy but with struggles
Difficult
Impossible
Info
User Manual
Use
Interpret Results

Screenshots walking through more helpful than code just displayed on screen.

The long command line inputs are quite unwieldy to use.

Very little feedback- I almost never knew if I was doing the right thing.

Too many prerequisites required which makes the system nearly impossible to install.

Although all prerequisites are available online, and they all have somewhat good documentation, the authors should restrict from providing information in a minimalist style.

Acknowledgement

- U Mich
  - VG Vinod Vydiswaran
  - Yang Liu
  - Numerous volunteer evaluators
- UTHealth
  - Anupama Gururaj
  - TURF team (Drs. Jiajie Zhang and Min Zhu)
- I2b2 organizing committee
  - Ozlem Uzuner
  - Amber Stubbs
  - Kevin Cohen