



MONGOLIAN ACADEMY OF SCIENCES

e-Science Activities in MAS/ Mongolia

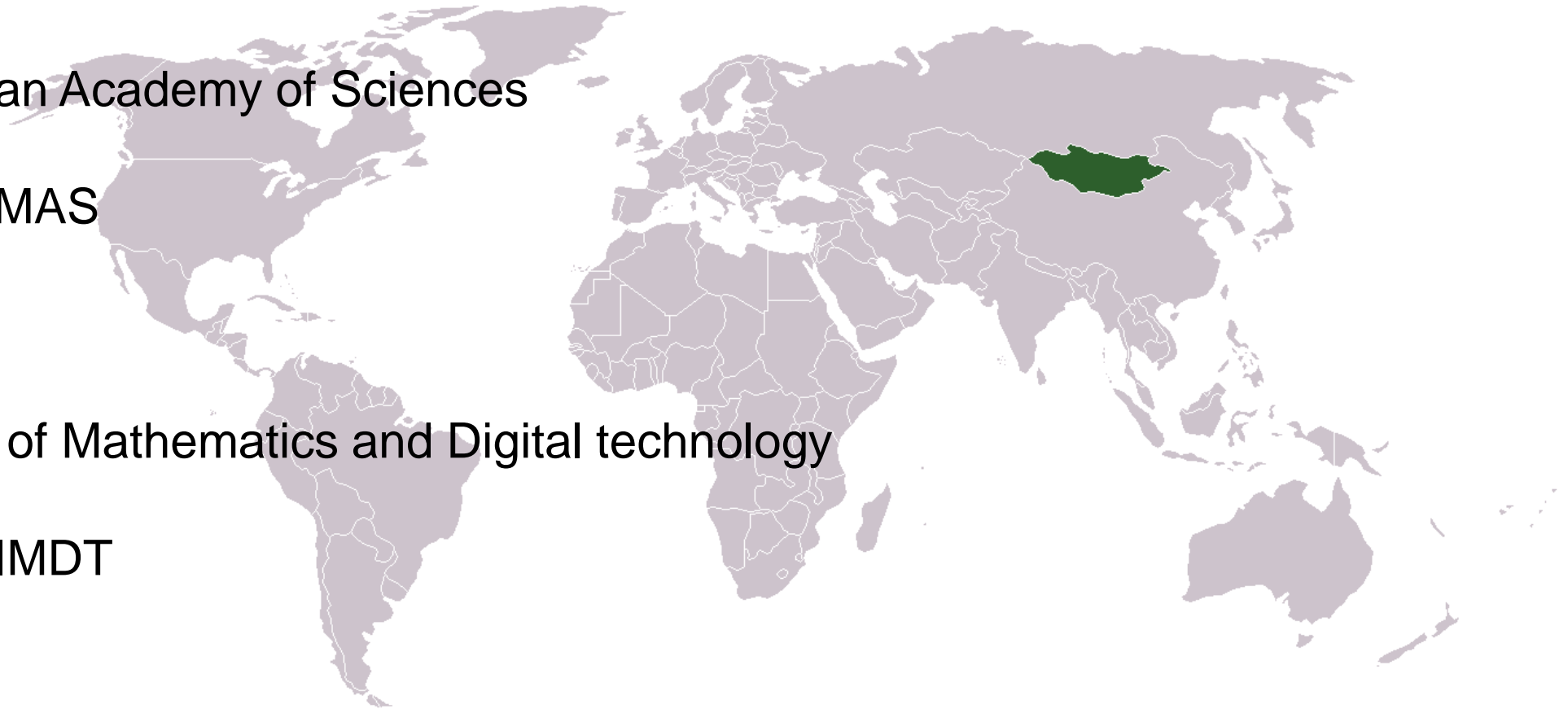
OTGONSUVD Badrakh
/Head of Department of Information Technology,
Institute of Mathematics and Digital Technology/

2022.03.22



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Mongolian Academy of Sciences

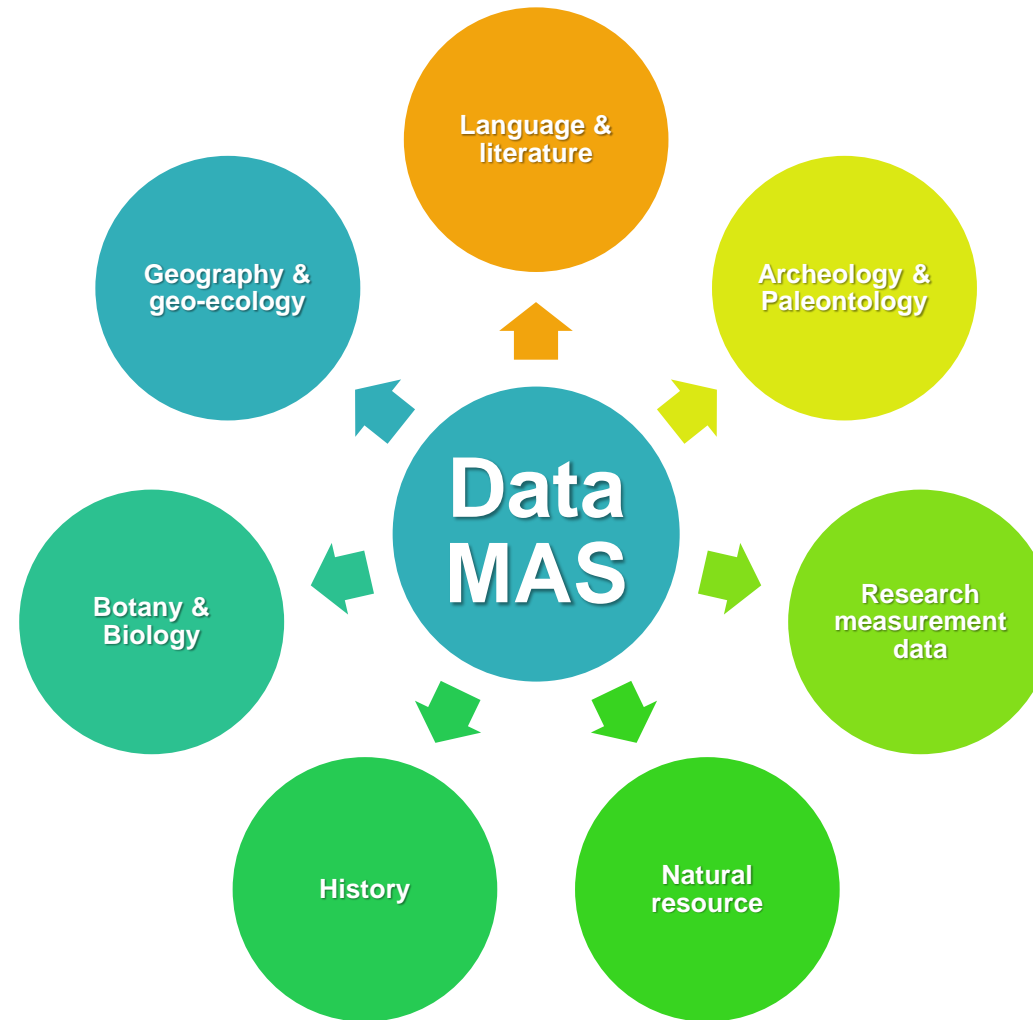
14 institutes:

8 Organizations:

- Mongolian Academy of Sciences
- National University of Mongolia
- University of Science and Technology
- University of Health
- University of Education
- University of Agriculture
- Academy of Agricultural Science
- Academy of Medical Science

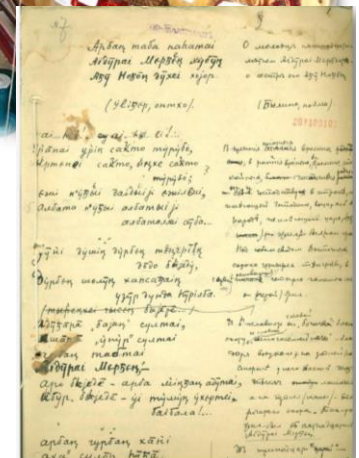
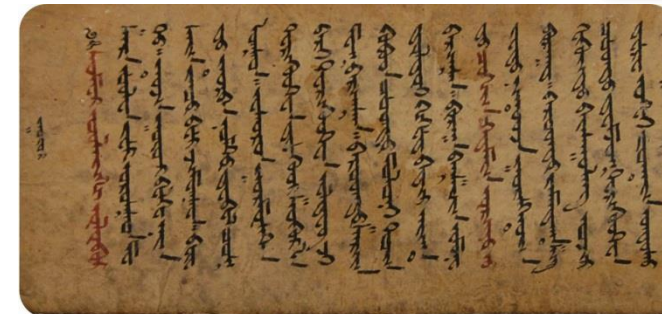
- Institute of Mathematics and Digital Technology
- Institute of Archaeology
- Institute of Botanic Garden
- Institute of Paleontology
- Institute of Geology
- Institute of History and Ethnology
- Institute of Philosophy
- Institute of International Affairs
- Institute of Physics and Technology
- Institute of Geography and Geoecology
- Institute of Astronomy and Geophysics
- Institute of Chemistry and Chemical Technology
- Institute of Biology
- Institute of Language and Literature

Data type of MAS



Language & literature archives

- Tibetan manuscripts- 6889
- Sutras-1150
- Hand written reports of field study - 450
- Epics - 109
- Legends - 345
- Fairy tales - 1352
- Songs - 1165
- Benedictions - 166
- Praise songs - 147
- Monologues and recollections - 116



History archive

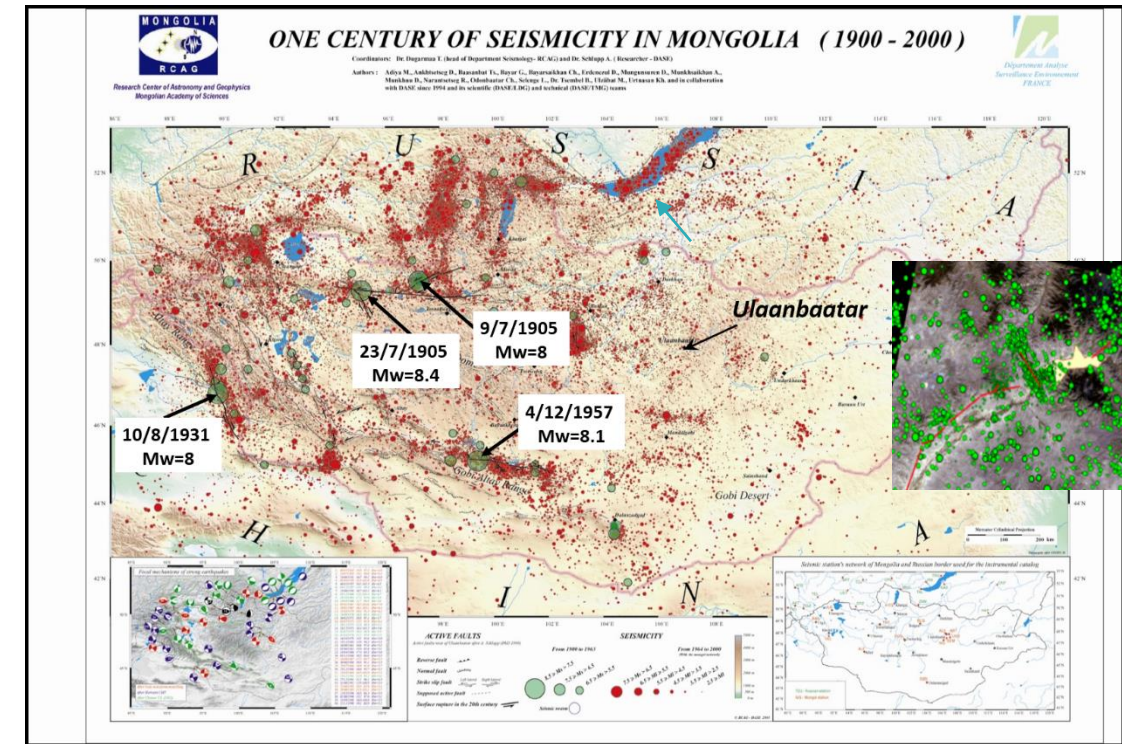
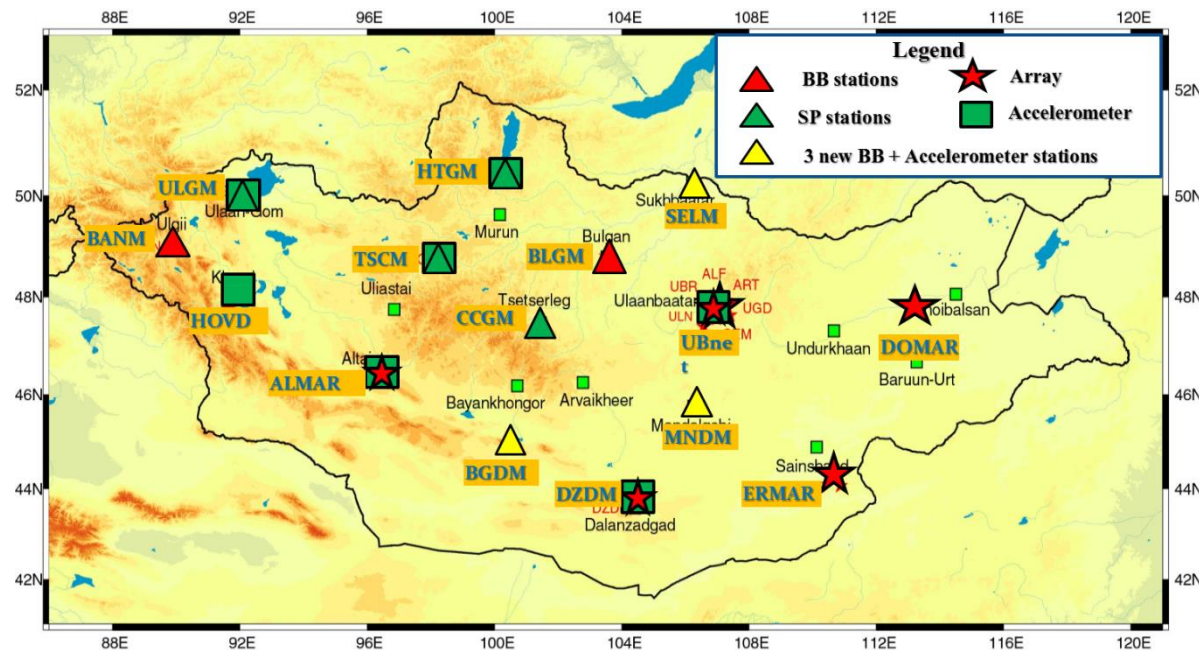
22.000 objects belonging to the cultural and household culture area of Mongolia and Central Asia.

55.000 filing cards, including photographs, descriptions and data of the museums



Natural resource

The seismic station network of Mongolian territory





Botany & Biology

There are about 10,000 scientific base documents,

catalog including description of 7,800 species of insects,
catalog of habitat description of 9,000 insects,
-- 4,000 stuff models of 4,000 birds.

Mongolian state fund and private herbarium collections possess 75,000 perennial, 3,500 vegetation species of swamp areas, 10,000 weed plants, 10,000 moss plants and 2,500 fungus species.
~600 traditional songs and other folklore, ~300 art works, 20 sculptures and more than 40 kinds of instruments.

Database of Mongolian Flora

1. Database of Mongolian flora

(currently to belong to the 134 families, 683 genus and about 3100 species of the vascular plants)

2. Database of Herbarium (UBA) of the institute of Botany, MAS

- Database of collections of Algae (4500 sheets)
- Database of collections of Fungi (4000 sheets)
- Database of collections of Lichens (14500 sheets)
- Database of collections of Mosses (19500 sheets)
- Database of collections of Vascular plants (81000 sheets)
- Database of Seed collections (1220 examples)

Total: 123500 specimens collections in Herbarium (UBA)



MERIT knowledge portal





Institute of geography & geoecology





Institute of Mathematics and Digital Technology

Main areas of research

I. Research and Development of Digital Technology

1. Artificial Intelligence and Machine Learning
2. Data Science
3. Software Development

II. Research of Theoretical and Applied Mathematics

1. Theoretical Mathematics
2. Computational Mathematics
3. Mathematical Models and Simulations
4. Optimization and Optimal Control

Artificial intelligence and machine learning laboratory:

High Capacity / Dell Vostro 5090 Intel (R)Core (TM)
9-9900K @ 3.60GHz, 16 cores 32GB 2666MHz, 500GB
SSD + 2TB HDD, 1Gbps / s Nvidia RTX 2070 8GB
(2304 CUDA cores) / five computers.



Center for Digital Cultural Heritage

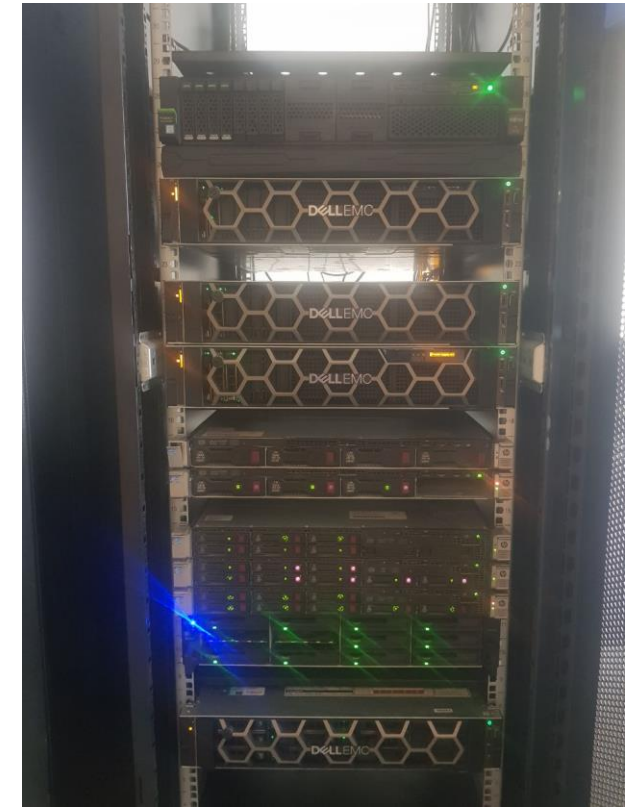
CANON EOS5D Mark II digital camera and Epson Expression 10000XL using an A3 scanner High quality printed books and ancient scriptures level can be quickly digitized. In 2021, Einscan SE 3D scanner was purchased and the equipment was added to the Cultural Heritage Digitization Center.



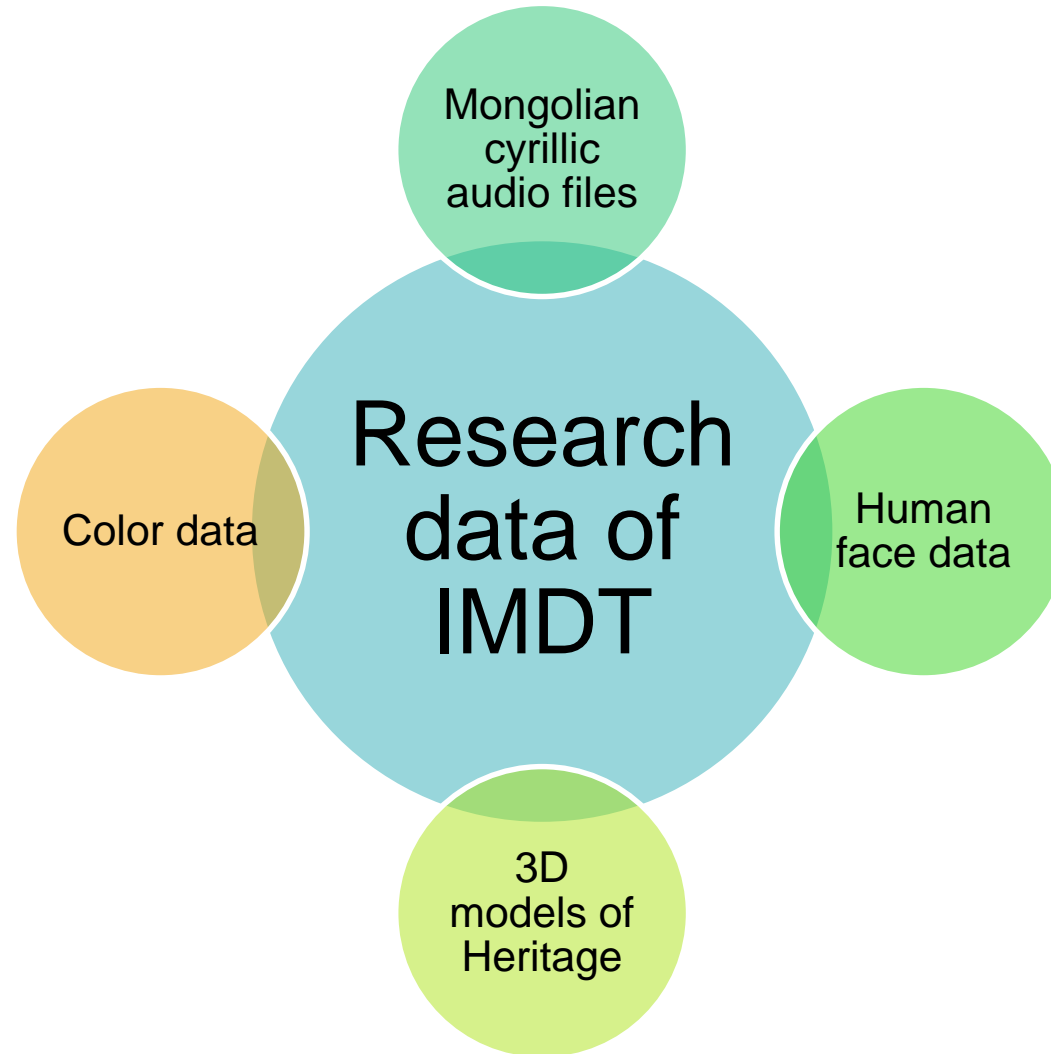


Computing center of IMDT

№	Бренд, модель	CPU	RAM	Storage	Network i nterface	GPU
1	Fujitsu	Intel(R) Xeon(R) Gold 6130 CPU @ 2.10GHz 64 cores	192GB 2666MH z	Micron 5200 2TB SSD	1Gbp/s	Nvidia Tesla V10 0 32GB (5120 C UDA cores)
2	Dell R740	Intel(R) Xeon(R) Gold 6240 R CPU @ 2.40GHz 96 core s	320GB 2666MH z	1.5TB SSD	1Gbp/s	-
3	Dell R740	Intel(R) Xeon(R) Gold 6240 R CPU @ 2.40GHz 96 core s	320GB 2666MH z	1.5TB SSD	1Gbp/s	-



Data of IMDT



Color science project



Color measurement equipments

Sentera Double 4k Multispectral Sensor

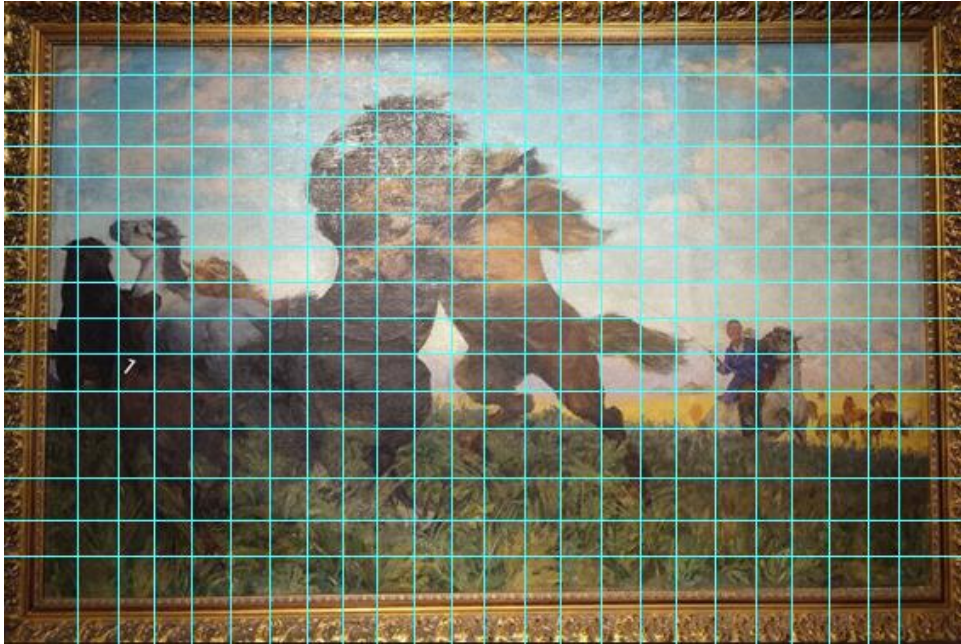



X-rite i1 Pro Colorimeter



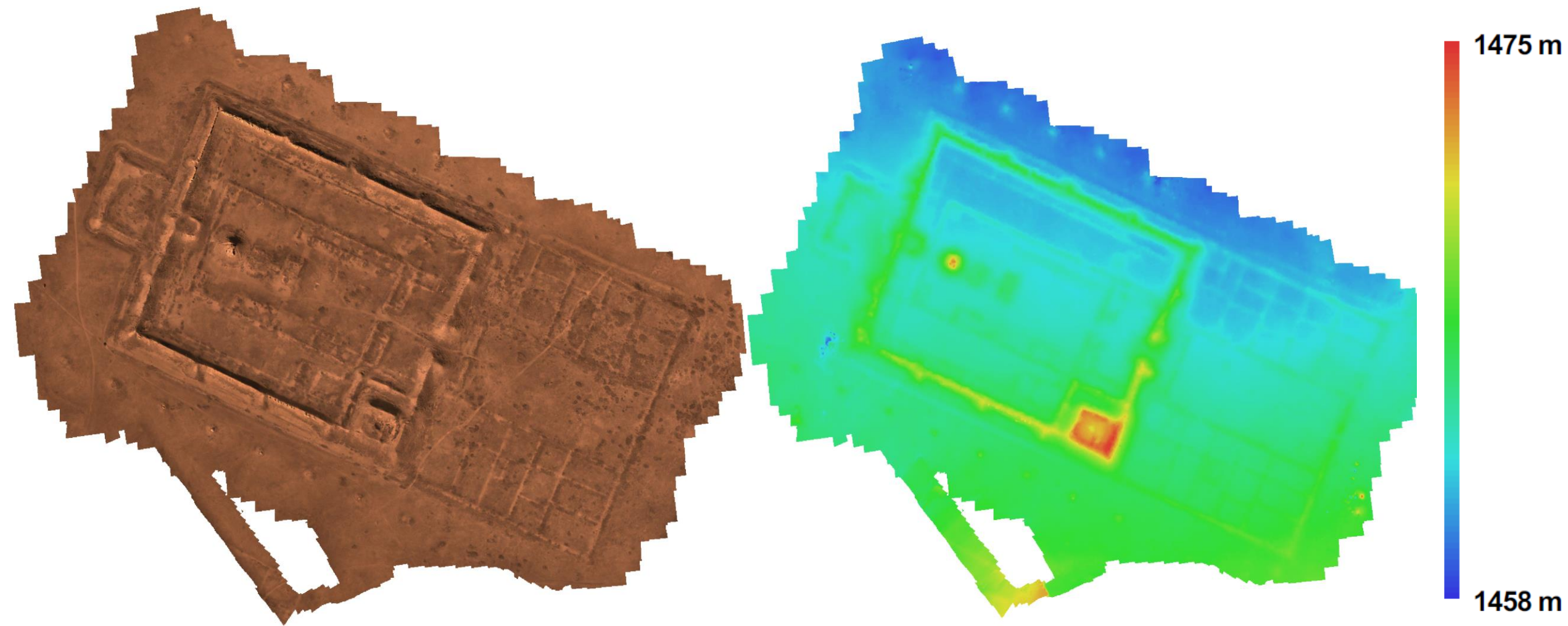


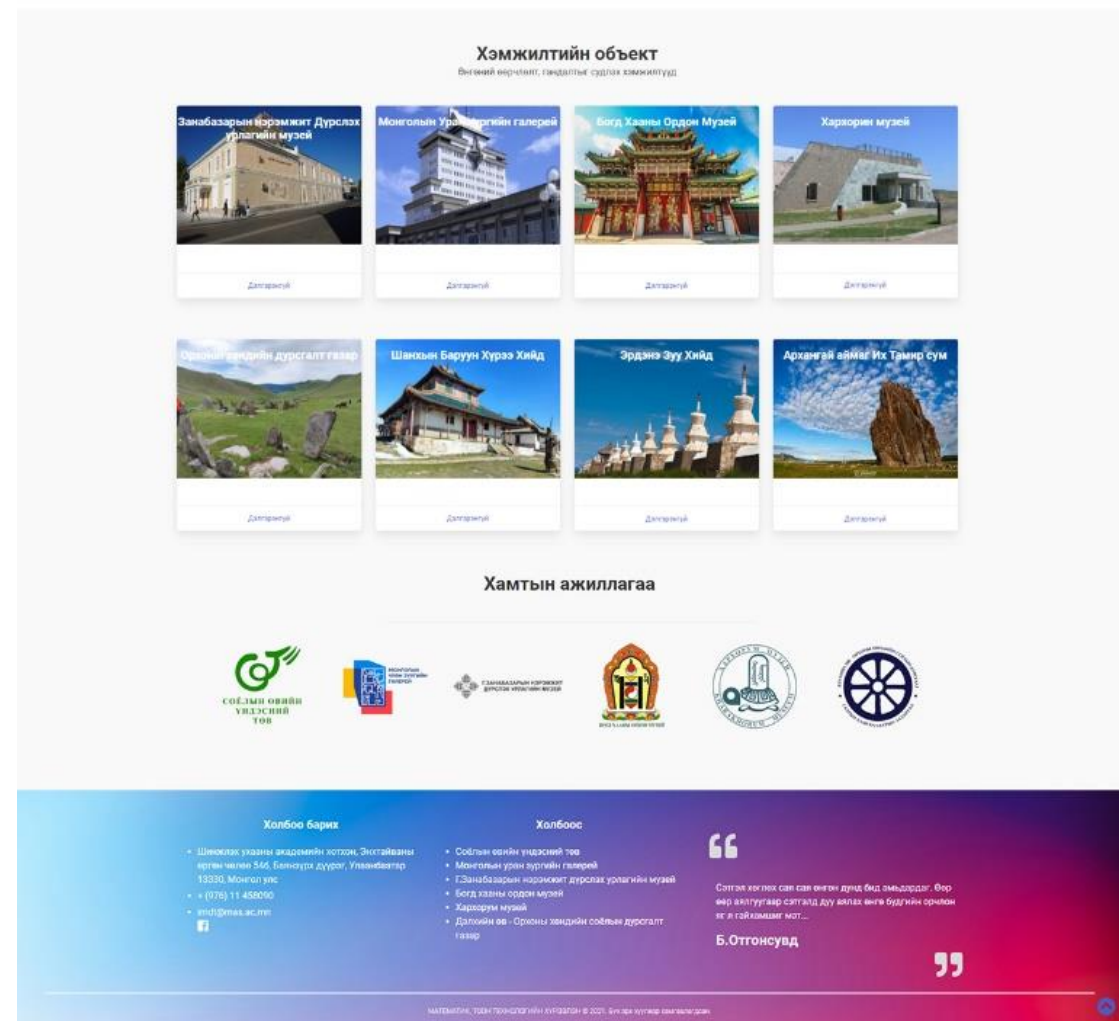
Color measurement data of Heritage



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
1	SAMPLE_I	SAMPLE_F	XYZ_X	XYZ_Y	XYZ_Z	LAB_L	LAB_A	LAB_B	LAB_C	LAB_H	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL	SPECTRAL
2	1 B1	9.581349	10.64499	4.301331	38.976	-5.377	20.078	20.786	105	3.8942	3.8667	3.9041	4.1657	4.3771	4.7017	5.0583	5.5043	6.0354	6.7324	7.5884	8.6837	10.0828	11.3666	12.0957	12.1817	11.7988	11.3629	15.512	
3	2 B2	13.41121	15.27843	7.501803	46.013	-8.24	16.993	18.885	115.9	5.8266	6.0235	6.3697	6.8373	7.4445	8.1558	9.0533	10.0603	11.0669	12.1374	13.2659	14.535	15.7971	16.6423	16.9501	16.8277	16.3702	15.9501	15.512	
4	3 B3	11.33897	11.36384	5.076852	40.187	2.779	17.921	18.136	81.2	4.8209	4.896	4.9822	5.1717	5.4186	5.7271	6.1149	6.5381	6.9599	7.4271	7.9786	8.6762	9.4923	10.2175	10.8567	11.4081	11.8449	12.3197	12.684	
5	4 B4	13.47607	14.14232	6.013662	44.436	-1.026	20.664	20.689	92.8	5.6044	5.807	5.9359	6.1193	6.434	6.7662	7.1465	7.5821	8.1293	8.8252	9.7731	11.0508	12.4919	13.6482	14.4559	15.0093	15.3204	15.5008	15.482	
6	5 B5	9.241113	10.38232	5.004731	38.52	-6.186	15.424	16.618	111.9	4.3686	4.5476	4.7118	4.9137	5.2126	5.5305	5.9798	6.4982	7.0072	7.6305	8.3691	9.2853	10.3836	11.3244	11.7878	11.7436	11.3243	10.8231	10.325	
7	6 B6	7.959057	8.390063	4.06884	34.782	-1.188	14.219	14.268	94.8	4.2859	4.3949	4.4545	4.5078	4.6519	4.7599	4.8677	4.9574	5.1259	5.4119	5.8419	6.4419	7.3015	8.1916	8.9314	9.3393	9.4082	9.2163	8.882	
8	7 B7	6.261089	6.531274	2.873195	30.715	-0.391	15.237	15.242	91.5	2.5185	2.5931	2.6813	2.8163	2.9596	3.2067	3.4768	3.7702	4.0636	4.3323	4.6562	5.0989	5.5645	6.0288	6.5248	6.9847	7.2095	7.2888	7.237	
9	8 B8	12.2367	13.13038	6.330619	42.959	-2.87	16.674	16.919	99.8	5.1276	5.366	5.6734	6.0395	6.5634	7.0899	7.7232	8.3677	8.9429	9.5997	10.3711	11.343	12.4288	13.2833	13.8226	14.012	13.9289	13.8565	13.758	
10	9 B9	10.37107	10.63421	4.449938	38.957	0.899	19.196	19.217	87.3	3.9629	4.1303	4.1493	4.2897	4.5609	4.874	5.3326	5.8069	6.3371	6.9217	7.5438	8.2588	9.0806	9.8276	10.461	10.9528	11.2763	11.5872	11.789	
11	10 B10	15.78164	16.12345	6.969371	47.136	1.363	21.109	21.153	86.3	5.588	5.7462	6.0579	6.4862	7.0321	7.6718	8.4888	9.3023	10.1016	10.9305	11.8348	12.8739	13.9861	14.9327	15.7581	16.3903	16.8084	17.2678	17.600	
12	11 B11	9.315251	10.15221	4.6331	38.114	-3.826	16.719	17.151	102.9	4.1862	4.2856	4.4145	4.6006	4.8607	5.1963	5.5372	5.9394	6.4221	7.0026	7.6504	8.4408	9.3161	10.1053	10.7412	11.1136	11.2426	11.2595	11.034	
13	12 B12	7.864852	8.727354	4.4064	35.454	-4.945	13.402	14.285	110.3	3.8497	3.961	4.1429	4.3434	4.6193	4.9689	5.3556	5.7106	6.1055	6.5689	7.1428	7.8506	8.5801	9.1756	9.5526	9.6772	9.54	9.2918	8.933	
14	13 B13	13.0528	13.37373	5.211431	43.321	1.036	22.634	22.658	87.4	4.2177	4.3757	4.5495	4.7988	5.2322	5.7366	6.3138	6.8985	7.5023	8.1648	8.947	9.9122	11.0482	12.1665	13.1923	14.0137	14.5435	14.8823	14.916	
15	14 B14	9.466816	11.51909	5.671305	40.441	-12.619	15.392	19.904	129.3	4.6433	4.7672	4.9557	5.1816	5.5139	5.9874	6.6129	7.4949	8.5267	9.636	10.7941	11.9382	12.9627	13.5332	13.5872	13.2621	12.6457	11.9179	11.095	
16	15 B15	9.300503	10.44522	4.980771	38.63	-6.17	15.739	16.905	111.4	4.4186	4.5125	4.6405	4.869	5.1264	5.4687	5.9236	6.4499	7.0744	7.7632	8.5537	9.4472	10.3796	11.0739	11.4255	11.5231	11.4227	11.2276	10.837	
17	16 B16	8.383149	9.342078	4.274114	36.635	-5.372	16.2	17.067	108.3	3.8994	4.0171	4.0537	4.1914	4.4084	4.6804	5.052	5.5217	6.052	6.6716	7.3425	8.1055	8.9087	9.5598	10.0526	10.3641	10.4211	10.3178	10.007	
18	17 B17	10.42561	11.17343	5.142413	39.871	-2.623	17.039	17.24	98.8	4.621	4.6952	4.7977	4.9167	5.2014	5.586	6.1047	6.7647	7.464	8.1985	8.946	9.707	10.4344	10.9994	11.479	11.819	11.9526	12.0007	11.90	
19	18 B18	8.639803	9.138383	4.059561	36.249	-1.473	16.804	16.868	95	3.794	3.9099	4.009	4.1245	4.3453	4.6039	4.874	5.1827	5.5149	5.8857	6.405	7.0409	7.8504	8.6603	9.3981	9.9644	10.2336	10.2735	10.091	
20	19 B19	9.875718	10.51469	4.973457	38.751	-2.058	15.985	16.117	97.3	4.3472	4.4317	4.4908	4.7504	5.07	5.5036	6.001	6.5508	7.1508	7.7745	8.4027	9.0847	9.7692	10.3036	10.7324	11.0438	11.2001	11.2597	11.198	
21	20 B20	8.483436	9.726158	4.960086	37.346	-7.56	13.634	15.59	119	4.6394	4.8824	4.9938	5.1411	5.3473	5.5862	5.8884	6.241	6.6879	7.2597	7.9248	8.8207	10.0988	11.2461	11.6696	11.3684	10.6156	9.8087	9.086	
22	21 B21	10.18296	11.86539	5.496656	41.001	-9.358	17.207	19.587	118.5	4.2306	4.3082	4.5618	4.8752	5.2801	5.8146	6.5461	7.3745	8.3048	9.2878	10.3143	11.4391	12.6245	13.4024	13.6259	13.3588	12.7882	12.2432	11.735	
23	22 B22	9.361236	9.43741	4.606925	36.813	2.159	14.62	14.779	81.6	4.4405	4.5662	4.8636	4.8425	5.0929	5.3548	5.6097	5.8477	6.0925	6.3817	6.7678	7.2572	7.8621	8.4713	9.0906	9.6426	10.0427	10.3705	10.50	
24	23 B23	7.552272	7.912607	4.097823	33.8	-0.728	12.352	12.373	93.4	4.0825	4.2319	4.3203	4.4245	4.5922	4.7532	4.9275	5.1235	5.3448	5.6358	6.0037	6.4894	7.1233	7.7647	8.2275	8.4988	8.5455	8.4628	8.275	
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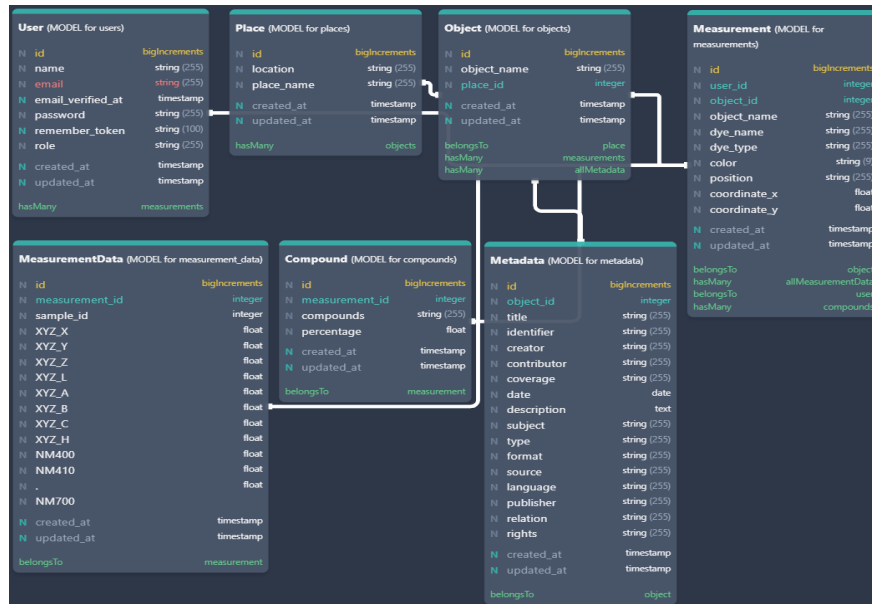
Color measurement data of Heritage







Color database of Heritage



Хүнийг сахиу

Г.Замбаатарын Нарангид Дурсгал Урлагийн Музей | Монголын Уран Зургийн Галерей | Богд Хаань Ордон Музей | Хархирум Музей | Орсонь Хонгорин Дурсгалт Газар | Шанхуйн Багшын Хурал Хийд | Урдань Зуу Хийд | Архангай Аймаг Их Төвний Сум

Объектийг нэр | Хэргийг нэр | Хэргийг нэр | Хэргийг нэр

N	Хэргийн нэр	Объектийг нэр	Өнгө	Хэргийн нэр	Хэргийн нэр	Хэргийн нэр	Хэргийн нэр
1	Замбаатарын Нарангид Дурсгал Урлагийн Музей	Монголын Уран Зургийн Галерей	Өнгө 1 урлагийн музей	Төв	15	42	+
			Өнгө 1 нэгдсэн	Байгууллагын дотор	20	14	+
			Өнгө 2 урлагийн музей	Төв	15	42	+
			Өнгө 3 нэгдсэн	Байгууллагын дотор	13	20	+
2	Замбаатарын Нарангид Дурсгал Урлагийн Музей	"Сүхбаатарын урлагийн музей" Төвний Төвний	Өнгө 4 нэгдсэн	Байгууллагын дотор	50	60	+
			Өнгө 5 нэгдсэн	Байгууллагын дотор	62	81	+
			Өнгө 6 урлагийн музей	Байгууллагын дотор	23	51	+
			Өнгө 1 нэгдсэн	Байгууллагын дотор	39	14	+
			Өнгө 2 нэгдсэн	Байгууллагын дотор	60	46.5	+
			Өнгө 3 урлагийн музей	Байгууллагын дотор	38	62.5	+
			Өнгө 1 нэгдсэн	Байгууллагын дотор	7	10	+
			Өнгө 2 урлагийн музей	Байгууллагын дотор	11	13	+
			Өнгө 3 нэгдсэн	Байгууллагын дотор	37	12	+

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colordata

Хэрэглэгчийн нэр

Хэрэглэгчийн нэр

Нууц үг

Нууц үг

НЭВЭРХ

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Methods and results for the study of cultural heritage data

- Color analysis and environmental risk assessment of immovable cultural monuments using multispectral technology
- Color analysis and perspective prediction of historical and cultural monuments
- Methods for recognizing paintings and building color distribution models for paintings
- Using color data in color quality analysis

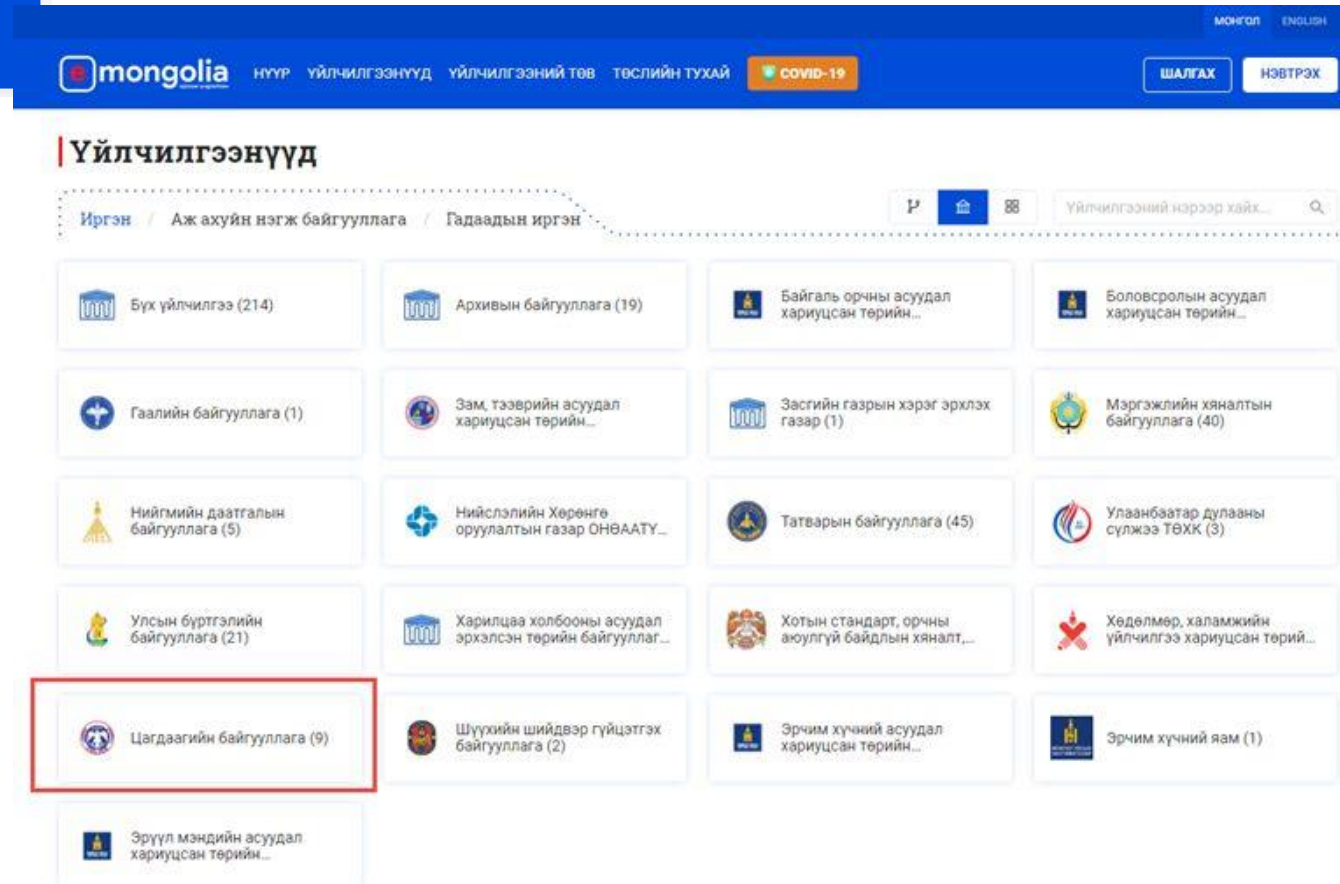
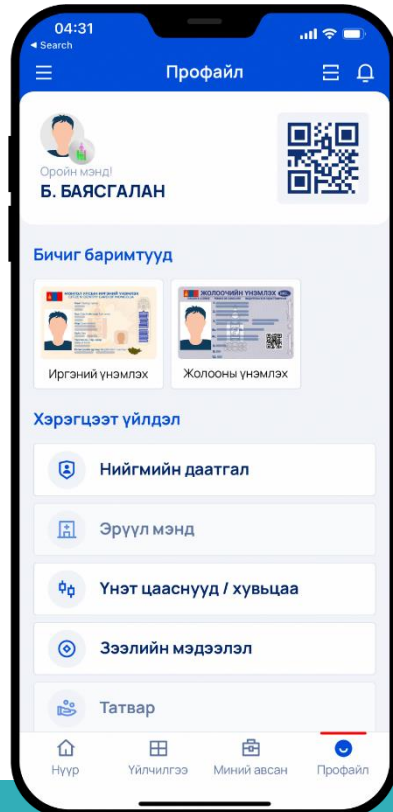


E MONGOLIA

1,934,723+
USERS

500+
ONLINE
SERVICES

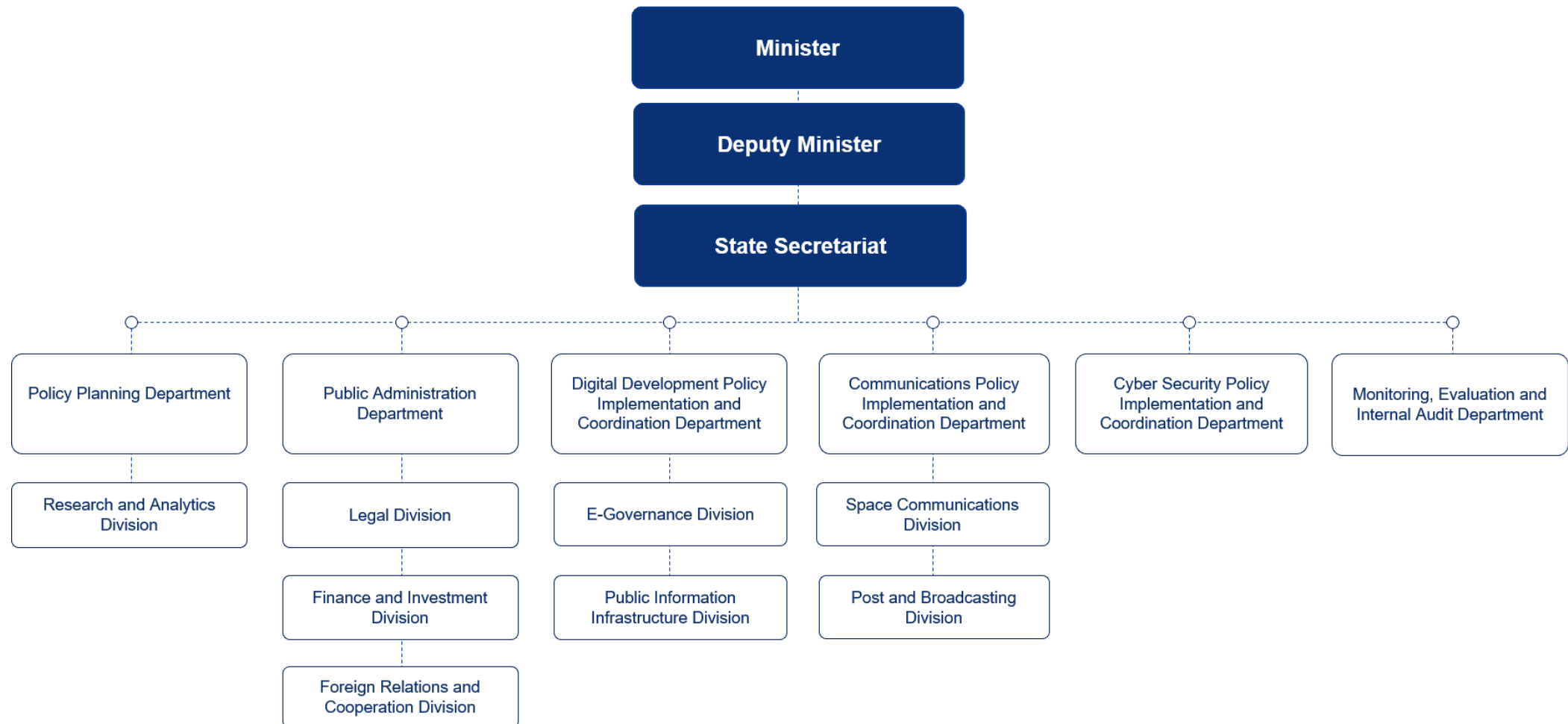
6,145,809+
TOTAL RECEIVED
SERVICES





Ministry of digital development and communications

Organizational Structure of the Ministry





MDDC & IMDT cooperation

- Develop an open data policy
- To support human resource development and training of data analysts and artificial intelligence specialists
- Research and development for Internet of Things
- Improving skills and use of information technology of public
- Use of advanced techniques and technologies in e-government transition

“Thank you for you attention”



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