



www.GeothermalData.org

**National Geothermal Data System
Architecture Design, Testing and
Maintenance**

May 18, 2010

Principal Investigator
Walter S. Snyder
Boise State University

National Geothermal Data System

Overview

- **Timeline**

- Sept 1, 2009 – August 31, 2014
- Completion to date: 10%

- **Budget**

- DOE: \$5,000,000; Awardee: \$0
- Funding received FY09: \$2,569,253
- Funding received FY10: \$0

- **Barriers**

- Resource assessment and data needs, including lack of available and reliable resource and related information.

- **Partners**

- GeoHeat Center (Oregon Institute of Technology); Stanford Geothermal Program (Stanford Univ.); U.S. Geological Survey, Great Basin Center for Geothermal Energy (Univ. of Nevada, Reno); Energy & Geoscience Institute (Univ. of Utah); Arizona Geological Survey

Relevance/Impact of Research

Purpose:

To create the National Geothermal Data System (NGDS) comprised of a core and distributed network of databases and data sites that will comprise a federated system for acquisition, management, maintenance, and dissemination of geothermal and related data.

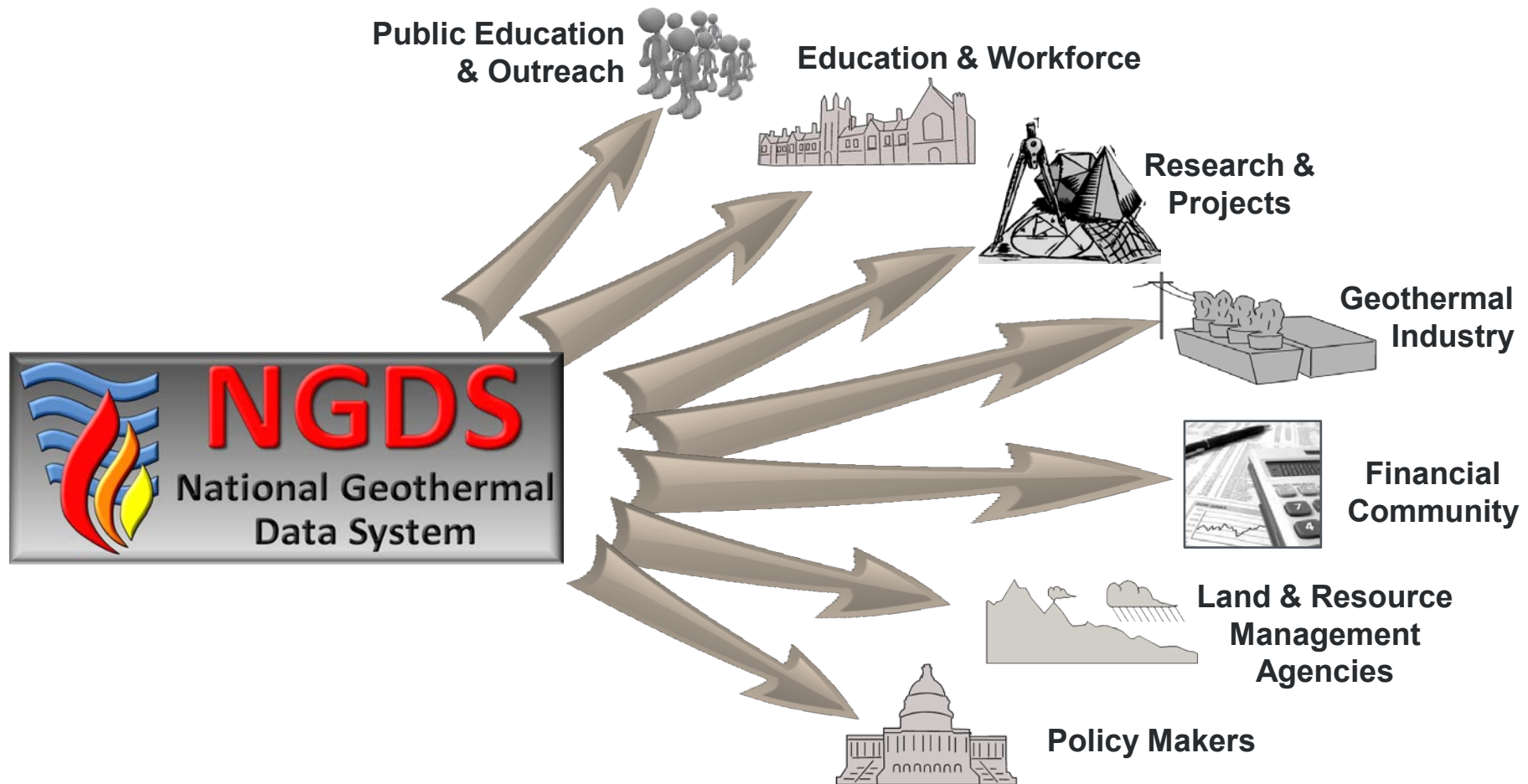
Relevance/Impact of Research

Impact – Data are the basis of knowledge and fundamental for education and decision-making; the impacts of access to reliable data (new and legacy) include:

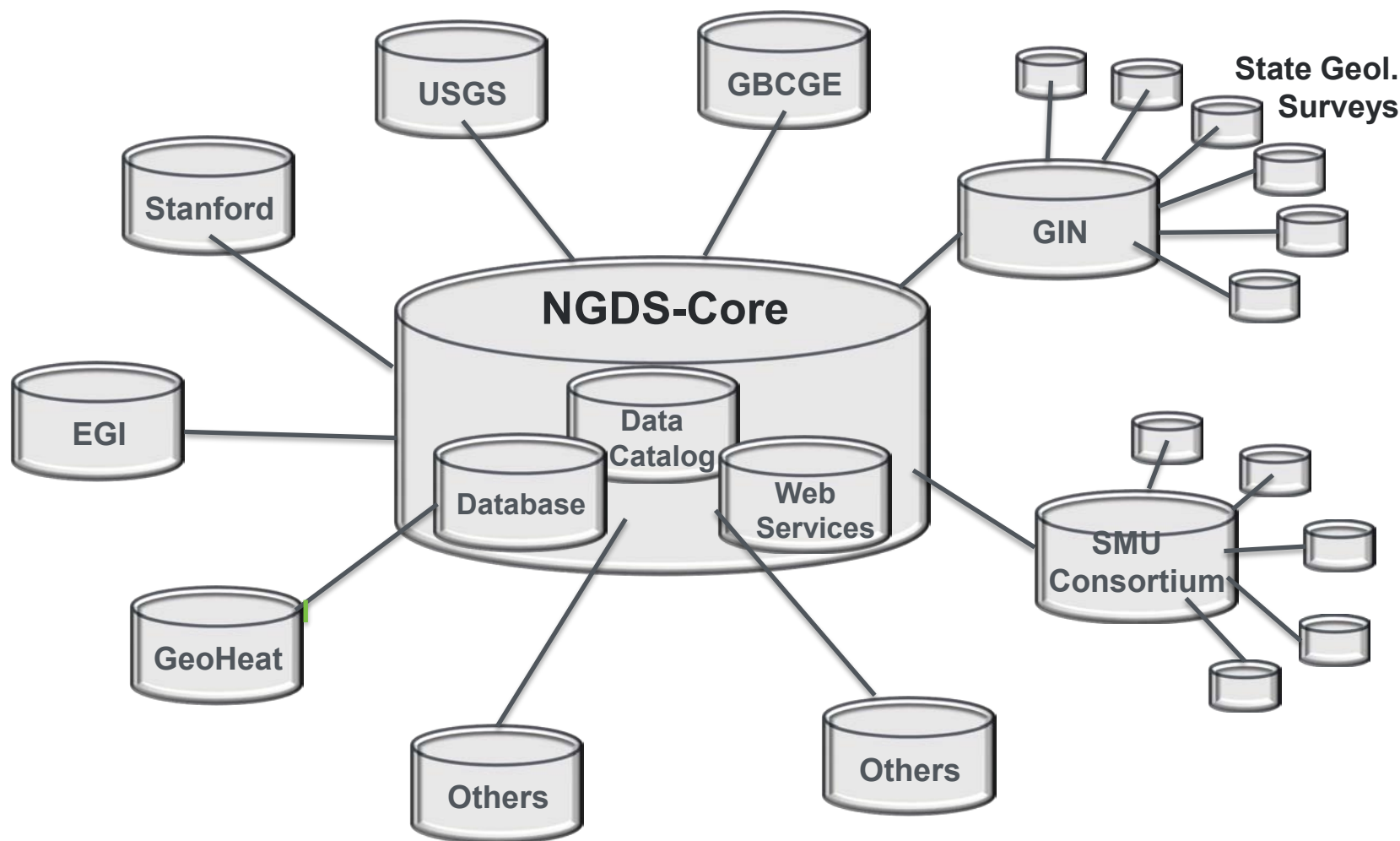
- **Reduces the upfront risk** for industry and investors associated with exploration and development of a targeted project
 - Reduces the time, costs, and risk for making a business decision to invest in the project.
 - Helps to bring more geothermal energy online
 - Facilitates use of US Geological Survey's Resource Classification System to evaluate geothermal site potential.
 - Stimulates industry growth
- Basis to educate new **workforce**
- Provides a platform to support **research and development**
- Supports more rapid approval of leases and licenses by providing **land and resource management agencies** with access to reliable information
- Supports **decision-making processes** at both state and federal level

Relevance/Impact of Research

Impact – Understand Extended User Community:



DISTRIBUTED SYSTEM – Conceptual Management Design



DATA TYPES

Data documents & products:

Include preformatted text, photos, diagrams, videos and viewable maps on subjects the user selects, views on screen and can then download.

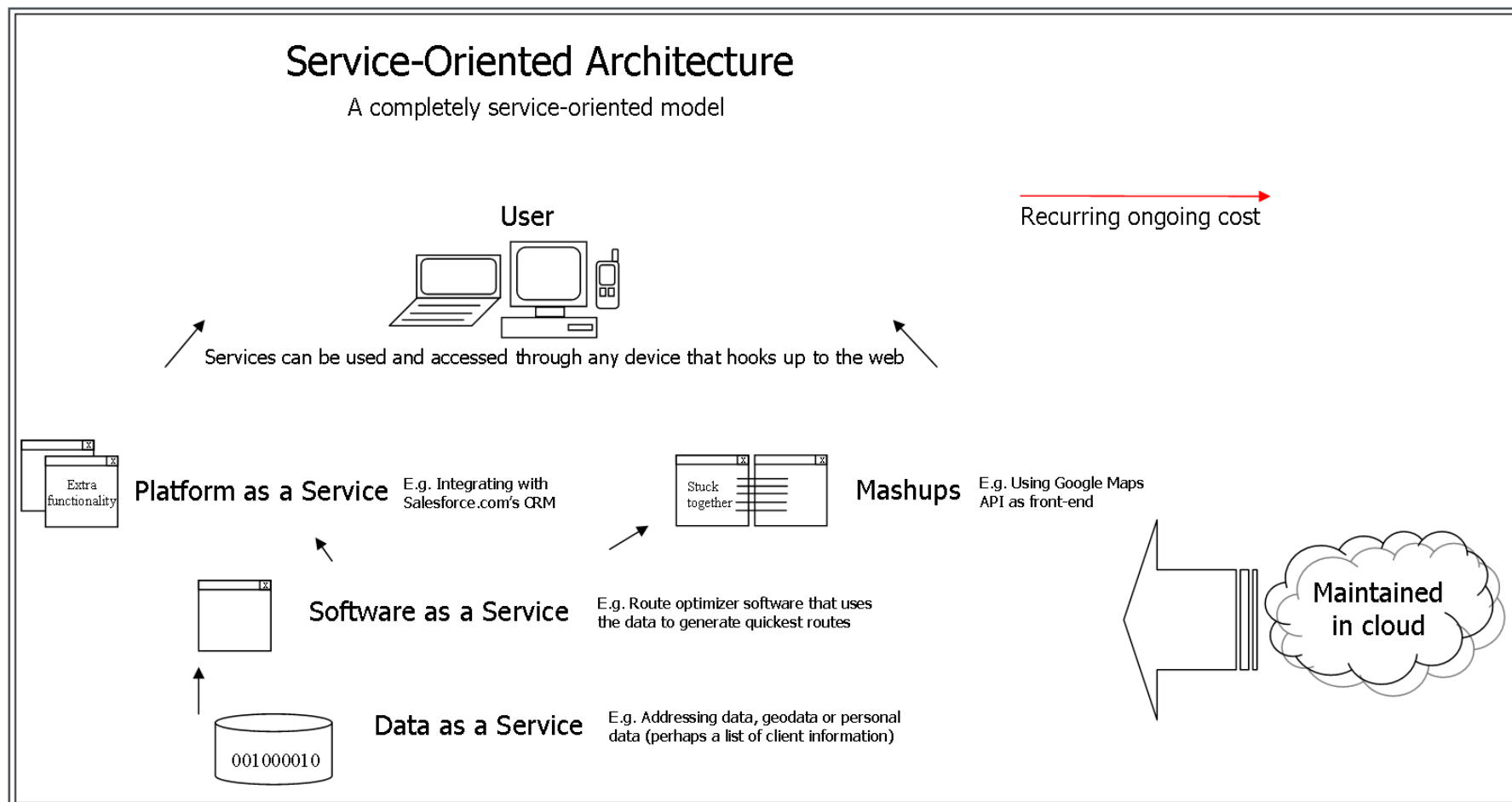
Data sets:

A type of data product where base data are provided, typically in spreadsheets, sometimes word processing tables, but with variable levels of associated metadata.

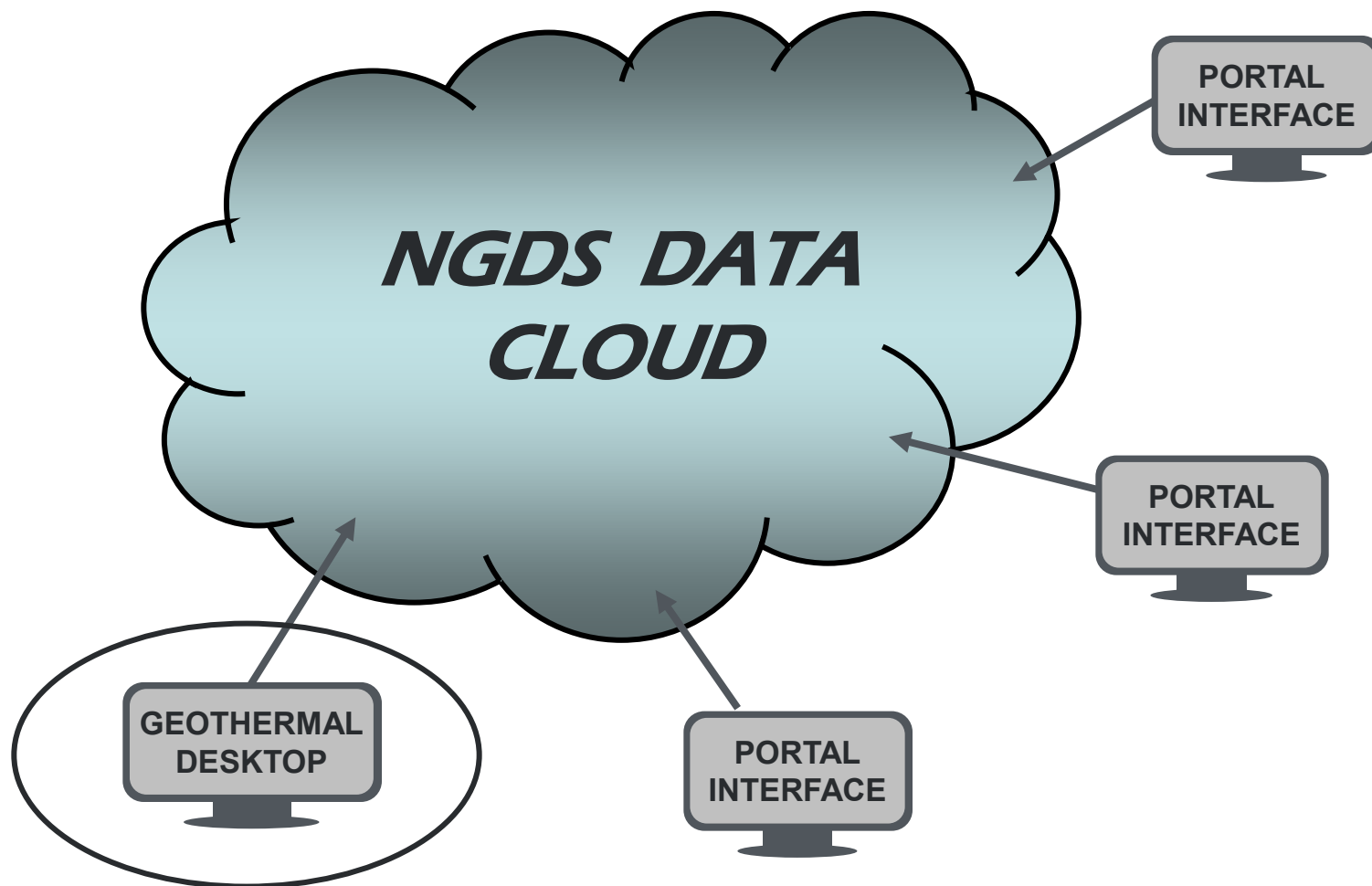
Base/raw data:

The "raw" data that populate the tables and fields of a database; these include data and the metadata that describe the data.

Web Services & Service-oriented Architecture

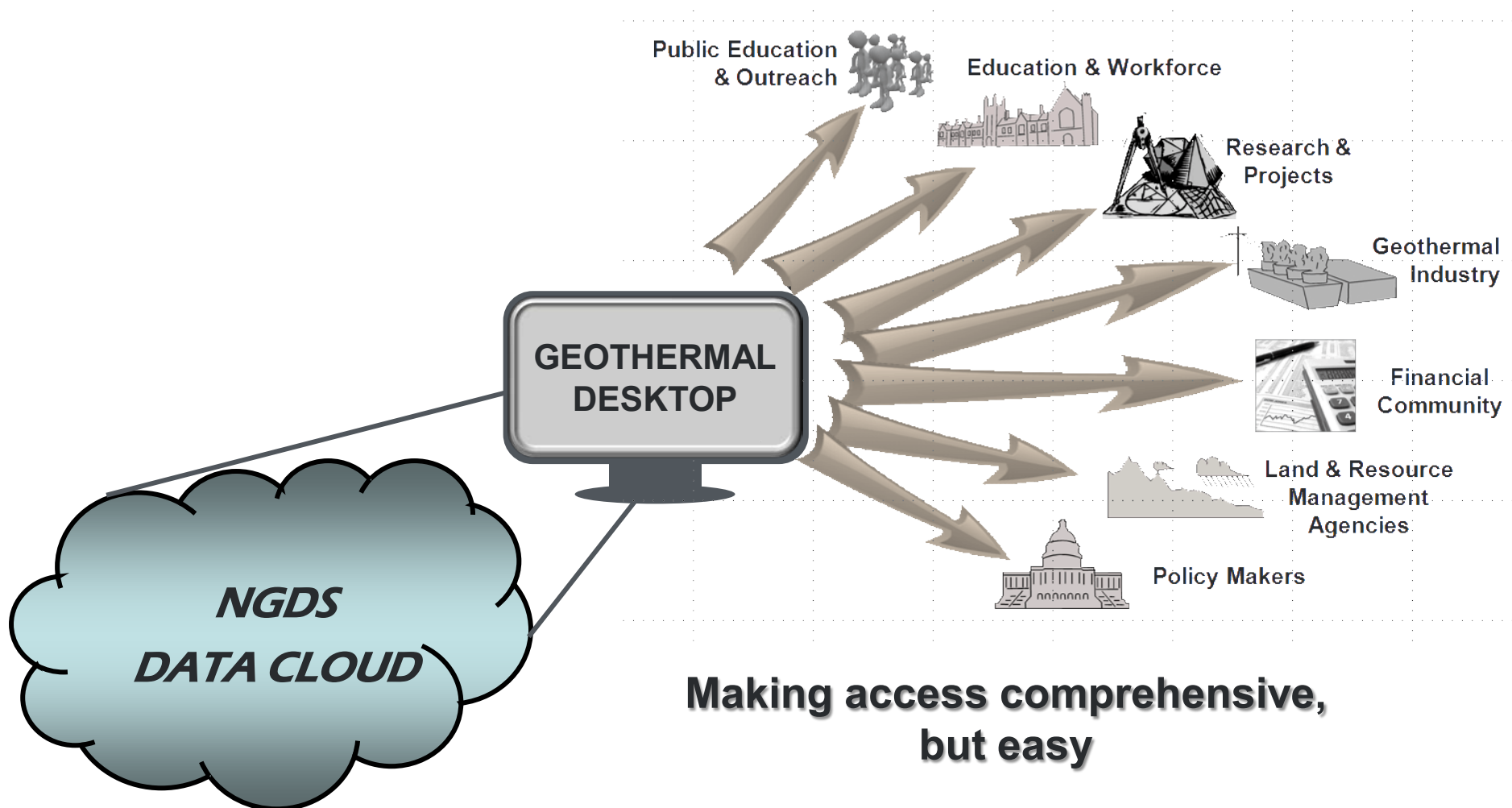


Web Services & Service-oriented Architecture



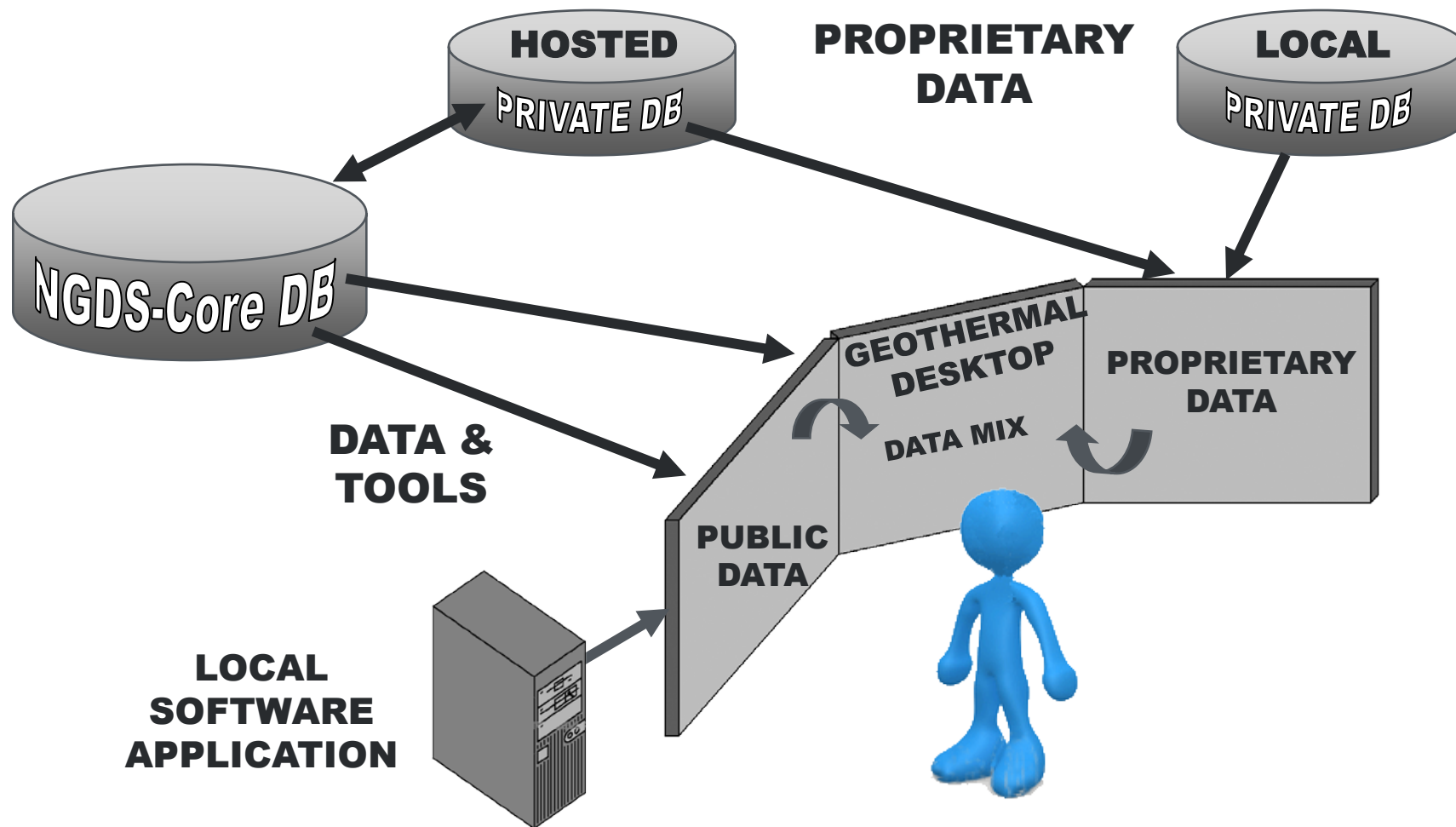
Scientific/Technical Approach

GEOHERMAL DESKTOP – ACCESS FOR THE FUTURE



Scientific/Technical Approach

GEOHERMAL DESKTOP – CUSTOM WORKING ENVIRONMENT



Accomplishments, Expected Outcomes and Progress

Data Model

- Polled NGDS partners re data types
- Examined other sources for data model (e.g., Energistics, Public Petroleum Data Management (PPDM), GeoSciML, GeoStrat, EarthChem, IRIS)
- Contacting Demonstration Project PI's to determine their needs
- Compiling and comparing approaches, data types, standards and protocols used

Data Catalog & Registry

- Prototype of a data registry and metadata catalog (GIN)
- Investigation of additional approaches (e.g., Mercury)
- Initial design for Digital Library sketched out

Geothermal Desktop

- Focus on development of the data entry and management modules
- Developed initial approach to map (GIS) views of data

Project Management/Coordination

Managing a Distributed Network

- Biweekly web-based meetings (via GoToMeeting)
- Frequent e-mail and phone contacts
- Visits to home sites of partners

Technical

- Agile approach to project management (OnTime software)

Leveraging NSF-funded projects

- **GeoStrat** funded by the Earth Science Division/Geoscience Directorate
- **Geosciences Information Network (GIN)** funded by Directorate for Computer & Information Science & Engineering

Project Management/Coordination

Budget & Spending Plan

1	Project Title:		Recovery Act: National Geothermal Data Sy											
2	Financial Assistance Recipient:		Boise State University		Note: National Laboratory spending should not be included in this table. National labs report their Estimated Future Spend Plan and Expended To Date information in the worksheet B1-Financial Data - Lab. Use separate worksheets if multiple National Laboratories are involved. Be sure to enter the name of the lab in cell C2 of the lab table.									
3	CPS #:		0											
4	CID #:		DE-EE0001120											
5	DOE Project Total:		\$ 4,992,089		Data Entry Error: The sum of the totals of Funds Expended To Date (cell K31) and Estimated Future Spending (N31) must equal the total for the Current Approve									
6	Project Spend Plan and Estimate of Future Spending (excludes National Laboratory Spending)													
7			Current Approved Spend Plan			Obligated	Funds Expended to Date			Estimated Future Spend Plan			DOE EFSP	
8	Period (by Federal Fiscal Year)		DOE Amount	Cost Share	Total	DOE Amount	DOE Amount	Cost Share	Total	DOE Amount	Cost Share	Total	By Fiscal Year	
9		From To												
10	Prior to FY10		4,992,089	0	4,992,089	2,569,253	2,420		2,420	2,420		2,420		
11	FY10 - Qtr 1				0		141,299		141,299	141,299		141,299		
12	FY10 - Qtr 2				0		212,814		212,814	212,814		212,814		
13	FY10 - Qtr 3				0				0	423,907		423,907		
14	FY10 - Qtr 4				0				0	423,907		423,907	\$ 1,201,926	
15	FY11 - Qtr 1				0				0	257,384		257,384		
16	FY11 - Qtr 2				0				0	257,384		257,384		
17	FY11 - Qtr 3				0				0	257,384		257,384		
18	FY11 - Qtr 4				0				0	257,384		257,384	\$ 1,029,534	
19	FY12 - Qtr 1				0				0	260,569		260,569		
20	FY12 - Qtr 2				0				0	260,569		260,569		
21	FY12 - Qtr 3				0				0	260,569		260,569		
22	FY12 - Qtr 4				0				0	260,569		260,569	\$ 1,042,276	
23	FY13 - Qtr 1				0				0	243,662		243,662		
24	FY13 - Qtr 2				0				0	243,662		243,662		
25	FY13 - Qtr 3				0				0	243,662		243,662		
26	FY13 - Qtr 4				0				0	243,662		243,662	\$ 974,649	
27	FY14 - Qtr 1				0				0	243,662		243,662		
28	FY14 - Qtr 2				0				0	243,662		243,662		
29	FY14 - Qtr 3				0				0	253,958		253,958		
30	FY14 - Qtr 4				0				0	0		0	\$ 741,283	
31	Totals		\$ 4,992,089	\$ -	\$ 4,992,089	\$ 2,569,253	\$ 356,533	\$ -	\$ 356,533	\$ 4,992,088	\$ -	\$ 4,992,088	\$ 4,248,385	
32														

Budget & Spending Plan

eere.energy.gov

Project Management/Coordination

Budget & Spending Plan

AJ35																	
	A	B	C	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
15	Number of Task, Subtask, Milestone, Deliverable per project SOPO			Title - Tasks, Subtasks, Milestones, Deliverables including Go No/Go Decision Pts										For milestones provide type			
16	PHASE I																
17	Task 1.0			Data System													
18	Subtask 1.1			System Conceptual Design													
19	Task 2.0			Data Sharing and Web Services													
20	Subtask 2.1			Data Catalog and Procedures for Data													
21	Task 3.0			Geothermal Desktop													
22	Subtask 3.1			Beta										A - ARRA Milestone			
23	Task 4.0			Standards, Protocols and Security													
24	Subtask 4.1			Plan of Design													
25	Task 5.0			Classification Systems													
26	Subtask 5.1			Geothermal Resource Classification													
27	Subtask 5.2			Financial Risk Classification System													
28	Task 6.0			Management Plan													
29	Subtask 6.1			Development and Testing of a Project													
30	Task 7.0			Sustainability Plan													
31	Subtask 7.1			Design of a Sustainability Plan													
32	Task 8.0			Data Acquisition Plan. ARRA Milestone: Complete draft acquisition plan										A - ARRA Milestone			
33	Task 10.0			Data Acquisition by Source or Type of Data													
34	Subtasks 10.1 to 10.9			Data Acquisition by Source or Type of Data													
35	Task 11.0			Community Interaction and Relationship													
36	Subtask 11.1			Industry Workshops													
37	Subtask 11.2			Booths and Workshops At Professional													
38	Subtask 11.3			International Relationships													
39	Task 12.0			Project Management and Reporting.										GN - Go No/Go Decision			
40	PHASE II																
41	Task 1.0			Data System													
42	Subtask 1.2			System Prototype										A - ARRA Milestone			
43	Subtask 1.3			System Testing & Adjusting													

AJ35																	
	BF	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	Mark as Proper			
15	int	Original (baseline)			Approved Updated Budget			Actual (Amount spent to date per task)			Comments						
16																	
17		\$164,757						\$65,500									
18																	
19		\$127,468						\$15,000									
20																	
21		\$110,902						\$48,000									
22																	
23		\$36,721						\$12,852									
24																	
25		\$50,387						\$12,597									
26																	
27																	
28		\$17,589						\$7,915									
29																	
30		\$17,589						\$7,035									
31																	
32	n	\$144,577						\$65,711									
33		\$458,162						\$101,000									
34																	
35		\$36,846						\$18,423									
36																	
37																	
38																	
39		\$39,350						\$2,500									
40																	
41																	
42																	
43																	

Project Management/Coordination

Budget & Spending Plan

	F4								
	A	B	C	D	E	F	G	H	I
1	FY10-14 Monthly Spend Plan								
2	Project Title:	National Geothermal Data System							
3	Awardee:	Boise State University							
4	Award #:	09EE0001120							
5									
6	Total DOE Obligation:	\$4,992,089			Plan numbers should not be updated retroactively.				
7	Recipient Cost Share:				Plan numbers for future months may be updated.				
8	Total Project Cost:	\$4,992,089							
9									
10									
11		DOE			COST SHARE		VARIANCE		
12		Phase	Plan	Actual	Plan	Actual	DOE	Cost Share	
13	Sep-10	1	\$0	\$2,420					
14	Oct-09	1	\$100,362	\$18,031			\$82,332	\$0	
15	Nov-09	1	\$100,362	\$30,925			\$69,438	\$0	
16	Dec-09	1	\$100,362	\$34,868			\$65,495	\$0	
17	Jan-10	1	\$100,362	\$14,201			\$86,161	\$0	
18	Feb-10	1	\$100,362	\$36,056			\$64,306	\$0	
19	Mar-10	1	\$100,362	\$214,428			-\$114,066	\$0	
20	Apr-10	1	\$100,362				\$100,362	\$0	
21	May-10	1	\$100,362				\$100,362	\$0	
22	Jun-10	1	\$100,362				\$100,362	\$0	
23	Jul-10	1	\$93,696				\$93,696	\$0	
24	Aug-10	1	\$93,696				\$93,696	\$0	
25	Sep-10	1	\$93,696				\$93,696	\$0	
26	Oct-10	2	\$85,795				\$85,795	\$0	
27	Nov-10	2	\$85,795				\$85,795	\$0	
28	Dec-10	2	\$85,795				\$85,795	\$0	
29	Jan-11	2	\$85,795				\$85,795	\$0	
30	Feb-11	2	\$85,795				\$85,795	\$0	
31	Mar-11	2	\$85,795				\$85,795	\$0	
32	Apr-11	2	\$85,795				\$85,795	\$0	
33	May-11	2	\$85,795				\$85,795	\$0	
34	Jun-11	2	\$85,795				\$85,795	\$0	
35	Jul-11	2	\$85,795				\$85,795	\$0	
36	Aug-11	2	\$85,795				\$85,795	\$0	

Project Management/Coordination

Schedule

	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	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC
1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

Project Management/Coordination

			Project Phase		PHASE 1				PHASE 2			
			Calendar Year		1	2	3	4	1	2	3	4
			2009		2010				2011			
			S:O:N:D:J:F:M:A:M:J:J:A		S:O:N:D:J:F:M:A:M:J:J:A				S:O:N:D:J:F:M:A:M:J:J:A			
			Federal Fiscal Year		2010				2011			
					1	2	3	4	1	2	3	4
Project Management by Task												
Project Initiation Date: Sept. 1, 2009												
Revised: Sept. 1, 2009												
TECHNICAL												
1.0 Data System												
1.1 System Conceptual Design												
1.2 System Prototype												
1.3 System Testing & Adjusting												
2.0 Data Sharing & Web Services												
2.1 Data Catalog												
2.2 Procedures for data sharing												
2.3 Web Services Design												
2.4 Web Services Implementation												
3.0 Geothermal Desktop												
3.1 Beta Development												
3.2 Beta Testing & Version 1.0 Development												
3.3 Ver 1.0 Deployment & Vers 2.0+ Development												
4.0 Standards, Protocols & Security												
4.1 Plan												
4.2 Implementation, Maintenance & Revision												
5.0 Classification System												
5.1 Geothermal Resource Classification												
5.2 Financial Risk Classification System												
ORGANIZATIONAL / MANAGERIAL												
6.0 Management Plan												
6.1 Development & testing												
6.2 Implementation												
7.0 Sustainability Plan												
7.1 Design												
7.2 Implementation												
DATA ACQUISITION												
8.0 Data Acquisition Plan												
9.0 Data Acquisition Prioritization & Review												
10.0 Data Acquisition by Source & Type												
10.1 EGI Sample Library												
10.2 Geothermal Specific Data												
10.3 Lower Temperature & Direct Use												
10.4 Industry Data												
10.5 USGS Data												
10.6 BLM / PEIS Data												
10.7 State Geological Surveys												
10.8 Legacy Data												
10.9 Routine Data Input												
COMMUNITY												
11.0 Community Interaction and Relationships												
11.1 Industry Workshops (EGI & GBCGE)												
11.2 Booths & workshops at geothermal meetings												
11.3 International relationships												
REPORTING												
12.0 Project Management and Reporting												

Future Directions

What is being worked on now and for the rest of FY10

- Develop and deploy the **NGDS Digital Library and Catalog** for documents and datasets.
- Develop mechanisms for **web-based submission** and attribution of digital **documents** and **datasets** into the Digital Library and Data Catalog
- Develop a **plan for data acquisition and sharing**, including the approach to web services
- Deploy the **beta version of the NGDS Geothermal Desktop**
- Develop a plan for setting, adopting and adapting to various **standards and protocols** for web services, metadata, data sharing, data acquisition, etc.
- Work with the US Geological Survey and others to implement within the NGDS the **Geothermal Resource Classification System** and tools for **Financial Risk Analysis and Classification**

Summary

- **Establishing and maintaining a data system network**
 - Social-cultural-political issues more important and difficult than technical ones
 - Need to accommodate multiple approaches, philosophies and outlooks
 - **Demands flexibility** in technical, management and community issues
- **Demonstration projects**
 - Technical flexibility in working with each; requires one-on-one interaction
- **System management and design**
 - Following industry-standard approaches as mitigated by the realities of a distributed network

Summary

- **Core system must handle all classes of data**
 - Products/documents
 - Datasets
 - Raw Data
 - NGDS Partners can work with the data classes of their choice
- **Core system management and design must be designed to accommodate full range of data required to support geothermal activities**
 - Requires flexibility and extensibility be part of the design
 - NGDS Partners can accommodate data types of their choice
- Key is to design a system that can meet the **needs of a highly varied user community**

END